

building  india

Transforming the Nation's Logistics Infrastructure

July 2010

CONFIDENTIAL AND PROPRIETARY

Any use of this material without specific permission of McKinsey & Company is strictly prohibited

McKinsey & Company

Need to study logistics infrastructure

✓ Completed

Developing nation gets significantly impacted by its logistics infrastructure ...

... therefore there is a strong need to ...



Key enabler for economic growth



High, long-term, interdependent investments



Complex design and management

- Understand status quo and root causes of weaknesses of infrastructure in India



- Analyse future needs of India's logistics infrastructure



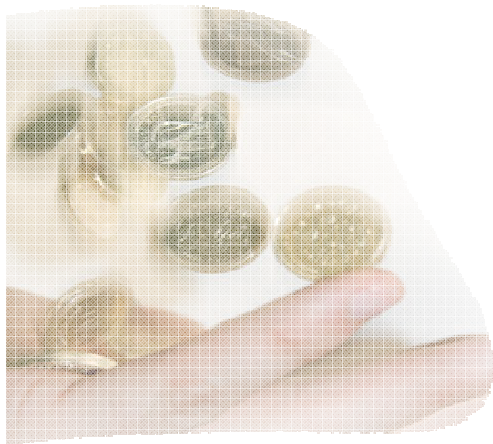
- Develop a strategy and comprehensive set of recommendations to implement strategy



Key messages

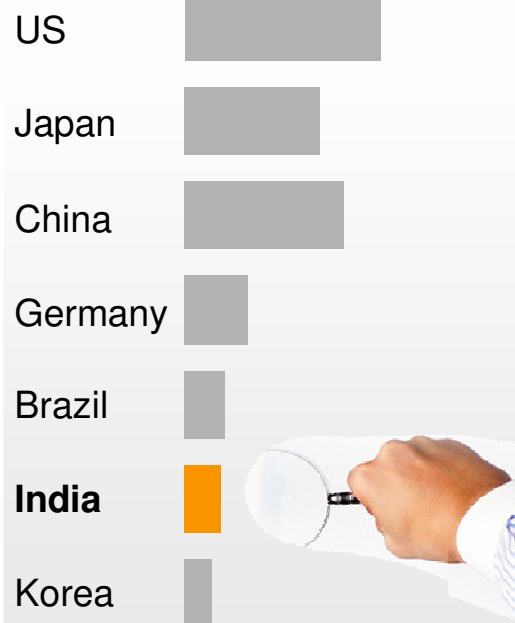
1	The nation's logistic infrastructure is in poor shape and has a poor outlook	Despite high concentration of freight flows, India's logistics infrastructure is heavily inefficient leading to annual economic losses of USD 45 billion and CO ₂ emissions 20% above optimal. Even with a sharp increase of up to USD 500 billion till 2020 in infrastructure investments, India will not be able to keep pace with an over 2.5-fold freight traffic growth over the next decade. This will result in an more unbalanced modal mix and three times higher annual economic losses in 2020
2	4 shifts will allow to transform the nation's logistics infrastructure	India has to adopt a fundamentally different approach to building its logistics infrastructure through shifts on four dimensions: Focus on key network connectors, proactive development of enablers, sweating existing assets and reallocation of investments across and within modes. The new approach will result in a balanced modal mix (46% freight on rail), reduced losses, energy consumption and pollution even without additional investments. With 40% more investment on top of the planned USD 500 billion the nation's logistics infrastructure could even be taken up to international standards by 2020
3	The transformation requires a National Integrated Logistics Policy	Achieving the four shifts will require a concerted effort by multiple stakeholders. A National Integrated Logistics Policy (NILP) that shapes a vision for India's logistics infrastructure in 2020 would be a critical enabler for implementation. Such a policy should outline tangible objectives to build infrastructure capable of keeping pace with India's growth, define a set of programmes that can help realise these goals, and ensure a governance structure that enables efficient and timely execution
4	The transformation will offer multiple opportunities for private sector	The proposed approach to transform the nation's logistics infrastructure would provide multiple opportunities to the private sector, the infrastructure users, logistics providers as well as infrastructure developers. Opportunities reach from building new infrastructure to capture new markets to offer new logistics services

While absolute logistics spend in India is lower than in most nations, as a percentage of GDP it is relatively high



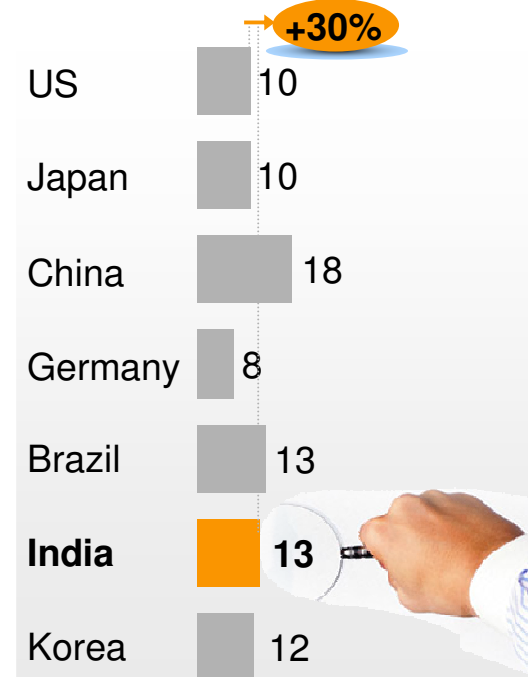
What does not look like an issue ...

Spend on logistics
USD billions, 2007



... or like a small, but inevitable issue ...

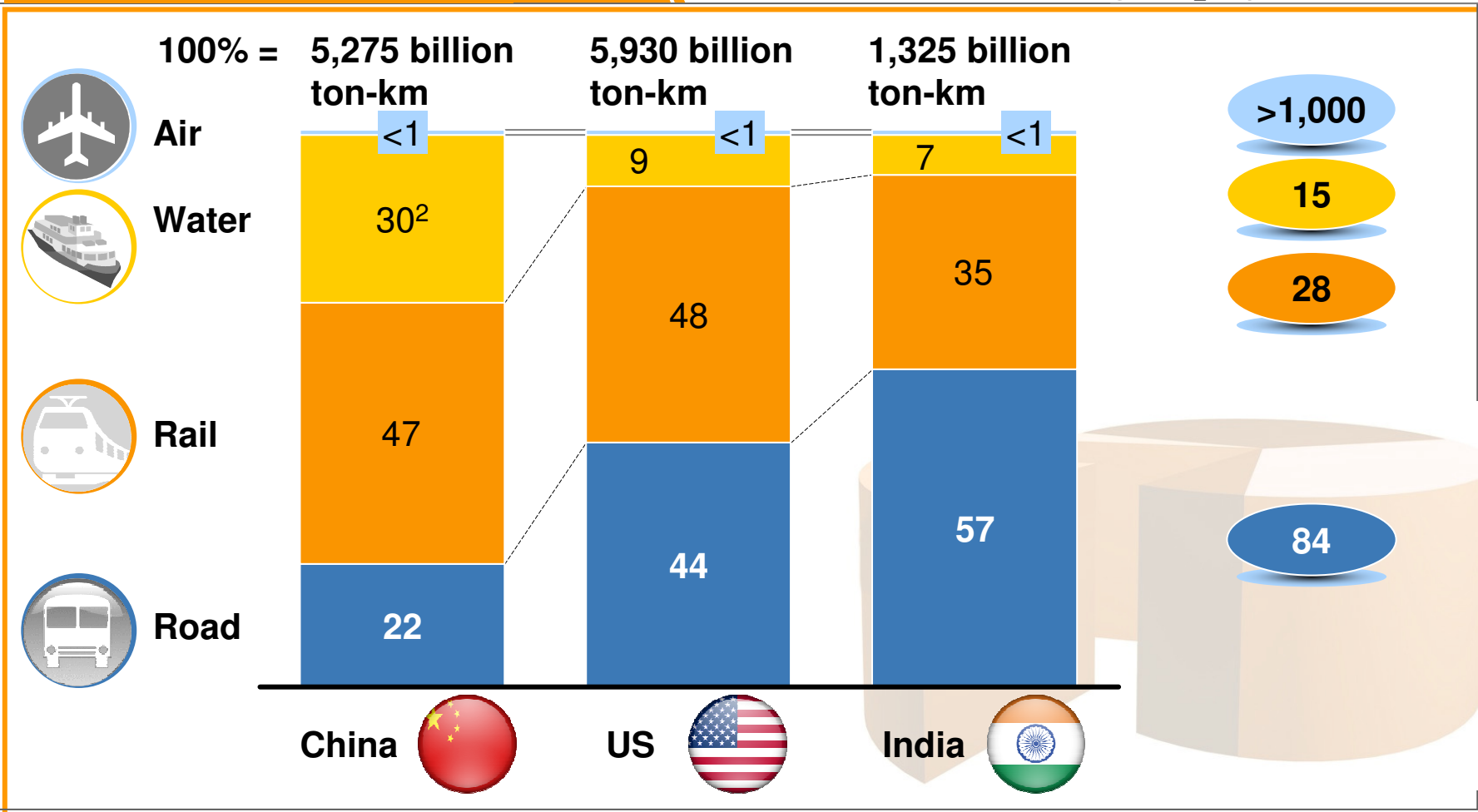
Logistics as % of GDP
Percentage, 2007



High logistics cost is partially driven by the fact that freight transport in India is dominated by roads ...

Mode share¹ (percent of ton-km)

Emission per ton-km
g CO₂ equivalent



¹ Share estimated for 2007, excluding pipelines

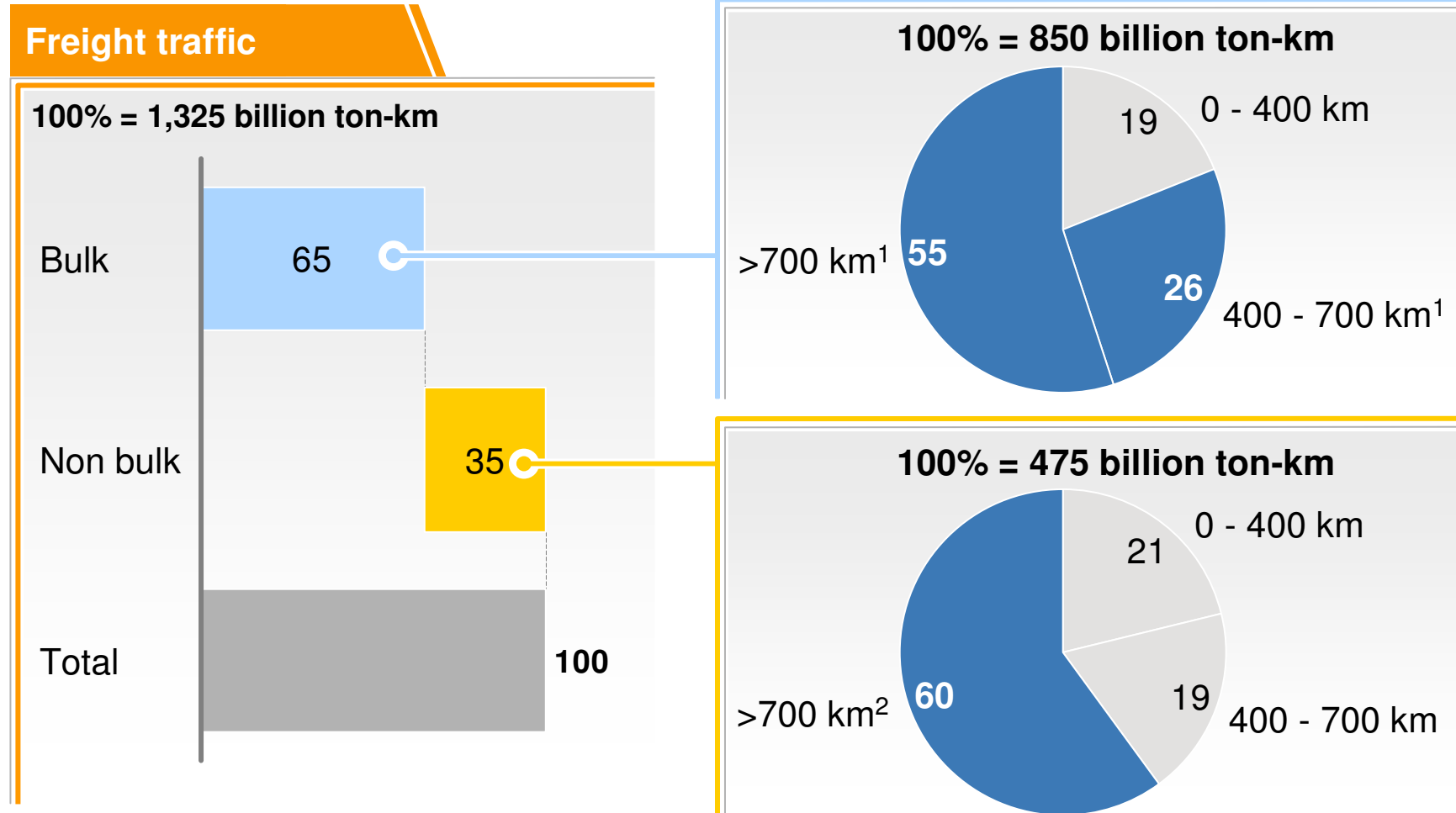
² Two-thirds of this is from coastal shipping, one-third from inland waterways

SOURCE: World Economic Forum; McKinsey; China Statistic yearbook; Planning Commission India; NHAI; Indian Railways; DG Shipping; Bureau of Transportation Statistics US

... despite the fact that two-thirds of India's freight travels over long distances that are structurally suitable for rail and waterways ...

Percent

■ Rail/waterways potentially cheaper than road



¹ Assuming rail siding available at origin, a short last mile move required on road of under 50 km to final destination

² At 700 km distance, true for heavy cargo such as tiles/stones/pig iron (28 tons in a container); assuming no rail siding available but short last mile moves on trucks of less than 50 km between rail terminals and points of origin/destination

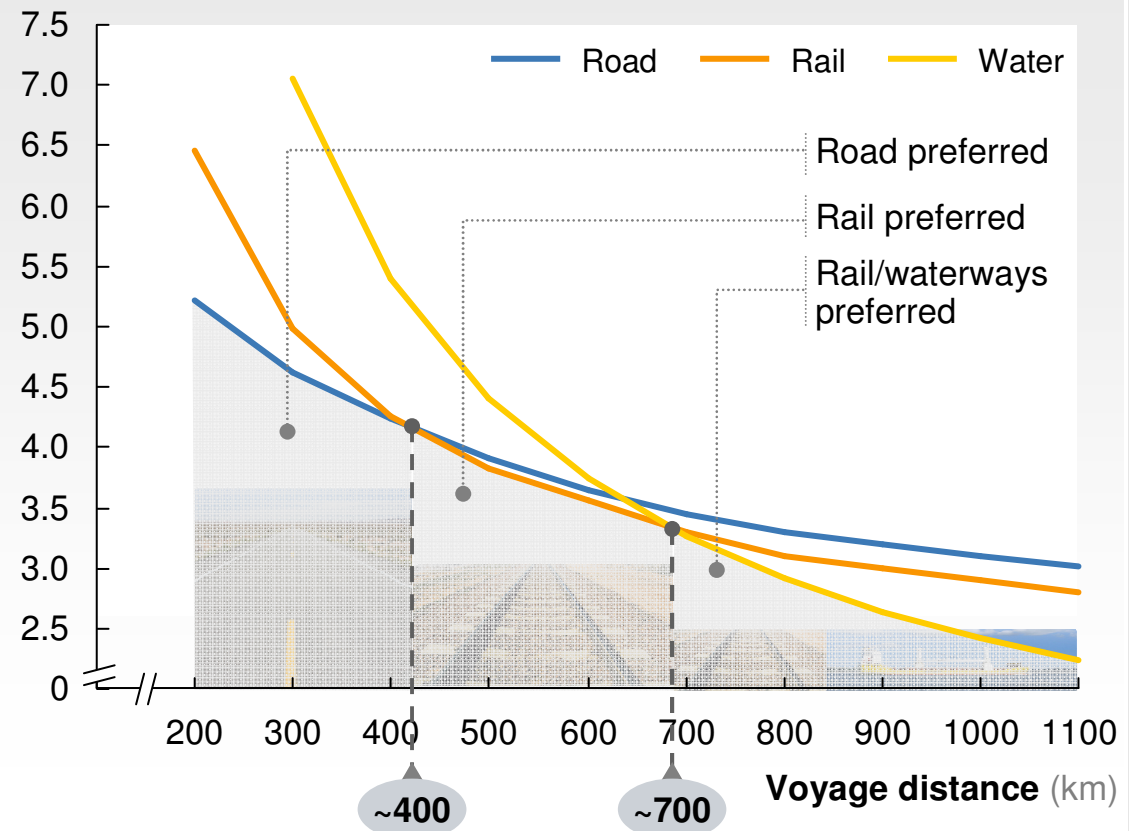
... as transport costs on rail and waterways are lower than on roads for longer distances

Freight traffic

- Cost estimates for transportation of bulk commodity (coal) across modes
- Road movement assumed to be on a 25 ton truck with 16 ton payload
- For rail, instance with one siding used, with only one last mile required. Costs can be even lower, with two sidings available
- Coastal movement assumed on handysize vessel requiring ballast back-haul, with last mile road movements both ends. Costs reduce further with rail sidings between port and mine/user industry location

Transportation cost by mode

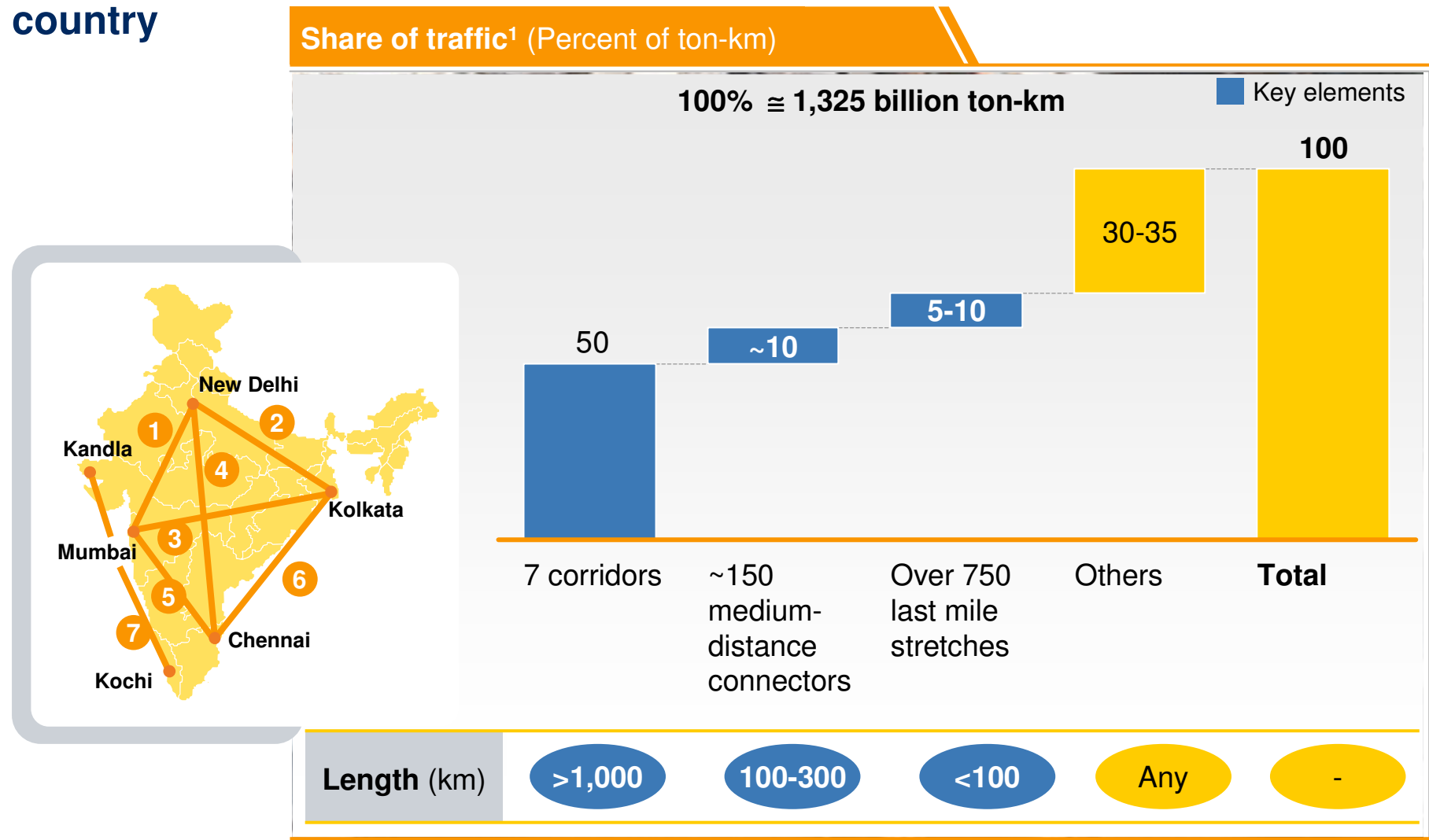
US cents (including handling and last mile costs) per ton-km



1 Refers to coastal shipping

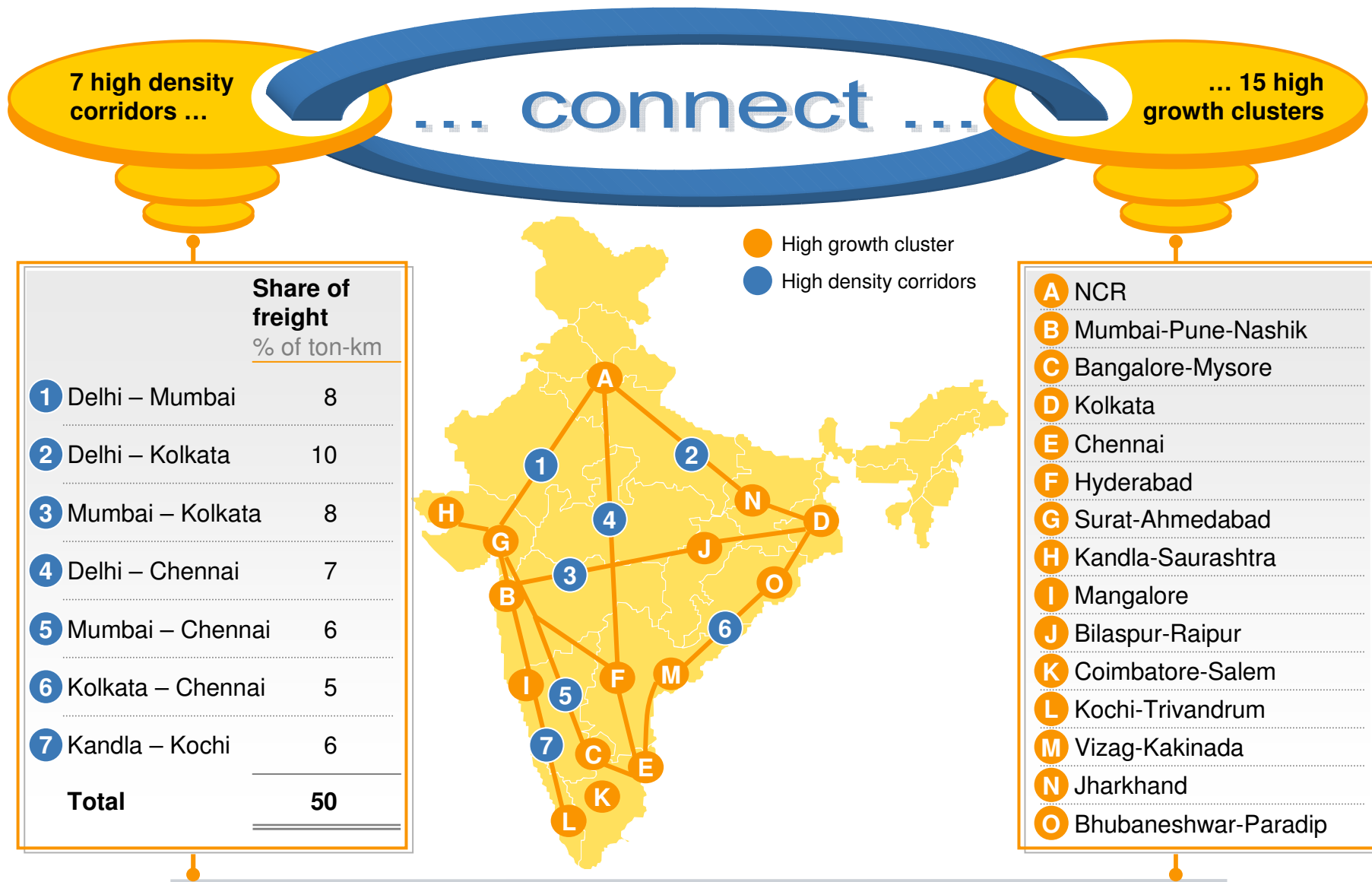
2 For large volume movements (e.g., coal to power plants, it makes sense to use rail with two sidings for even shorter distance movements for reasons of truck availability)

So far, India does not benefit from the fact that three components of the logistics network account for over two-thirds of total freight traffic in the country



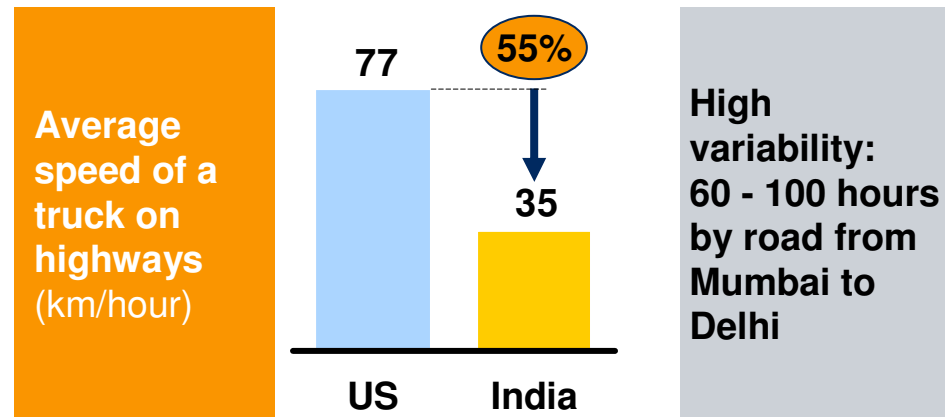
¹ Share estimated for 2007

Only 7 corridors connect 15 high growth clusters and carry 50% of freight

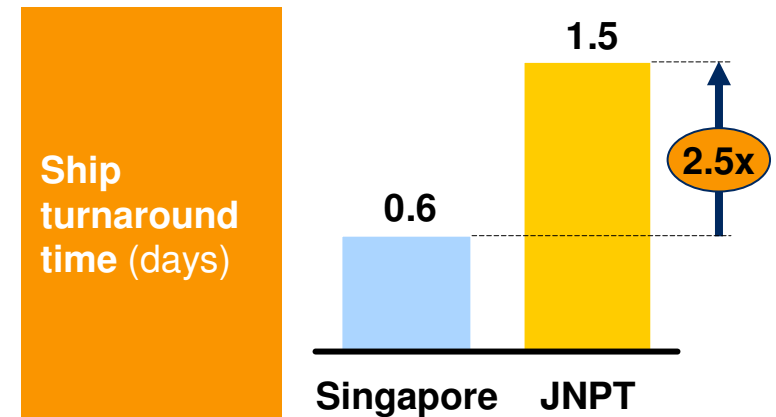


In addition, low infrastructure and equipment quality drives cost up

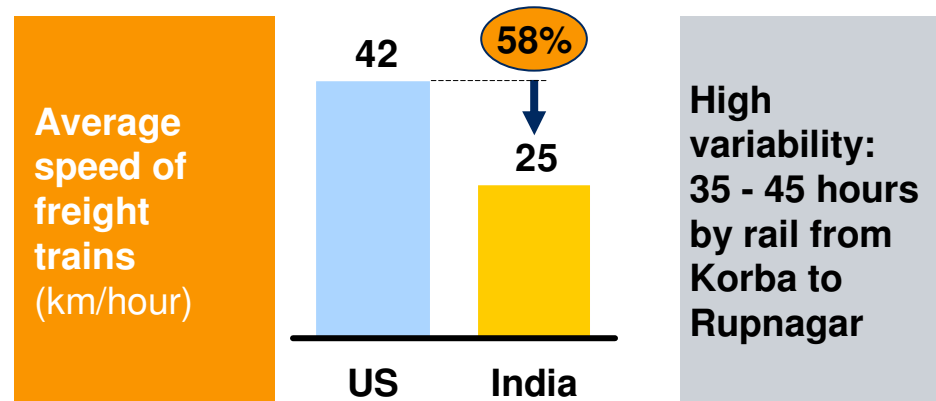
Low speeds and high transit time variability on road



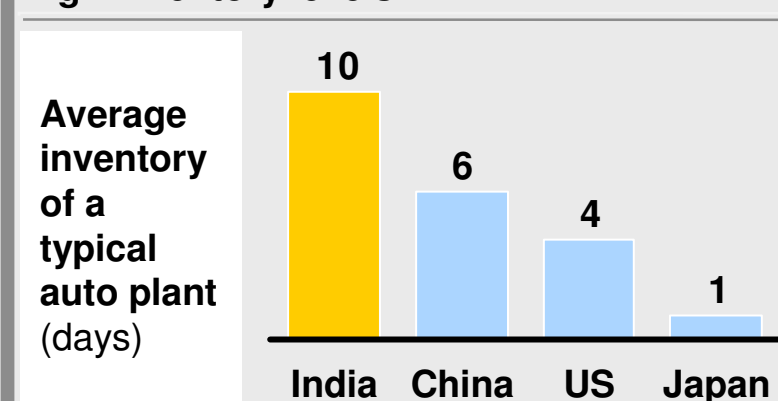
High turnaround times at ports



Low speeds and high transit time variability on rail

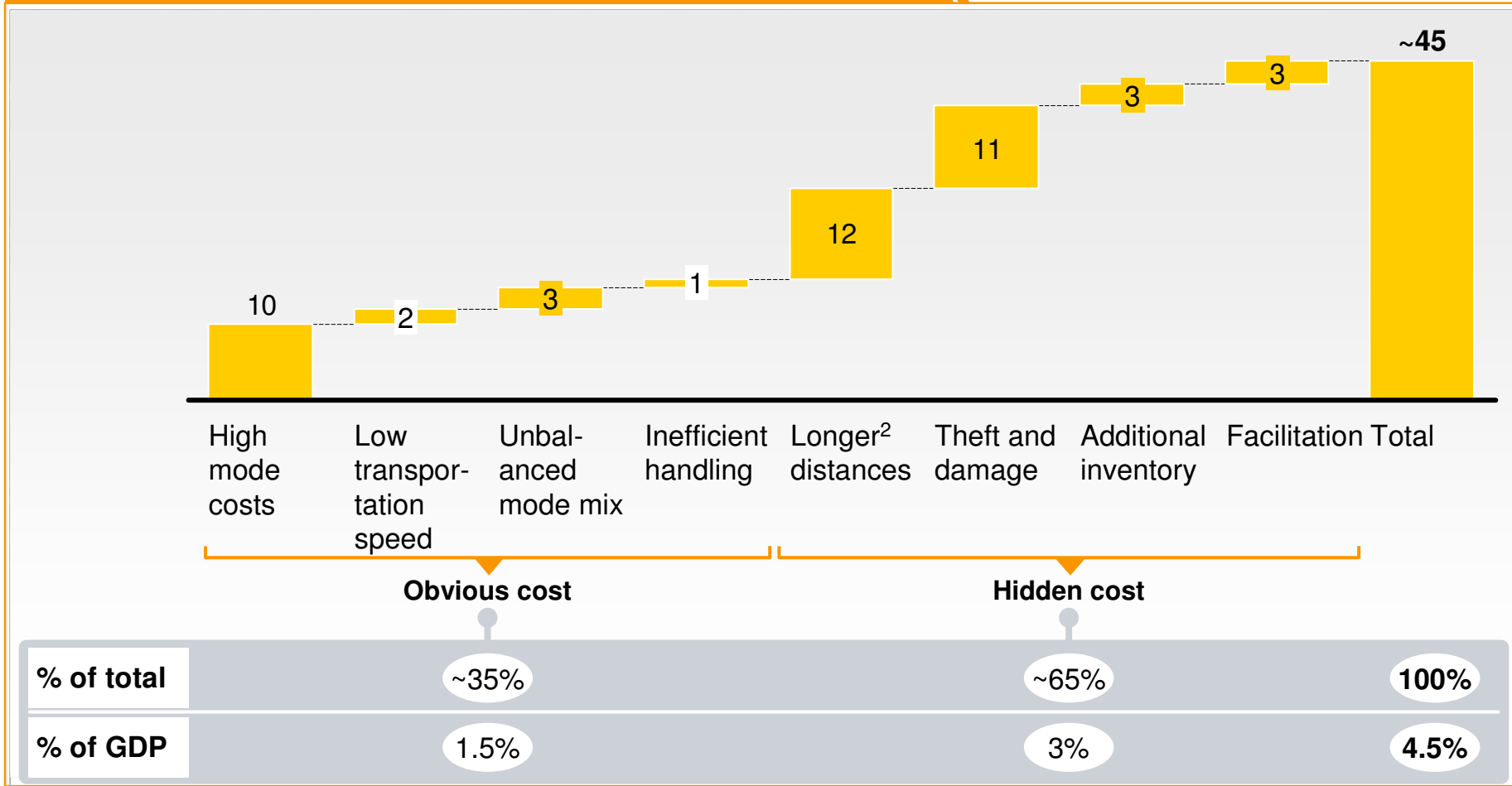


High inventory levels



The poor state of logistics infrastructure resulted in losses of USD 45 billion or around 4.5% of GDP in 2008

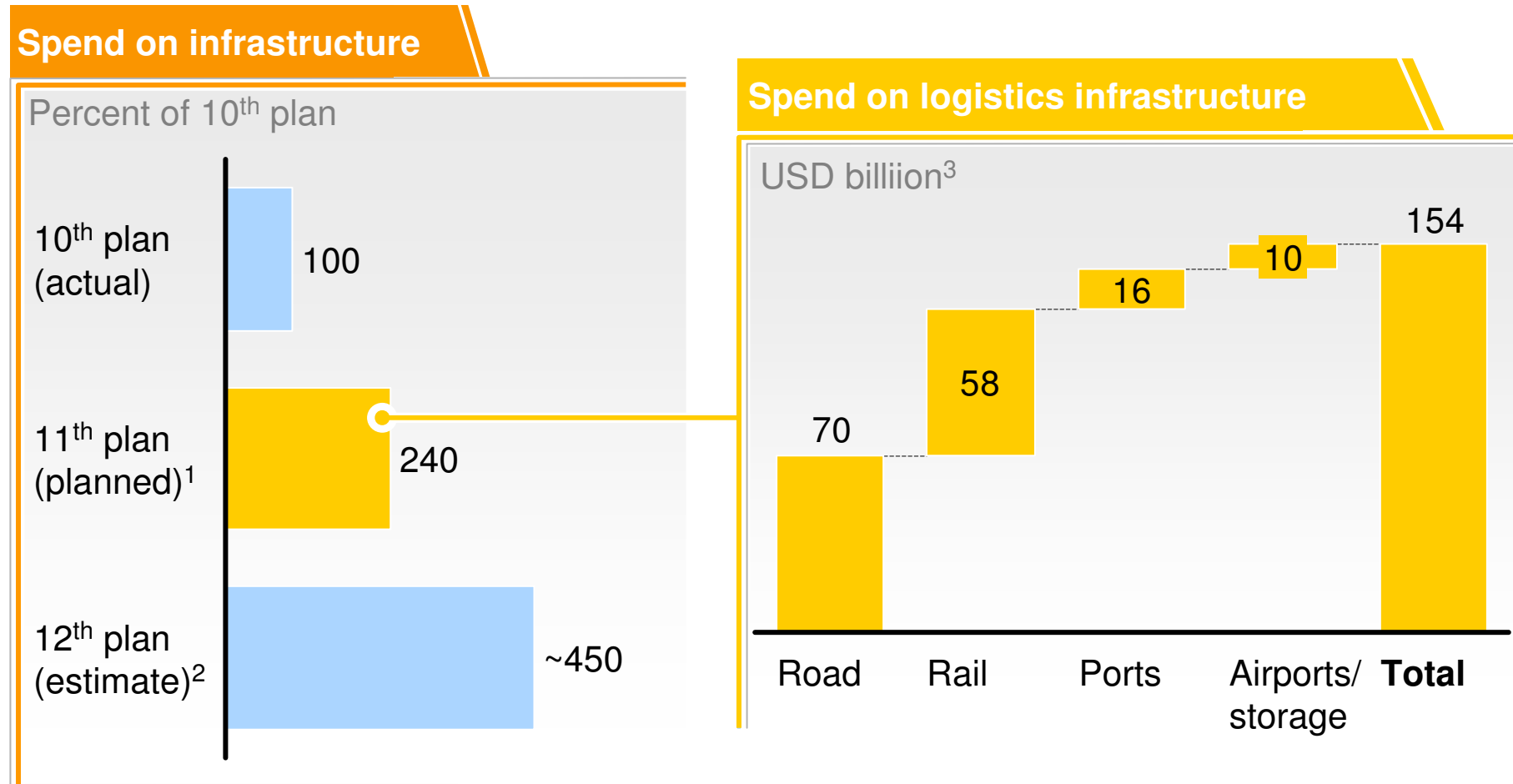
Inefficiencies in India's logistics network¹ (USD billions)



1 Extra spend vis-à-vis best-in-class. Estimated for 2007

2 Based on longer average distances travelled relative to other large countries, e.g., average distance travelled by coal in India is close to 500 km versus around 400 km in China

Even as the 11th plan represents an inflection point in terms of infrastructure spend...



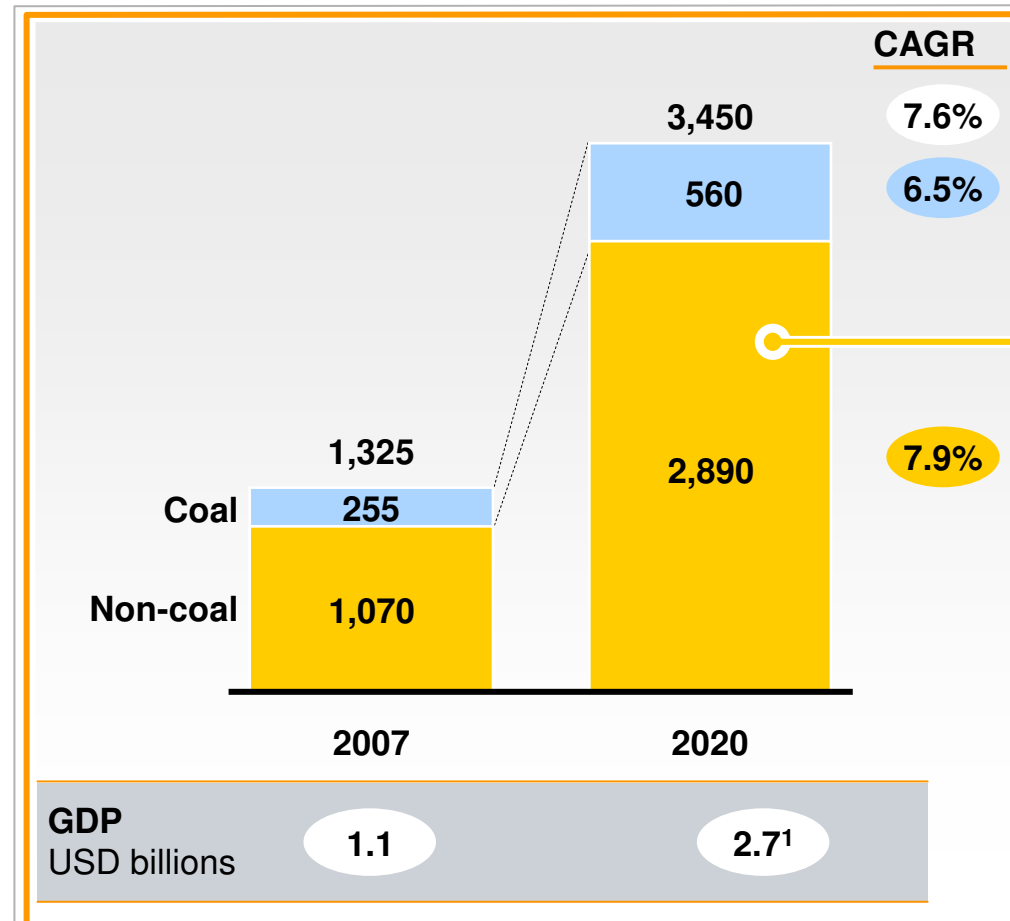
1 Actual for 2002-03 to 2004-05, estimates for 2005-06 and 2006-07

2 USD trillion spend on infrastructure in total announced. Estimate 30% of this will be spent on logistics infrastructure as in earlier plan periods

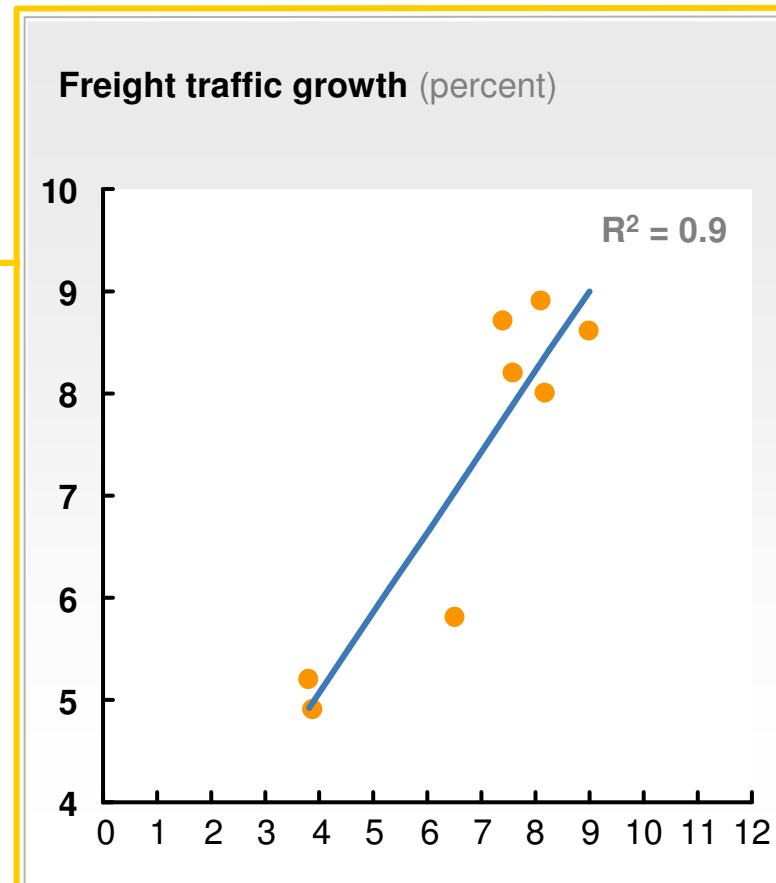
3 At 1 USD = INR 45

...the fact that freight traffic is expected to grow more than 2.5-fold over the next decade...

Billion ton-km



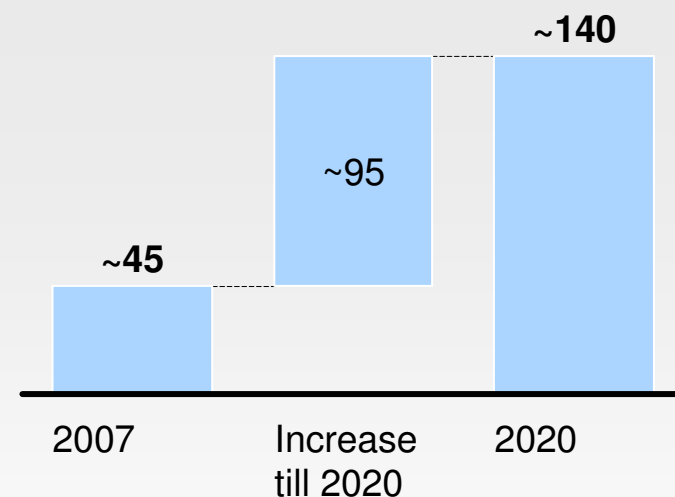
Regression analysis of historical GDP and freight traffic growth for non-coal movement in India



1 Estimate based on 7.5% annual GDP growth

... will only worsen the situation with increased waste and emissions

Logistics-related waste (USD billion)



Waste

Percent of GDP

~4.5

—

~ 5.0%

Emission

Million tons CO₂ equivalent

~ 65

~ 115

~ 180

- Imbalanced mode mix (road share increases from 57% to 70%), mainly due to shortage of rail and interchange capacity
- High pressure on already bottlenecked road network in key stretches
- Higher transport costs, with more traffic on most expensive mode
- Higher inventory levels with slower average speeds on road
- Higher theft, waste and facilitation payments with increased share of road, and slower speeds

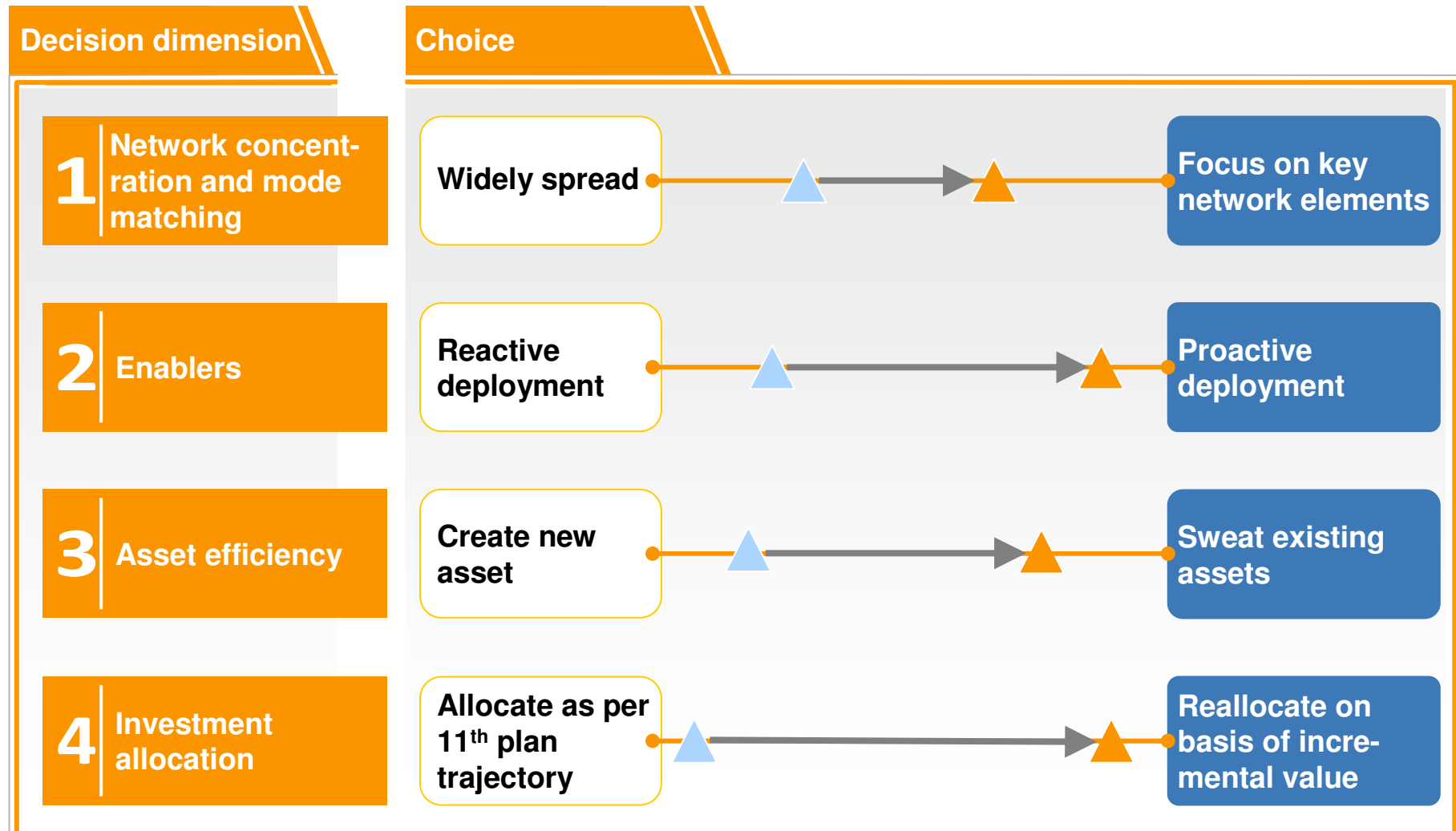
Over 1% of India's total commercial energy consumption wasted in 2020 due to inefficiencies in freight transport

Key messages

1	The nation's logistic infrastructure is in poor shape and has a poor outlook	Despite high concentration of freight flows, India's logistics infrastructure is heavily inefficient leading to annual economic losses of USD 45 billion and CO2 emissions 20% above optimal. Even with a sharp increase of up to USD 500 billion till 2020 in infrastructure investments, India will not be able to keep pace with an over 2.5-fold freight traffic growth over the next decade. This will result in an more unbalanced modal mix and three times higher annual economic losses in 2020
2	4 shifts will allow to transform the nation's logistics infrastructure	India has to adopt a fundamentally different approach to building its logistics infrastructure through shifts on four dimensions: Focus on key network connectors, proactive development of enablers, sweating existing assets and reallocation of investments across and within modes. The new approach will result in a balanced modal mix (46% freight on rail), reduced losses, energy consumption and pollution even without additional investments. With 40% more investment on top of the planned USD 500 billion the nation's logistics infrastructure could even be taken up to international standards by 2020
3	The transformation requires a National Integrated Logistics Policy	Achieving the four shifts will require a concerted effort by multiple stakeholders. A National Integrated Logistics Policy (NILP) that shapes a vision for India's logistics infrastructure in 2020 would be a critical enabler for implementation. Such a policy should outline tangible objectives to build infrastructure capable of keeping pace with India's growth, define a set of programmes that can help realise these goals, and ensure a governance structure that enables efficient and timely execution
4	The transformation will offer multiple opportunities for private sector	The proposed approach to transform the nation's logistics infrastructure would provide multiple opportunities to the private sector, the infrastructure users, logistics providers as well as infrastructure developers. Opportunities reach from building new infrastructure to capture new markets to offer new logistics services

When developing India's future logistics infrastructure key design choices should be taken differently

▲ Current trajectory
▲ Rail driven balanced modal



... which will lead to a much more balanced modal strategy

			SHIFT	
			From current trajectory to balanced modal mix
1	Network structure	Network components and mode		
		Corridors (rail and water)	~4 ¹	7
		Connectors (expressways)	5-7 ²	20-30
		Last mile links (road & rail)	NA ³	~750
2	Enablers	Illustrative enabler to support network		
		Logistics parks	NA	15-20
3	Asset efficiency	Illustrative shift		
		Percent of toll booths with electronic tolling	<50% ⁴	>90%
4	Investment allocation	Share of spend (percent ⁵)		
		Water	9	9
		Rail	41	50
		Road	50	41

1 No focused last mile program in current plans

2 Expressways only

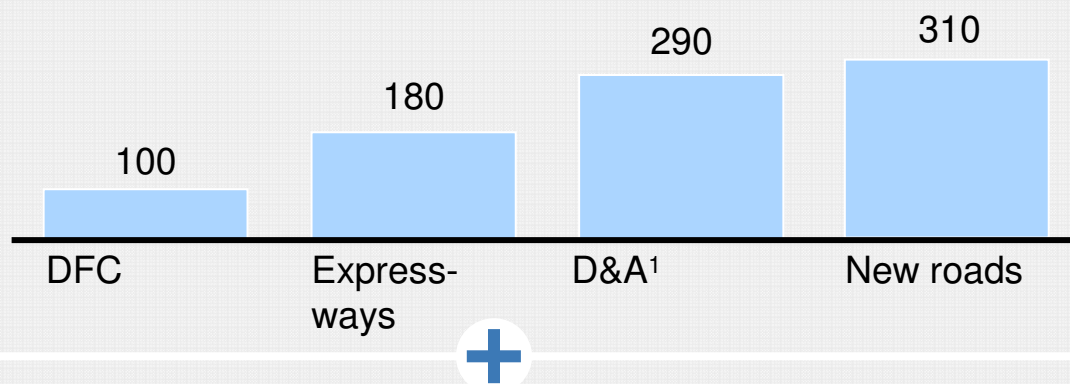
3 Two rail Dedicated Freight Corridors (DFCs) planned, plus coastal corridors

4 Assuming all current manual toll booths not upgraded, whereas all new toll booths created have electronic tolling lanes

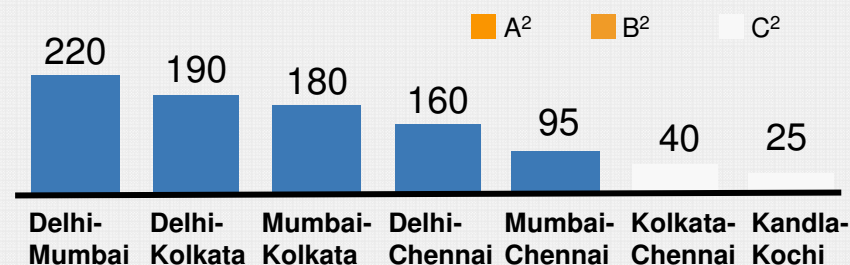
5 100% = ~USD 500 billion over the next decade

1 Network structure – India should develop the 5 DFCs with the highest traffic density by 2020

Cost of freight infrastructure capacity (index)



2020 rail freight traffic along corridors (billion ton-km)

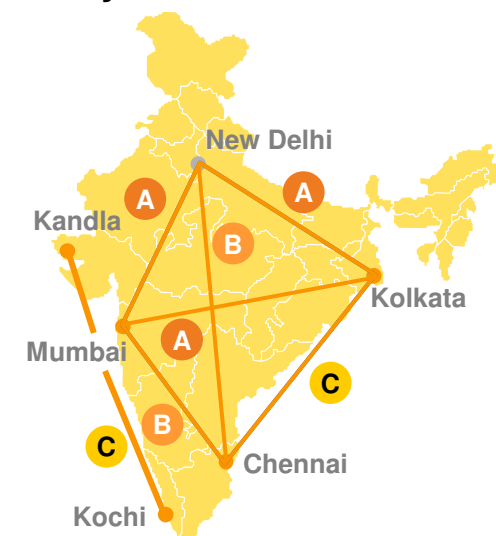


Traffic density

(million ton-km per track-km)

170	120	100	85	85	31	12
-----	-----	-----	----	----	----	----

India should kickstart the development of 5 (A and B) priority corridors immediately



1 Development and augmentation of rail lines

2 A/B/C is the order of priority

2 Enablers – The balanced modal strategy will require network hubs, standardisation and a talent pool

Logistics park

- Network hubs need to be developed at outskirts of large production and consumption centers
- Large zones should be earmarked for warehouse development and road/rail connectivity, including DFC links
- Potential locations should include Mumbai, Nagpur, NCR, Kolkata, Ahmedabad, Hyderabad, Vishakhapatnam

Standardised equipment

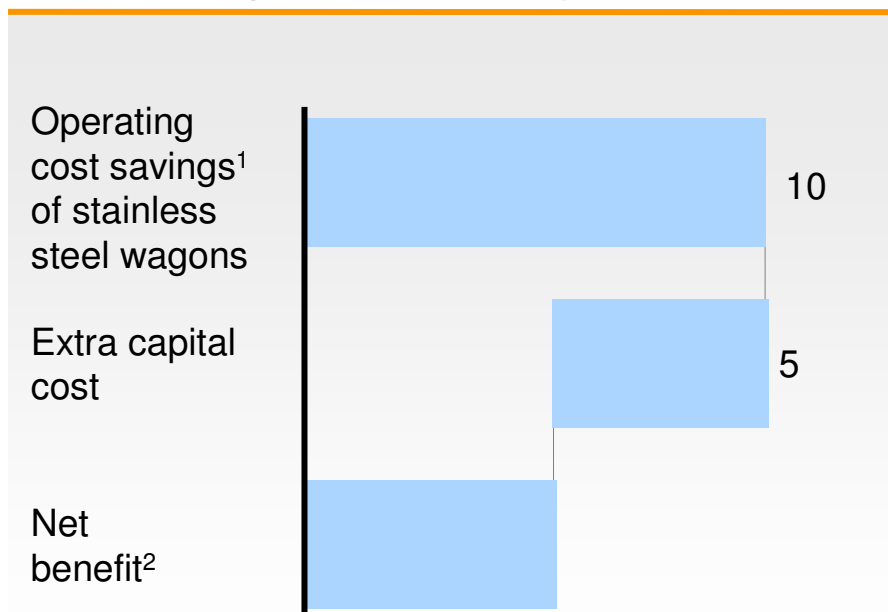
- Encourage a set of standards for containers and pallets to enable
 - Manufacture of standard handling equipment
 - Planned design of warehouses with racks to enable standard pallet sizes
 - Design standardized trucks and roads, bridges etc.

Skill development programs

- Create training infrastructure including certification programs and on-the-job training programs to train over 20 million skilled personnel required in logistics including
 - 5 million truck drivers
 - 100,000 warehouse managers
 - 70,000 coastal seafarers

3 Asset efficiency – Improving equipment can result in significant value creation

Rail: Cost-benefit of shift to stainless steel BOXN rail wagons (INR lakh/wagon)



Shift to stainless steel wagons should be encouraged

Road: Cost for different trucks (assuming similar utilisation)

Gross vehicle weight	Cost per ton-km relative to 16-ton truck (Index³)	Truck cost⁴ (INR lakh)
16 tons	100%	~11.5
25 tons	85%	~15.3
30 tons	75%	

Incremental capex of 3.5-4 lakhs for a 25 ton truck versus a 16 ton truck can be recovered in less than two years. Hence larger trucks should be encouraged

1 Present value of operating costs reduction over the life of the wagon

2 Excludes benefits of savings on capex expenditure on tracks, with fewer tracks required to serve same freight volume

3 100% = INR 1.2/ton-km at full load, 100% fronthaul and backhaul utilisation in tons

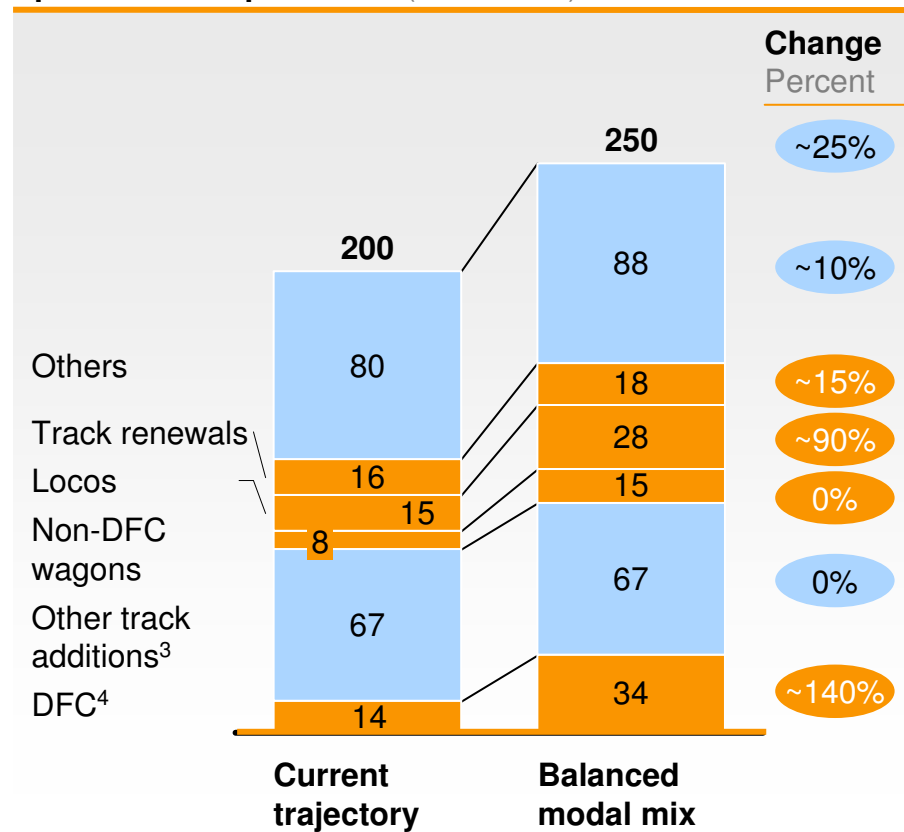
4 Fully loaded truck including cabin and body

5 Typically used as a tractor trailer

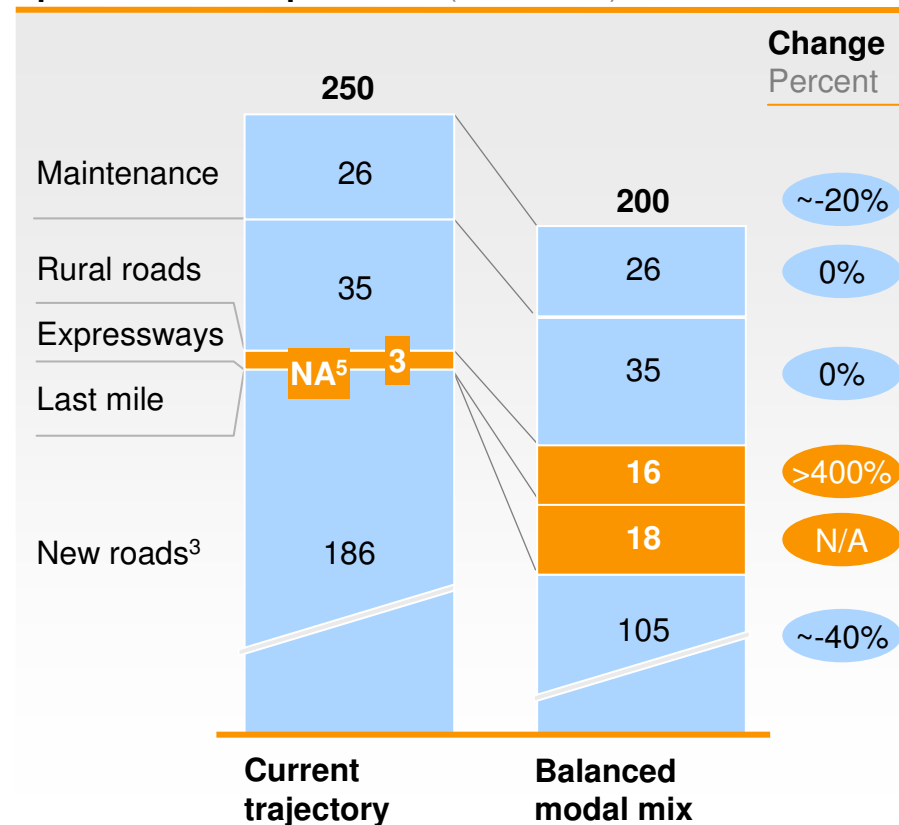
4 Investment allocation – The shifts and the 10 point program require a reallocation of funds across and within modes ...

Categories with major spend increase

Spend on rail up to 2020¹ (US\$ billion)



Spend on roads up to 2020¹ (US\$ billion)



1 Spend between 2008 and 2020

2 E.g., coaches, locomotives, signaling, electrification, track renewals, bridge works, computerisation, passenger and other user amenities, workshops and production units

3 New tracks (excluding DFCs), rail doubling and gauge conversion. Over half of this spend is for developmental reasons, not the most economically viable locations. Change for the economically viable locations is more significant

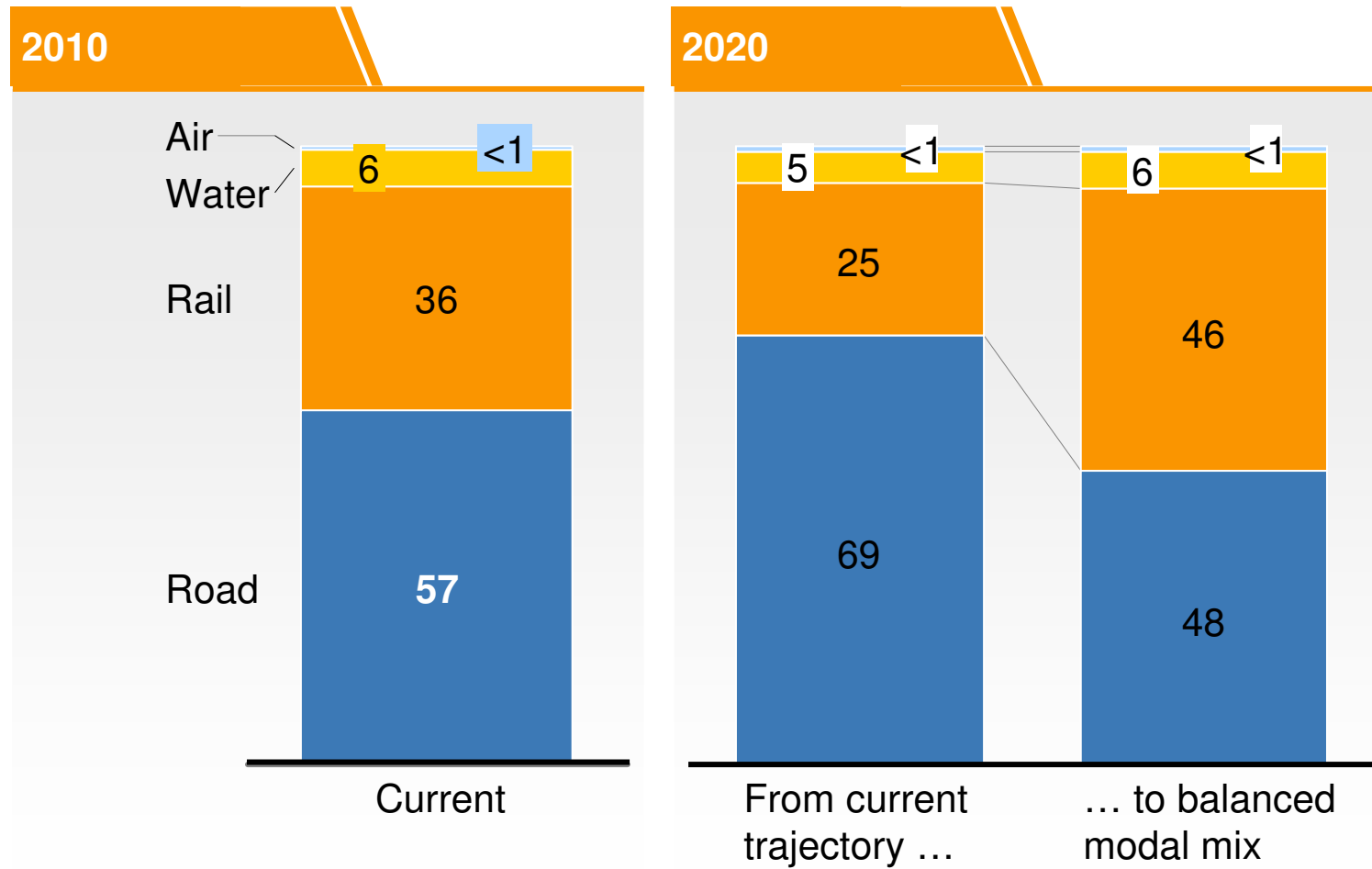
4 Including wagons

5 No focused program for last mile

6 Includes state highways/major district roads, excludes expressways and roads built as a part of focused last mile program

... and lead to very different modal mix

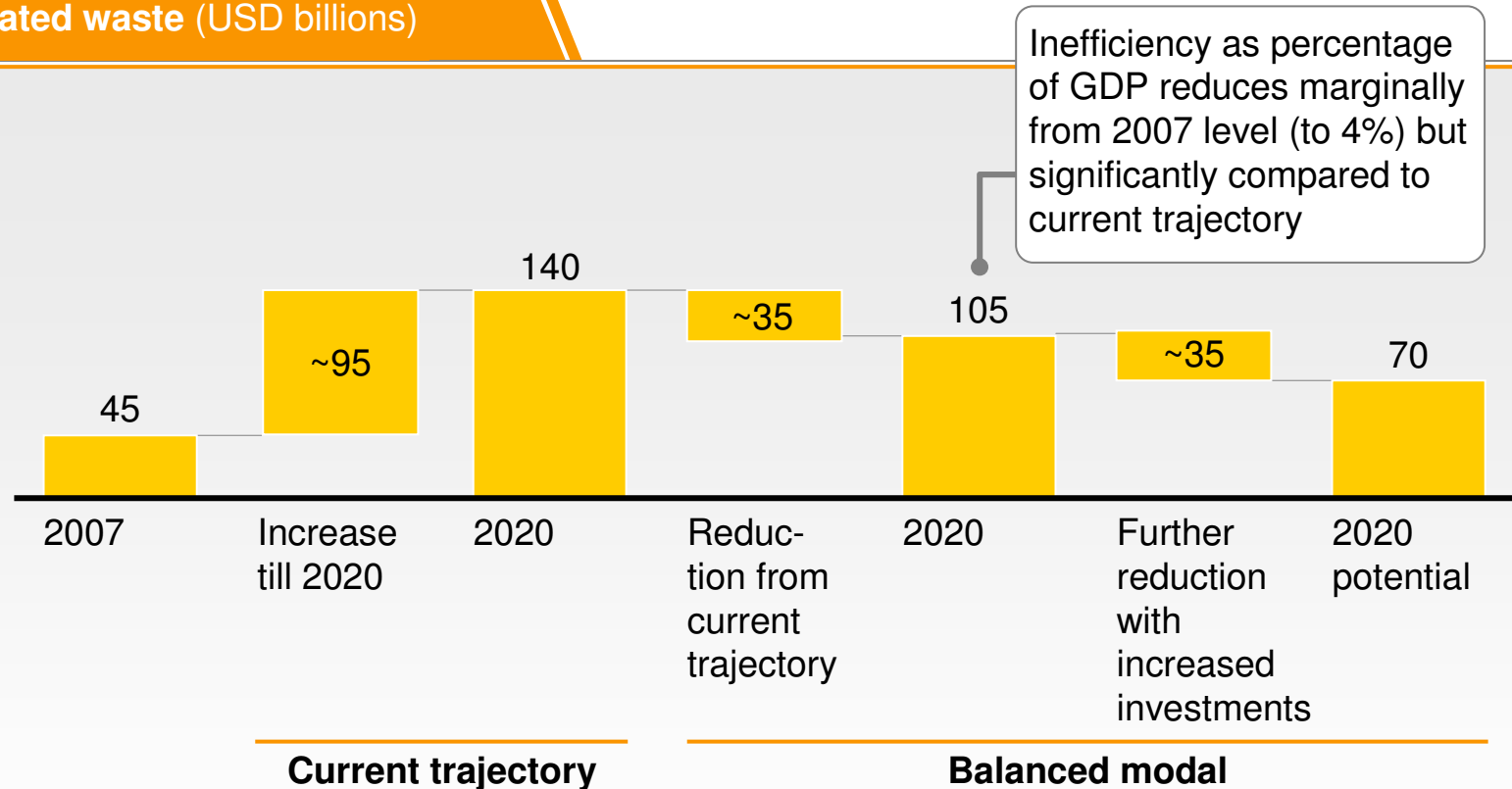
Percent



Balanced modal approach can reduce cost and emissions significantly

ESTIMATES

Logistics-related waste (USD billions)



Emission

(Million tons CO₂ equivalent)

~65

~115

~180

~30

~150

~20

~130

Key messages

1	The nation's logistic infrastructure is in poor shape and has a poor outlook	Despite high concentration of freight flows, India's logistics infrastructure is heavily inefficient leading to annual economic losses of USD 45 billion and CO2 emissions 20% above optimal. Even with a sharp increase of up to USD 500 billion till 2020 in infrastructure investments, India will not be able to keep pace with an over 2.5-fold freight traffic growth over the next decade. This will result in an more unbalanced modal mix and three times higher annual economic losses in 2020
2	4 shifts will allow to transform the nation's logistics infrastructure	India has to adopt a fundamentally different approach to building its logistics infrastructure through shifts on four dimensions: Focus on key network connectors, proactive development of enablers, sweating existing assets and reallocation of investments across and within modes. The new approach will result in a balanced modal mix (46% freight on rail), reduced losses, energy consumption and pollution even without additional investments. With 40% more investment on top of the planned USD 500 billion the nation's logistics infrastructure could even be taken up to international standards by 2020
3	The transformation requires a National Integrated Logistics Policy	Achieving the four shifts will require a concerted effort by multiple stakeholders. A National Integrated Logistics Policy (NILP) that shapes a vision for India's logistics infrastructure in 2020 would be a critical enabler for implementation. Such a policy should outline tangible objectives to build infrastructure capable of keeping pace with India's growth, define a set of programmes that can help realise these goals, and ensure a governance structure that enables efficient and timely execution
4	The transformation will offer multiple opportunities for private sector	The proposed approach to transform the nation's logistics infrastructure would provide multiple opportunities to the private sector, the infrastructure users, logistics providers as well as infrastructure developers. Opportunities reach from building new infrastructure to capture new markets to offer new logistics services

Development of National Integrated Logistics Policy (NILP) is needed to move from strategy to implementation

Design principles

- Focus on an integrated network
- Move to balanced modal mix
- Increase emphasis on improving efficiency of existing assets
- Allocate more investments to rail
- Build in flexibility to adapt to change in economic conditions

Governance

- High level inter-ministerial effort
- Committee should include representatives from the concerned ministries, departments and from the private sector
- Recommend budgetary allocations across projects
- Focus not only on strategy development but also on monitoring of program implementation

Objectives 2020

- Increase share of rail towards 45%
- Reduce economic losses by USD ~ 35 billion or 25 per cent by 2020
- Reduce emissions by ~15 per cent from expected levels under current trajectory
- Improve coordination across modes to achieve on-time, on-budget delivery of projects



Ten targeted programmes should be the bedrock of the NILP ...

1 Rail dedicated freight corridors	Accelerate SPVs for two planned rail corridors, and simultaneously set up three additional SPVs in parallel
2 Coastal freight corridors	Undertake integrated projects with last mile programs, logistics parks, and accelerated port development for Kandla-Kochi and Kolkata-Chennai corridors
3 National expressways	Build 20-30 expressways for 100-300 km stretches to manage rise in traffic, as against 5-7 in current NHDP
4 Last mile roads	Implement a dedicated programme for ~750 last mile links to connect key ports/rail terminals and production/distribution centres to corridor/ connector network
5 Last mile rail	Develop track/rail head infrastructure and ensure wagon availability mainly to support 8-10 critical coal corridors in states like Chhattisgarh, Orissa
6 Multimodal logistics parks	Identify, finalise locations of major logistics parks; earmark land in selected cities, provide infrastructure (power, utilities, transport)
7 Roads maintenance	Upgrade maintenance contracts for national/state highways by increasing scale (road length, contract duration) and modifying contracts
8 Technology adoption	Standardise technology for nation-wide electronic toll collection (ETC) in future contracts, and establish a nation-wide clearing house
9 Logistics skills development	Develop suitable training infrastructure for warehouse managers, logistics managers, coastal seafarers and truck drivers
10 Equipment standardisation/ improvement	Enable superior equipment e.g., larger trucks, lower tare load rail wagons and common standards for container/equipment design to aid inter-modal transport

Key messages

1	The nation's logistic infrastructure is in poor shape and has a poor outlook	Despite high concentration of freight flows, India's logistics infrastructure is heavily inefficient leading to annual economic losses of USD 45 billion and CO2 emissions 20% above optimal. Even with a sharp increase of up to USD 500 billion till 2020 in infrastructure investments, India will not be able to keep pace with an over 2.5-fold freight traffic growth over the next decade. This will result in an more unbalanced modal mix and three times higher annual economic losses in 2020
2	4 shifts will allow to transform the nation's logistics infrastructure	India has to adopt a fundamentally different approach to building its logistics infrastructure through shifts on four dimensions: Focus on key network connectors, proactive development of enablers, sweating existing assets and reallocation of investments across and within modes. The new approach will result in a balanced modal mix (46% freight on rail), reduced losses, energy consumption and pollution even without additional investments. With 40% more investment on top of the planned USD 500 billion the nation's logistics infrastructure could even be taken up to international standards by 2020
3	The transformation requires a National Integrated Logistics Policy	Achieving the four shifts will require a concerted effort by multiple stakeholders. A National Integrated Logistics Policy (NILP) that shapes a vision for India's logistics infrastructure in 2020 would be a critical enabler for implementation. Such a policy should outline tangible objectives to build infrastructure capable of keeping pace with India's growth, define a set of programmes that can help realise these goals, and ensure a governance structure that enables efficient and timely execution
4	The transformation will offer multiple opportunities for private sector	The proposed approach to transform the nation's logistics infrastructure would provide multiple opportunities to the private sector, the infrastructure users, logistics providers as well as infrastructure developers. Opportunities reach from building new infrastructure to capture new markets to offer new logistics services

The resulting approach provides multiple opportunities to the private sector

User industries



- Need to prepare for worsening service levels and costs in current trajectory - Plan network and pick locations minimising transportation; collaborate with companies in region to build local infrastructure; try to lock rail capacity
- In case new balanced modal network materializes, it will lead to
 - Redesign of supply chain network, including review of inventory levels
 - New markets could become feasible for some bulk materials like cement

Developers/ EPC providers



- Large scale opportunities in road, rail and ports for construction/development companies (~USD 200, 90 and 50 billion in road, rail and ports resp.)
- Increased BOT projects, including in railways, requiring more emphasis on skills such as risk assessment including traffic projection
- Larger, longer duration road maintenance contracts, requiring a TCO perspective

Equipment/ tech- nology providers



- Large demand for rail equipment providers (400k wagons; 50k coaches, 10k locos over next decade) if balanced modal strategy materialises
- Increased demand for technology solutions including warehouse management/tracking solutions, common electronic tolling platform and signalling technology

Logistics service providers



- Role of 3PLs including container rail operators, coastal shipping operators and warehouse providers, will increase with opportunity to provide wider service
- Warehousing companies, developers can target multi-modal logistics parks
- 3PLs will require to upgrade talent pool and work closely with current and new customers to sharpen their service offering

People to reach out to

Rajat Gupta



Thomas Netzer



Sriram Jambunathan



Hemang Mehta



Achint Setia

