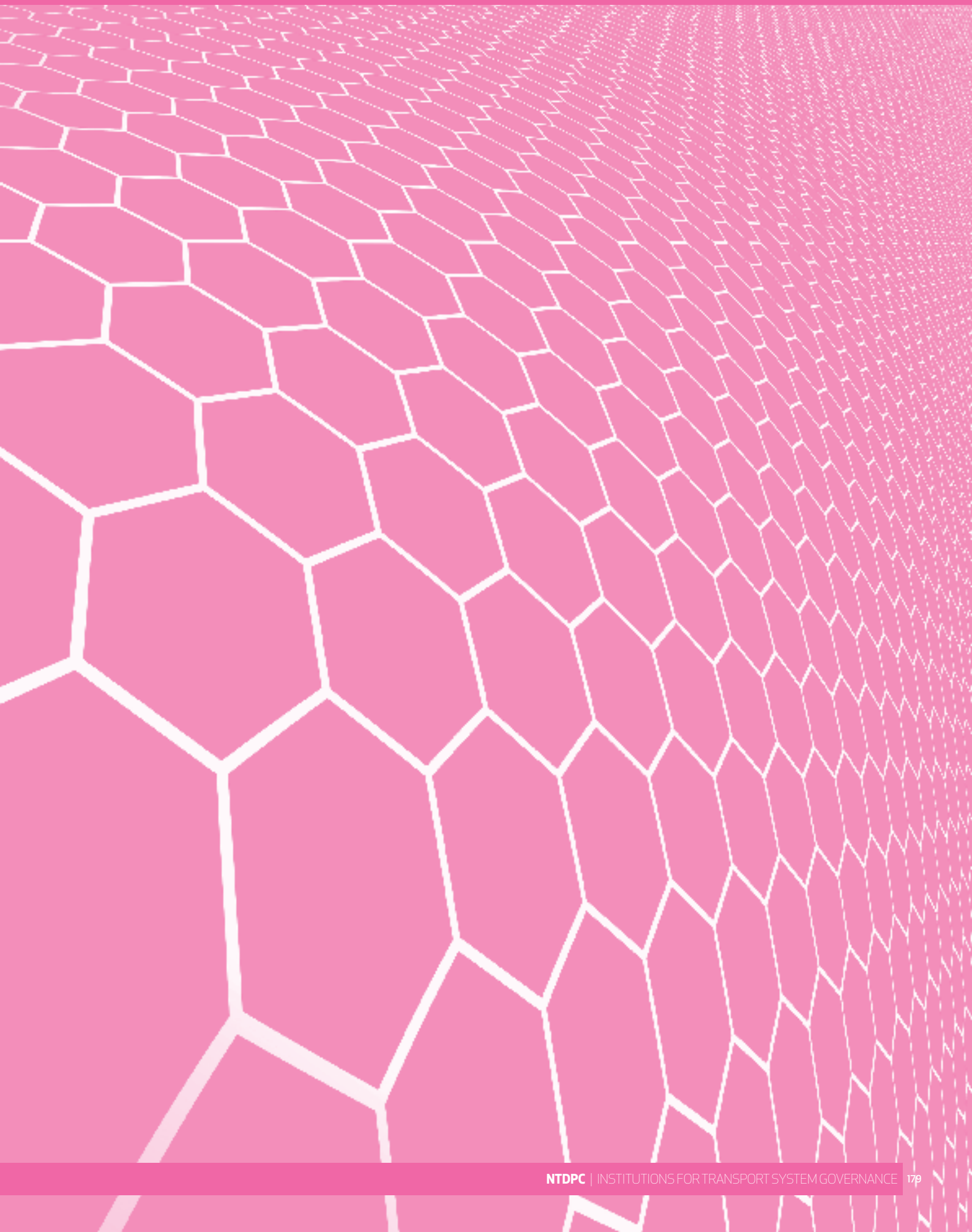
5. INSTITUTIONS FOR TRANSPORT SYSTEM GOVERNANCE



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India's transport system does not meet the country's current needs, much less the future requirements for goods and passenger transport as the country grows. The physical infrastructure is congested in nodes—ports, inland container depots, and urban streets—and inadequate in others such as rural roads.

India may be the pre-eminent economy in South Asia, but it is also the one country in the region that does not yet have a deepwater seaport. Freight delays are an oft-cited constraint on the investment climate, one of the obvious handicaps for efforts to develop the manufacturing sector or leverage domestic energy resources for power generation, and a key contributor to India's relatively concentrated economic geography. The transport system is also energy-inefficient, with nearly 70 per cent of cargo moving by road rather than rail or inland waterways.

India's urban transport and mobility needs are changing quickly as its cities grow in population and geographic size. Transport choices about how to do so will set the tone for the energy efficiency and livability of India's cities. Public transport and non-motorised transport (bicycles and walking) continue to play an important role in urban mobility, but use of personal vehicles (two wheelers and cars) is increasing as incomes rise. India will need to invest strategically in public transport and pedestrian infrastructure to retain a sustainable mix of transport. Congestion in the denser city cores already appears to be motivating more businesses to locate in peri-urban areas, which in turn places greater stress on water, sanitation, and other infrastructure that is still in development. The cost per kilometer of short-distance shipping within urban areas can be multiples of long-distance rates.[1] Idling in traffic also increases air pollution that in turn affects human health, crop yields, and the climate. The World Health Organisation (WHO) declared diesel exhaust a carcinogen in 2012; and recent scientific research finds that black carbon, the dark particles found in particularly high concentrations in diesel exhaust, is second only to CO_2 in driving global warming.[2]

India's transport system must evolve rapidly to support growth over the coming decades. Although the near-term projections for India's growth have dropped to 5-6 per cent, the country should return to 8-10 per cent growth over the medium and long run, with a consequent increase in the circulation of goods, people, and raw energy supplies (Chapter 3 on Macroeconomic Growth Backdrop: Transport Investment Requirements 2012-32). More than this 'committed usage,' India must also build up the transport system to sustain much higher growth in manufacturing that is necessary to generate employment

1. World Bank (2012).
2. Bond et al. (2013).

for its expanding young workforce. The transport infrastructure is obviously also important for encouraging balanced regional growth in manufacturing-related employment.

The weaknesses of the transport system interact with other constraints on growth. Limited connectivity creates an artificial 'scarcity' of land; for example, driving up prices and affecting firm competitiveness. Improving transport also lowers the costs of trade between various regions, affecting the efficiency of the internal market and the prospect for income gains from specialisation in products where there is a regional comparative advantage.[3] Lowering the cost of trade also affects the returns from investments in human capital and, by implication, can reduce incentives for skilled workers in rural yet transport-linked areas to migrate.[4]

India needs to develop institutional capacity not only to achieve economic growth, but also to support goals such as energy security and environmental sustainability.

The domestic and global fiscal resources for this upgrade are constrained. India will need to ensure maximum socio-economic return on high capital investment, both to ensure sustainable public investment as well as attract private finance. It will also need to build an institutional environment to ensure effective use of private finance and support public-private partnerships (PPPs) that increase the efficiency of infrastructure delivery. Private finance does not eliminate public financial support for infrastructure; it merely shifts the timing of commitments and the distribution of contributions across users and taxpayers. The real gains from PPPs come from sharing risk across parties with different abilities to mitigate them and from tapping into public and private comparative advantage in project management, innovation, and technology adoption.

In any case, finance is necessary but not sufficient. The country will also have to develop the institutional capacity to be more strategic in decision-making about investment in and regulation of transport infrastructure in order to not only achieve economic growth but also support other development goals such as energy security and environmental sustainability. 'Transport policy' will need to address the way that passengers and freight are transported, beyond simply meeting the demand for some form of mobility.

This report makes recommendations for national transport policy for the long term, with a perspective of about 20 years. In addition to making policy prescriptions for this long period, it is also making projections for the kind of investments that will be required in each sector. It also provides a set of recommendations for inter-modal transport and logistics arrangements (Chapter 4, Volume II on Integrated Transport: Strategy and Logistics). All of these policy recommendations and investment projections are being made utilising the best information available at the present time (2013). The Committee is very cognizant of the fact that 20 years is a long-term horizon over which to make such prescriptions and quantitative projections. We have been witness, for example, to a complete revolution that has been brought about by information technology and the advent of the internet during the last 20 years. The world in 2013 is very different from what it looked like at the turn of the 1990s.

It is certain that we will witness many technological changes in transport in the coming 20 years that will make our current expectations obsolete. Moreover, we have also seen very large variations in the price of energy over the past two decades. No doubt, we will see similar variations over the next 20 years as well. The recent advent of shale oil and gas has materially altered the expectations with respect to energy prices that existed just five years ago. Similarly, concerns with climate change could become even more serious than they are today. Our work on the Transportation of Energy Commodities (see Chapter 8, Volume II) has been predicated on the continued large scale dependence on coal as the predominant energy source for the production of power in India. It is possible that in view of the climate change concerns related to expansion in the use of coal, there could be significant changes in power production strategy. We therefore believe that it is of utmost importance that India develops an institutional mechanism to adapt its overall transport strategy on a continuous basis.

This chapter on Institutions for Transport System Governance is devoted to suggesting such a mechanism so that the recommendations and projections of the NTDPC can be adapted to changing circumstances and conditions, be they related to technological developments, price changes or environmental concerns. For such institutional arrangements to work, it is essential that technical capacities are developed to make continuous technocratic arrangements and adaptations: hence this Committee's emphasis on institutional development for transport governance and the need for significant capacity development. This chapter lays out a framework for moving from the current approach to transport development as a collection of investment projects and sector-focused policy and regulation to system governance. To begin with, we define transport system governance as an institutional system for generating and regenerating policy and investment strategies. 'Good

3. This effect is a well-known theoretical result; Donaldson (2013) shows empirical estimates of the income gains from lowering transport-related trade costs.
4. Michaels (2008) shows that the US Highway system increased the skill premium in rural areas with higher human capital endowments, and lowered in areas with lower levels of human capital, consistent with the Hecksher-Ohlin model of trade.

governance' is an investment, policy, administrative, and regulatory framework that supports and motivates a supply response to emerging demand for mobility and freight services, and enables a strategic and proactive response to transport planning for policy goals including environmental sustainability, socio-economic inclusion, and energy security.

'Integrated Transport Governance' does not mean setting up new monoliths, but rather creation of circulatory systems for statistical information, user feedback, and constructive interaction between levels of government and agencies focused on particular modes of transport.

The remainder of the chapter focuses on the subset of transport governance issues concerned with integrating policies and investments across modes and levels of government. We look at the status quo in India's transport system in comparative international perspective. India's current structure of separate ministries for each mode of transport is an anomaly in global practice. Transport governance is also unusually centralised, compared to peer countries and there are limited institutional mechanisms for intergovernmental coordination in integrating networks and developing important nodes such as airports and ports. Local government, particularly urban local governments' limited role in regional transport decisions is also somewhat unusual. Most global cities of sizes comparable to India's metros and Tier One cities have far more autonomy to shape their transport infrastructure for development.

Next, we outline a reform agenda for system governance. There are changes needed over the next decade which will be essential foundations for the country's longer-run transport governance. All involve significant institutional restructuring with associated capacity-building needs that cannot be achieved overnight, but must begin now. A set of critical interventions could be initiated immediately to work toward this transformation and help guide transport investment and policy in the interim.

These interventions at each level of government include:

Union Government Moving toward a single 'Ministry of Transport' by building the infrastructure for intermodal coordination of investment, and more integrated assessment of investment and policies. We envision a more consolidated national transport governance under a newly created **Office of Transport Strategy (OTS)** that is primarily concerned with building the foundation for an integrated energy-efficient national infrastructure, reducing externalities from sub-national transport decisions, and leveraging transport as a contributor to national equity goals. Although the Union government may play a substantial role in financing transport infrastructure, incentives embedded in funding should limit themselves to these roles and, following the principle of subsidiarity, other transport responsibilities should be left to state and urban local governments.

The Office of Transport Strategy should build the foundation for an integrated national infrastructure, reduce externalities, and leverage transport for national equity goals.

State Increasing state-level authority over and capacity for integrated network planning, prioritisation and project implementation, particularly for airports, urban transport and roads other than National Highways. States may also be given greater authority (and central resources) to maintain National Highways. Greater decentralisation of transport planning, within guidelines for environmental impact, inclusion, and other national goals, is in keeping with the principle of subsidiarity. It could improve the transport system's responsiveness to socio-economic and technical change in three ways. First, in the classic theories of federalism, lower level governments are assumed to have an informational advantage in understanding and responding to varied subnational concerns. Second, competition between states for investment and skilled labour can create strong incentives for performance, and third, state-level authority allows for greater experimentation with new approaches and technologies. All of these mechanisms rely on sub-national governments having the ability to identify, analyse and respond to the socio-economic needs of their constituencies.

Metropolitan/Urban India may have as many as 70-80 or more cities with populations of more than one million by 2030. Their needs, and especially those of the six or seven 'megacities' that will be more populous and economically larger than many countries in the world, cannot be handled by national or even national-state collaboration. Unified Metropolitan Transport Authorities (UMTAs) with statutory authority, independent finances, and expert staff with access to relevant data need to be created quickly in India's largest cities, and over time, with State support, in the next tier of cities. The national government has required larger cities to develop transport plans as part of the terms for national funding of urban infrastructure policy and national policy urges cities and states to form integrated transport planning units, but the institutional basis for metropolitan transport investment, management, and regulation remains nascent. Effective integration of transport investment across modes and between infrastructure and its use requires regular access to the information and skills of an expert body, as well as a governance structure that motivates attention to regional needs and enables integration of transport

Our goal is governance that motivates all parts of the system to focus on increased mobility and freight capacity at the least possible economic and environmental cost.

with regional planning. We therefore join the High Power Expert Committee on Urban Infrastructure, numerous experts, and civil society in recommending full implementation of the 74th Amendment and creation of the metropolitan planning committees that it envisions. The UMTAs could ultimately be integrated with these metropolitan authorities. Two additional mechanisms could be formation of autonomous transport planning 'centres of excellence' undertaking education, research, and evidence-based advocacy in all cities of at least a million (see Chapter 5, Volume III on Urban Transport). We also recommend allocating funding to support innovative experiments in 'passenger-facing' integration that reduce as many obstacles to multi-modal mobility as possible and thereby focus attention on the gaps in infrastructure and services. As in our recommendations for states, national funding to metropolitan agencies for urban transport should generally limit conditionalities to outcomes rather than approaches to urban transport.

However, all these initiatives will be empty shells unless India builds the human resource and organisational capacities to develop clear, feasible transport plans, implement them, and develop appropriate research strategies to monitor their progress. India must accelerate investment in training more transport planners and build systems for ongoing updating of skills. Human resource development must include not only an immediate push to fill the current gaps, but also a process for ongoing, continuous learning. India's transport planning institutions and their staff must be both motivated and able to experiment and learn from these efforts, adapt to new constraints, and take advantage of new technologies. Research that documents performance, identifies gaps, and develops solutions on an ongoing basis also plays a key part of sector governance. Such documentation and analysis of the relationships between public policies and outcomes is particularly important for coordinating efforts–and warning of undesirable side-effects of particular policies–in complex federal systems.

We conclude by summarising the institutional design rationale for the recommendations. Overall, the recommendations seek to reshape strategy, planning, and implementation across several dimensions: modes of transport investment, physical infrastructure and policies that affect the efficiency of use, and different national, regional, and local-scale systems. Our aim is to encourage governance that motivates all parts of the system to focus on the goal of increased mobility and freight capacity at the least possible economic and environmental cost. Projects and processes are a means, not an end.

DEFINING TRANSPORT SYSTEM GOVERNANCE

'Transport System Governance' is the combination of market, political, and administrative processes that define options for transport investment and use; prioritise among these options; implement the plans through law, regulation, community action and other means; and undertake research to measure the impacts of the transport investments and policies, and provide feedback for system improvement. The 'transport system' comprises various forms of physical infrastructure as well as the policies regulating access to and use of the facilities. Airports, container depots, ports, roads, rail, and inland waterways are part of the same network on which people and goods circulate; traffic laws, environmental regulation, competition regulation, and other policies create the incentives for investment in and operation of the airlines, buses, trucks, cars, ships, and trains that provide the flow. As 'governance,' it ideally includes various feedback loops: from market demand to investment, from political aggregation of preferences to policy choice, and from research to definition and evaluation of cost effective technology, policy, and investment options.

Any institutional strategy for transport governance must recognise that it is transport users' decentralised decision-making within the guidelines of policy and physical restrictions of infrastructure ultimately determine the extent and distribution of transport services available. Physical infrastructure and the policies governing its access and use create a framework for investment and location decisions as well as use of the network, but do not and cannot fully determine the quality of the system.

Government typically sets the terms of access to infrastructure in order to prevent monopolisation of fixed facilities (e.g. roads, railroad tracks, airports, ports) and to maintain incentives for service providers to minimise costs for high-quality service. It generally undertakes this role using a combination of three instruments: public sector development and management of fixed facilities; public-private partnerships with contractual provisions limiting the private partner's ability to restrict access to the facility; and regulation of private providers of fixed facilities. Maintaining competitive access to infrastructure facilities does not require public ownership, construction, or operation of infrastructure.

Governments also generally design and enforce safety regulations for services operating on the physical infrastructure (airlines, bus transport, etc). The market is unlikely to create sufficient incentives for safe operation, because passengers and freight users cannot

readily observe many of the maintenance actions and technical decisions related to safety, nor is there likely to be sufficient competition to allow users to exercise choice to create market pressure for safety. This includes creating and enforcing norms for network use such as speed limits, and traffic rules–a classic coordination role (see Chapter 12, Volume II on Safety).

Policy is important for ensuring that the transport system meets social goals such as environmental sustainability, energy efficiency, and social/economic inclusiveness. There is a range of instruments for achieving these goals, including direct siting and construction of physical infrastructure, subsidies for investments in physical infrastructure, subsidies to service providers, pricing policies, and specific purpose transfers to transport users, among others. Fiscal policies that affect the price of essential inputs for transport, such as fuel, may be designed for a variety of policy goals (such as revenue maximisation) but also affect the transport systems' impact through their influence on individuals' choices about forms of transport in which to invest.

While private investors have sited and built trunk infrastructure in the past (including, especially, railways in the 19th century, since access could be more readily controlled than for roads), governments typically undertake high-level design of the network as part of regional planning for economic development. While each of the components of a transport system could be built and operated privately (possibly under regulation to create competitive access), the public sector is more likely to internalise the externalities that each component creates for other parts of the system, the environment, and energy use. The government's roles in creating the physical network and regulating its use are intertwined, since both affect the potential flow rate of goods and passengers. Public sector institutions can also leverage their scale and relative consistency of structure to provide unique opportunities for accumulating knowledge, experience, and institutional memory over the long term.

The government's role in recognising and creating incentives to internalise externalities from transport investment is particularly important for urban infrastructure. There is a strong and long-lasting relationship between land use and transport as well as significant long-run environmental externalities of transport infrastructure when traffic densities are high. Freight and passenger links to surrounding regions determine the urban economy's contribution to national development. Transport also has social spillovers for equity, access to human-capital enhancing services (health and education), and labour market functioning. Gaps in the transport network can generate significant and long-lasting inequality by distorting firm location decisions and labour markets. Limited access to transport networks may motivate higher concentrations that may then be self-reinforcing, while congestion in economically vibrant areas may drive excessive dispersion. The government's role in providing finance for transport is especially important in rural areas where traffic and freight flows are not likely to be high enough to attract private investment.

Transport has strong social spillovers. Gaps in the transport network can generate significant and long-lasting inequality by distorting firm location decisions and labour markets.

Finally, much of the transport system's physical backbone is also publicly financed. Pure private investment would fall short of the optimal level of transport investment, given the positive externalities from transport development. Many parts of the transport system are also difficult to exclude people from, so would be difficult to finance based on user fees alone. Public finance, whether through broad taxes, carbon dioxide and fuel taxes, or other more focused benefit-linked means such as transport service taxes or user fees and land-based financing, is thus the only option.

In short, the public sector's role is to create an enabling environment for competitive public or private provision of energy-efficient, socially and economically inclusive mobility services.

The NTDPC is meant to provide a framework for institutional design and policy action. The market's role in transport system governance is in the background as a set of transactions and investment decisions that respond to policies that set the context for seeking profits and returns on investment.

Today's transport policy is important, particularly since the modal and spatial distribution of investment will affect the possibilities for freight and passenger flows for decades. However, tomorrow's policy is also important and India must begin to develop the institutional capacity to make these decisions without resorting to unusual arrangements such as the NTDPC. India's transport system will affect and be affected by a various 'known unknowns' in the coming decades:

- Variation over time and across regions in economic growth, driven by exogenous shocks (e.g. monsoon variability) and endogenous but spatially varying factors (e.g. state-level reforms).
- Urbanisation that could be concentrated in concentric rings around existing major metros or could agglomerate across a number of smaller urban areas. Transport investments will play a large role in shaping these patterns, but also have to anticipate and respond to the shifts.

Any institutional strategy for transport governance must recognise that transport users' decentralised decicion making within policy guidelines and physical restrictions of infrastructure ultimately determine the extent and distribution of transport services available.

- Electricity requirements and the means by which they are met: patterns of investment in transmission and generation that affect requirements for fuel transport, energy pricing and fuel choice (see Chapter 8, Volume II on Transportation of Energy Commodities).
- Global energy prices and fiscal policy choices that in turn affect choices about shipping and mobility.
- Technology change that alters costs of transport at various scales, energy requirements for transport, and/or dematerialises communication (e.g. substituting video/voice for mobility; data transmission and decentralised production for freight shipping).

Our emphasis on the institutional system is distinct from the more common approach of stating a policy goal. The Urban Transport Working Group of the NTDPC, for example, argues that India's urban transport planning must move toward an overall approach of 'Comprehensive Mobility Planning,' aiming to increase accessibility ('the ability to reach desired goods, services and activities') rather than simply increase mobility and manage traffic. The planning regime should be capable of designing and implementing programmes to 'Avoid' (reduce demand for trips through IT investment, land use planning, and other means); 'Shift' (shift mobility from personal vehicles to more energy and space-efficient public and non-motorised transport); and 'Improve' (increase fuel efficiency, reduce emissions) in addition to the traditional functions of planning, siting, constructing, and maintaining urban transport infrastructure. These goals are hard to argue with, but the challenge is how to encode these systemic goals in specific departments' operational, tactical decision-making for the next decades, in ways that allow decision-makers to adjust the means of meeting them to administrative capacity, budget constraints, technology opportunities, demographic change, new information on environmental and social impacts as more data on these points emerge, and other local factors.

SUMMARY

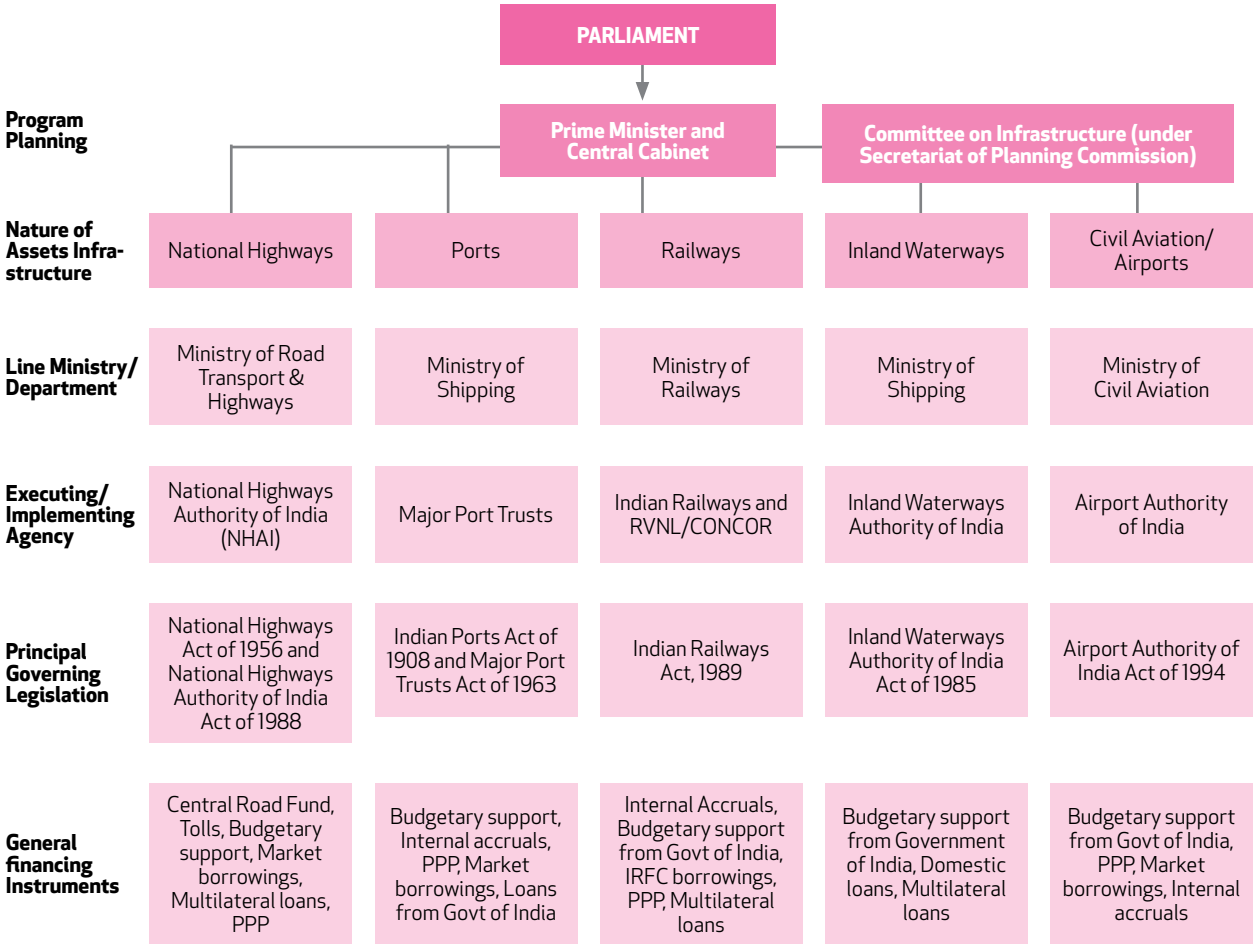
India's transport system will affect and be affected by various 'known unknowns' in the coming decades, including variation over time and across regions in economic growth, urbanisation, energy use and energy markets, and technology change. 'Transport system governance' is the combination of market, political, and administrative processes that will enable the country to respond to these changes. The 'transport system' comprises various forms of physical infrastructure as well as the policies regulating access to and use of the facilities. As 'governance,' it ideally includes various feedback loops: from market demand to investment, from political aggregation of preferences to policy choice, and from research to definition and evaluation of cost effective technology, policy, and investment options. Any institutional strategy for transport governance must recognise that transport users' decentralised decision making within the guidelines of policy and physical restrictions of infrastructure ultimately determine the extent and distribution of transport services available.

The NTDPC is meant to provide this framework for institutional design and policy action. Policy is important for ensuring that the transport system meets social goals such as environmental sustainability, energy efficiency, and social/economic inclusiveness. The government typically sets the terms of access to infrastructure in order to prevent monopolisation of fixed facilities (e.g. roads, railroad tracks, airports, ports) and to maintain incentives for service providers to minimise costs for high quality service. Governments also generally design and enforce safety regulation for services operating on the physical infrastructure (airlines, bus transport, etc), including creating and enforcing norms for network use such as speed limits, and traffic rules–a classic coordination role. Finally, much of the transport system's physical backbone is also publicly financed. There is a range of instruments for achieving these goals: including direct siting and construction of physical infrastructure, subsidies for investments in physical infrastructure, subsidies to service providers, pricing policies, and specific purpose transfers to transport users, among others. Our emphasis on institutional design is distinct from the more common approach of stating a policy goal.

TRANSPORT SYSTEM GOVERNANCE IN INDIA: 2012

India's transport policy environment is fragmented between modes and level of government, with infrastructure investment planning, policy-making, regulatory oversight (to the extent that it exists), and financing strategies scattered across and within levels of government. The country is unique in having separate national ministries for each mode of transport. India's intergovernmental division of responsibilities is somewhat more centralised than in other geographically large federations, and the country lacks the govern-

Figure 5.1
Institutional Arrangement in Central Government



Source: NTDPC Research.
Note: CONCOR=Container Corporation of India; IRFC=Indian Railways Finance Corporation; PPP=Public Private Partnership.

ance infrastructure for intergovernmental coordination around the points where the pieces of the transport system link together. It also has an unusually complex urban policy environment, with limited metropolitan-level fiscal or administrative powers to coordinate transport infrastructure or policy in denser areas.

This arrangement handicaps intermodal planning and execution at all levels of government. Fragmentation has not led to obviously redundant investment, given the general need for more transport capacity across India, but it has led to system inefficiency. Ports do not always have infrastructure for evacuation of goods; rail networks do not link with road networks for last-mile delivery of goods; bus and metro systems in urban areas do not always exchange people. Highways built by one level of government are not always linked to district roads built and maintained by another. The lack of an institutionalised arena or even professional context for examining the interaction between investment and maintenance of the physical infrastructure; regulation of access; and policies affecting operators in shaping the supply of transport options also dulls the system's incentives and ability to respond to demand.

OVERVIEW

Annex 5.1 summarises the country's transport policy oversight across levels of government, focusing on the agencies involved in investment and operations of transport.

Figure 5.1 is a snapshot of the national government agencies involved in India's transport governance. The degree of fragmentation has evolved and generally increased over time. Oversight of rail and ports, at the time the major modes of transport, were initially combined under the Department of War Transport, carved out of the Department of Communications in 1942. Road planning was initially left to another descendant of the Department of Com-

India's transport policy environment is fragmented, with infrastructure planning, policy making, and financing stragies scattered across and within levels of government

munications, the Department of Posts and Air, but assigned to the Department of War Transport in 1944 'in view of the imperative need for close coordination of effort between the authorities concerned with Railway Development and those concerned with the development road communications and transport.'[5] The Ministry of Railways was carved out of the Department of War Transport soon after Independence, in 1951, in accordance with Section 27-A of the Indian Railways Act. The remainder of the Department became the Ministry of Transport & Communications, and some transport-related functions under other ministries (such as Maritime Shipping & Navigation under Commerce) were assigned to this ministry. Assignment of responsibility to departments was reorganised again in 1966, under a renamed but still integrated Ministry of Transport and Aviation.

Two Ministries (Rail and Transport) became three in 1967 when the Ministry of Transport and Aviation was bifurcated into the Ministry of Shipping and Transport and the Ministry of Tourism and Civil Aviation. There was a brief re-consolidation in 1985, with the creation of a new Ministry of Transport with the Ministry of Shipping and Transport absorbed as a Department, but this Department (Surface Transport) became a Ministry again in 1986. The Ministry of Surface Transport was later divided into two Ministries: Shipping, and Road Transport and Highways in 2000. These were merged in 2004 to be two departments of a single Ministry of Shipping, Road Transport, and Highways, but subsequently redivided and currently stand as a Ministry of Shipping with responsibility for Ports and a Ministry of Road Transport and Highways.

The Planning Commission's Transport Division (PCTD) currently functions as the main coordinating body on transport investment as part of its efforts to combine State Plan requests, the broad Plan vision as well as the recommendations of sector working groups and Mid-Year Reviews. Transport infrastructure investment, particularly decisions on programmatic approaches or financially large projects is also a subset of the work overseen by the Planning Commission Secretariat on Infrastructure and the Cabinet Committee on Infrastructure.

The Transport Division's stated mandate[6] includes:

- Addressing policy issues concerning railways, roads, road transport, shipping, ports, inland water transport and civil aviation for improving efficiency and making these sectors more responsive to the present and future requirements of the country.
- Addressing intermodal issues for improving coordination among different transport sectors and ensuring that each sector works according to its comparative advantage and efficiency.
- Organising Quarterly Performance Review Meetings for different transport sectors to monitor progress of transport sector projects according to Plan priorities and targets.
- Carrying out zero-based budgeting in consultation with various transport sector ministries to improve efficiency and utilisation of resources according to Plan priorities and objectives.
- Work relating to Parliamentary Committees for different transport sectors.
- Examining Five Year and Annual Plan proposals received from the states, Union Territories and North Eastern Council in respect of transport sectors.
- Discussions with the representatives of the state governments and Union Territories to review physical targets, programmes and outlays of Five Year and Annual Plans of states and Union Territories.
- Examining the proposals of state governments for provision of Additional Central Assistance.
- Participation in various workshops and seminars relating to the transport sector.
- Formulation, appraisal and monitoring of Five Year and Annual Plans.
- Mid-term review of Five Year Plans.
- Providing inputs for the Working Group Reports on the various transport sectors; preparing Steering Committee Report on Transport Sector.

The first two lines of the mandate imply long-range intermodal planning, but several practical features of the PCTD's context complicate the execution of this task. First, the Planning Commission's larger mandate focuses on capital investment. The policy frameworks for optimising use of the facilities are outside its purview, overseen by ministries, affected by fiscal policy, and enforced by regulatory bodies to the extent that they exist. Maintenance is under ministries' or state agencies non-Plan budgets. Second, most of the Planning Commission's work revolves around a five-year cycle for the Plan. Within this context, there is limited scope for gathering the data or building the technical team for longer-run projections and visioning.

5. As documented in the Organisational History of the Ministry of Shipping listed on its website: http://shipping.nic.in/index1.php?lang=1&level=1&sublinkid=42&lid=52, accessed 13 February 2013.
6. According to http://planningcommission.nic.in/sectors/index.php?sectors=infra, accessed 1 October 2012.

Third, transport-related ministries (Annex 5.3) have significant scope to define their own policies for the modes of transport that they oversee, whether at the request of the Planning Commission or as independent initiatives. The Planning Commission delegated the first concerted study of urban transport, for example, to the Railways Ministry in the 1960s. The resulting report focused on rail-based solutions. The Ministry of Urban Development, which became the line ministry for urban transport in 1986 after the cabinet changed the Allocation of Business Rules, oversaw the most recent National Urban Transport Policy. It also drafted the Model Urban Transport Act for states. Jurisdictional disputes between the Ministry of Rail and Ministry of Urban Development, such as debates over specifications for the Delhi Metro, were resolved by a Group of Ministers and a Cabinet decision.

Similarly, the Ministry of Civil Aviation plays an important role in determining the location and capacity development of India's airports through the Airports Authority of India (AAI). The Ministry can and does dispute Planning Commission Infrastructure Division initiatives, for example in the case of proposed privatisation of Chennai and Kolkata airports. The Ministry of Shipping, under the rules of business, has responsibility for 'legislation and coordination of development of major and minor ports', as well as inland waterways and shipping policies. It also 'formulates the privatisation policy in the infrastructure areas of ports, shipping, and inland waterways'[7], and developed the Maritime Agenda 2010-20 as a statement of longer-run priorities. The Ministry of Road Transport and Highways (MoRTH) claims authority for 'planning, development and maintenance of National Highways in the country,' part of which has been delegated to the National Highways Authority of India (NHAI) established by a separate Act of Parliament in 1988 (operationalised in 1995).

Transportation planning on a regional (multi-state) scale currently takes place through ad hoc coordination between national ministries focused on particular modes of transport, and state level transport-related departments focused on the areas where their jurisdiction and the transport corridors overlap.

STATE AND LOCAL GOVERNMENTS

State governments play a larger role in constructing, maintaining, and regulating the road transport system and some ports than in other transport sectors. They are responsible for establishing the site, constructing, and maintaining roads other than the National Highways. The central government, however, has an important de facto role in state road planning through the Ministry of Road Transport

India is unique in having separate ministries for each transport mode. It lacks the governance infrastructure for intergovernmental coordination around points where pieces of the transport system link together.

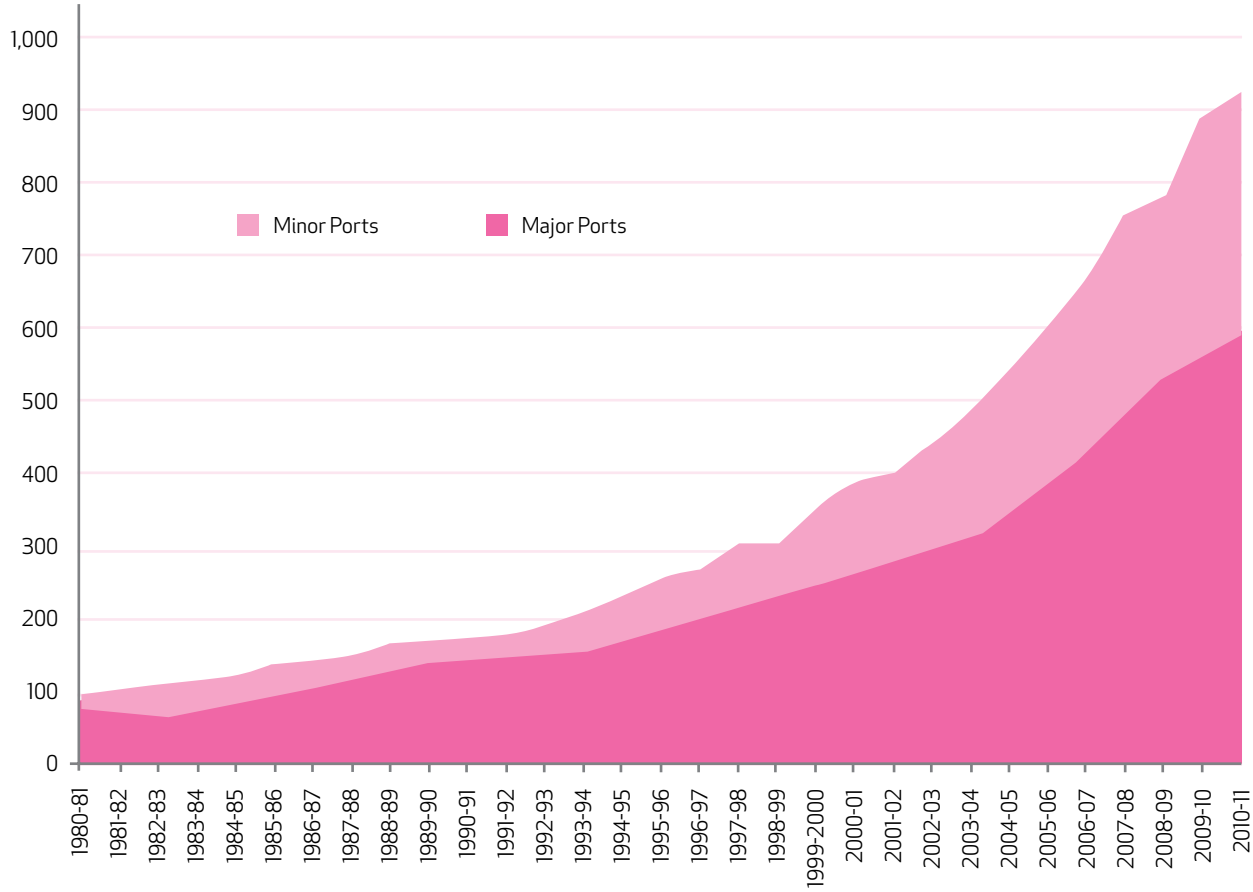
and Highways' responsibility to 'extend technical and financial support to state governments for the development of state roads and roads of inter-state connectivity and economic importance.'[8]

State-level division of responsibility across different tiers of roads (rural, major district roads, highways), policy and implementation, sources of finance (public, private, intergovernmental transfer), and links between the agencies overseeing roads policies and those involved in land, buildings, or other infrastructure also vary. Punjab, for example, separates road planning from construction and maintenance, but does not have separate agencies for rural and district roads/highways. The state has a separate Roads and Bridges Development Board (RBDB) in addition to the Public Works Department. The two are closely linked--the RBDB is chaired by the Minister of Public Works and has the Secretary Public Works as Member Secretary--but the RBDB was established as a separate entity in 1998. It acts as 'a nodal agency to plan, and monitor all aspects relating to construction and improvement of roads and bridges in the state. This Board is responsible for planning and deployment of funds on state roads, fiscal management, project management, interdepartmental coordination and the other key areas.'[9] It is the nodal agency for rural roads under the Prime Minister's Rural Roads programme (PMGSY). The Public Works Department (PWD), on the other hand, is the 'premier agency of the state government for construction, upgradation and maintenance of roads, buildings and bridges in the state.'[10] In Andhra Pradesh, oversight over roads is divided between the Department of Transport, Roads and Buildings (secondary roads) and the Department of Panchayati Raj and Rural Development (rural roads). Within the Department of Transport, Roads, and Buildings, the Roads Development Corporation oversees higher-traffic and privately financed roads. Many of the northeastern states have a single public works department.

The individuals staffing these various entities generally come from the same pool of officers on transfer, however, and thus are likely to have similar attitudes, training, and levels of knowledge on international and national experience in transport. This may improve inter-agency coordination, but it detracts from the ability to pursue specialised goals. As discussed in subsequent sections, it will be important

7. Rules of business as recorded at http://shipping.gov.in/index1.php?lang=1&level=1&sublinkid=43&lid=53, accessed 17 February 2013.
8. Website of the Ministry of Road Transport and Highways, http://month.nic.in, accessed 28 February 2013.
9. http://www.prbdb.gov.in/aboutus.htm, accessed 1 March 2013.
10. http://pwdpunjab.gov.in/, accessed 1 March 2013.

Figure 5. 2
Port Traffic
[Million Tonnes]



Source: Ministry of Shipping, Government of India, http://shipping.gov.in/, accessed 2 January 2012.
ICRA Rating Services - http://www.icra.in/Files/ticker/Indian%20Port%20Sector_Final_26Sep11.pdf, accessed 2 January 2012.

to develop a larger permanent professional staff in relevant state agencies.

The within-state division of authority for the second-tier roads appears to be in part a side effect of the response to new challenges of collaboration with the private sector in infrastructure development: state highway authorities were created to develop, implement, and maintain some sets of highways using private funding, while publicly funded roads remained with the public works or rural development departments. The 2004 enabling Act for Uttar Pradesh's Highway Authority, for example, divides jurisdiction by source of finance rather than road function: '19- (1) Subject to the rules made under this Act, it shall be the function of the Authority to develop, maintain and manage the state highways and any other highways vested in, or entrusted to it, by the state government in the manner that the authority becomes largely independent of government funding for the maintenance of the highways within three years from the date it is set up.'[11]

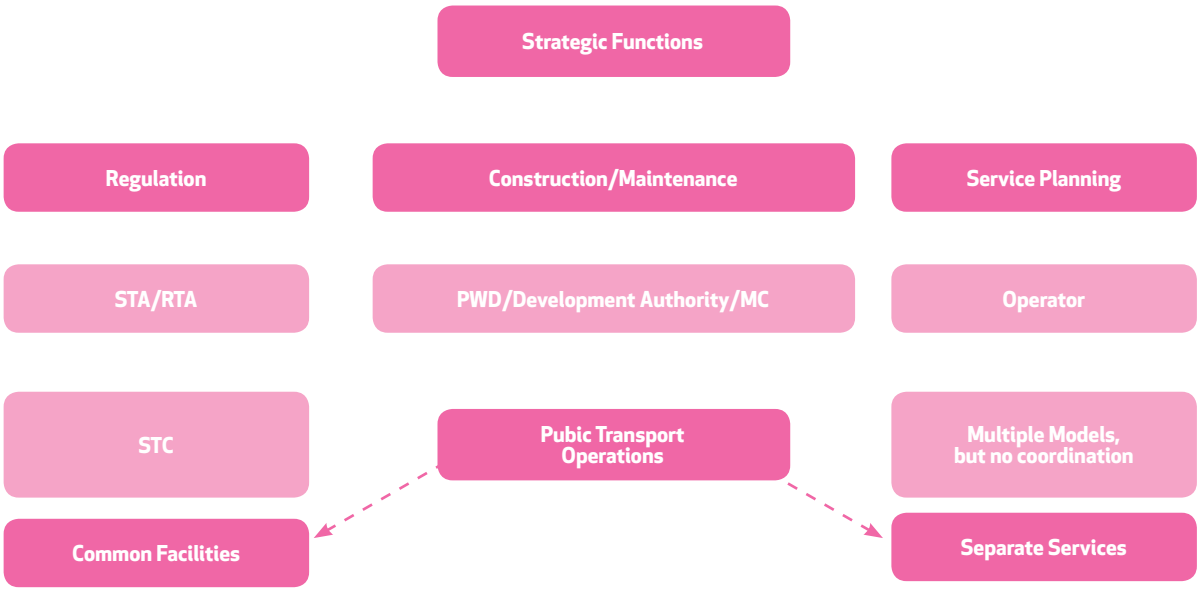
State Regional Transport Offices (RTOs) also issue licenses for private and commercial vehicles, including the common 'All India Permit' valid in states other than the place of issue. State Pollution Control Boards enforce the regionally varied emissions standards set by the national policy for vehicles.

The maritime states have also played a significant role in the development of India's overall port capacity through their investments in and policies toward minor ports. As Figure 5.2 shows, minor ports have accounted for an increasing fraction of India's port traffic over recent years, in part because these ports have been able to engage the private sector in various ways, including allowing the development of captive ports. States have also used their authority over tariffs at minor ports to attract both investment and business, with discounts for larger customers and tariff rates that attract private investment. Dubai Ports World, for example, began looking at larger investments in minor ports after the Tariff Authority for Major Ports reduced the national ports' tariffs to the point that operators started to lose money.

States' direct role in capital-intensive transport investments such as airports or large urban transport systems tends to be limited to being a minority partner with the national government and private

11. http://www.upsha.in/act.htm, accessed 1 March 2013.

Figure 5.3
Institutional Structure for Transport in Indian Cities



Source: NTDPC Research.
Note: STA: State Transport Authority
RTA: Regional Transport Authority
PWD: Public Works Department
Dev. Auth.: Development Authorities
MC: Municipal Corporations
STC: State Transport Corporation.

investors in joint ventures. State governments can propose airports, but they cannot independently develop these without central government permission. Their main influence is reactive, in their control over land acquisition for the projects and thus the location and pace of these projects. 'Airways aircraft and air navigation; provision of aerodromes; regulation and organisation of air traffic, and of aerodromes; provision for aeronautical education and training and regulation of such education and training provided by states and other agencies' is constitutionally a Union subject in India.

States have little formal influence on railway investment or operations. Connections between state-led transport systems (such as urban public transport) and airports are determined case by case. Indian Railways is divided into zones for investment planning, but these coincide with neither administrative regions (state or metropolitan) nor economic catchment areas relevant for transport system planning.

Rural local governments' role in transport is currently limited to contributions to the district rural roads plans and responsibility for maintenance of some rural roads. Both planning and maintenance are done under the oversight of a District Project Implementation Unit that reports to the state government. Working Groups on Rural Roads for the 11th and 12th Plans have proposed more extensive involvement of panchayat governments, although the Working Group for the 12th Plan notes, 'The objective of transferring full responsibilities for management of the rural roads network to PRIs [panchayati raj institutions] in most states is a long-term objective.'

URBAN TRANSPORT

'The present institutional framework to manage urban transport is quite fragmented and the responsibility is diffused. At the city level, several agencies are involved in the management of various components of urban transport. At the state level, urban transport is managed either by the Urban Development Department or by the Transport Ministry. At the Central Government level, urban transport is being managed by three Ministries, i.e. Urban Development, Railways and the Road transport and Highways. Laying down standards and norms for items such as roads is being done by the Indian Roads Congress.'(67)[12].

Urban transport planning is a 'constitutional and institutional orphan' according to the Report of the Working Group on Urban Transport (2012). It takes place as a collective but not necessarily collaborative effort between national, state, and, to a lesser extent, city government agencies. The specific constellation of agencies involved in urban transport planning varies between states due to their role in defining the financial and human resources of local government institutions, and within states by city size. Figure 5.3 summarises the typical division of responsibilities: the state government plays a dominant role in regulation, state and local government share responsibility for road investment planning and implementation,

12. NTDPC, Working Group On Urban Transport (2012).

and the local government undertakes maintenance. Public transport services are operated by a mix of state corporations (primarily focused on inter-city transport), municipal transport corporations (intra-city), and private providers of cabs, rickshaws, and mini-buses.

Transport governance for larger cities (million-plus) is more complex, in part due to the scale of operations but also because it often includes rail-based intra-city transport that national and state agencies are typically involved in.

Recent initiatives to encourage more integrated transport planning in India's larger cities expose the significant gaps in capacity to leverage urban transport for metropolitan development.

The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) required all eligible cities[13] to create comprehensive mobility plans (CMPs) in order to access funding under the programme. These generated some attention to integrating transport planning and the funding does appear to have created an impetus and opportunity for strategy documents such as the Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC)'s Comprehensive Traffic and Transport Plan.

The Energy and Resources Institute's (TERI) review of Comprehensive Mobility Plans (CMPs)[14] finds that the CMPs generally were not integrated with other city plans such as the Master Plan, and that the links between broad goals (if articulated) and specific projects were not made. Most of the CMPs mentioned the need for some kind of apex body, but did not mention details about how these would be formed. The Association of Municipalities and Development Authorities offered a similar critique in a 2010 review of the 35 CMPs then completed or underway. Chotani noted various gaps in the CMPs: lack of attention to mixed land use, slum and informal settlements and mobility needs, inattention to broad changes in city structure and links to the urban periphery, and lack of elaboration on legal and administrative issues in implementation. The report also noted that costing and funding were 'not on a rational approach,' cost benefit analyses were rare, and that road-widening projects were typically at the cost of space for pedestrians.[15]

A report by Hidalgo et al. interviews with '28 urban transport and planning experts in India, including Central, State and Municipal government officials, civil service officials, consultants, academics and representatives of NGOs'[16] found that some cities had gained new insight into transport planning and started to shift their thinking in line with moving people not vehicles. However, the authors' review of CMPs found that they were more often a list of projects rather than a plan based on a coherent strategy or enabling monitoring of the strategy. Municipalities did engage consultants and officials in preparing plans according to the guidelines released by the Union government, making an enormous quantity of data available and highlighting interaction of transport and land use planning. However, the preparation of CMPs was rushed, funding for advancing them very limited, the data collected were generally not managed for subsequent updating and use in ongoing decision-making. The paper also argued that many CMPs involved inadequate consultation in the rush to list projects for funding.

In a separate initiative, the Ministry of Urban Development's National Urban Transport Policy (2006) recommended that each city of more than a million residents form an Urban Metropolitan Transport Authority (UMTA). Only a few cities acted on the recommendation, and even then the UMTAs operate more like committees than planning secretariats. They are the equivalent of the National Development Committee without the kind of technical secretariat that the Planning Commission provides and its ability to generate options for consideration.

As of the 2011 Census, there are 53 cities of that size, but there are only 8-10 UMTAs existing in any form. There are six UMTAs/UMTA-like entities as of 2011, according to Agarwal and Chauhan[17]:

- The Greater Guwahati Transport Coordination Committee, set up in 1999 under the Chief Secretary.
- Delhi Transport Planning Group set up in 2001 under the Chief Minister. The Unified Traffic and Transportation Infrastructure Planning & Engineering Centre (UTTIPEC), set up in 2008 as part of the Delhi Development Authority (DDA), appears to have taken over UMTA-like responsibilities. Agarwal and Chauhan (2011) report that another statutory UMTA was under consideration as of 2011.
- Hyderabad UMTA set up in 2008 as part of the HMDA act. It includes the Chief Secretary as chairman, two transport experts, and heads of all transport agencies.
- Bangalore Metro Land Transport Authority, set up in 2007, discussed below
- Unified Mumbai Metropolitan Transport Authority, set up in 2008.
- Chennai UMTA, set up in December 2010[18].

Media reports indicate that discussions about formation of UMTAs are underway in Pune and Kochi, though the timeframe for implementation is not clear.

13. 68 larger cities, state capitals, and others of historical/tourist/other importance.
14. TERI (2011).
15. Chotani (2010).
16. Hidalgo et al. (2011).
17. Agarwal and Chauhan (2011).
18. The Act is available at http://www.thehindu.com/multimedia/archive/00287/Chennai_Unified_Met_287799a.pdf, accessed 7 March 2012.

Box 5.1

International Support for Integrated Urban Transport: Sustainable Urban Transport Project

The Government of India (GoI), in association with the Global Environment Facility (GEF), World Bank and United Nations Development Program (UNDP), initiated the Sustainable Urban Transport Project (SUTP) project in June 2007. The programme was started with the aim of developing integrated and comprehensive institutional and capacity development initiatives at the national, state and local government levels. The two main objectives of SUTP are:

- Strengthening capacity of GOI, Institute of Urban Transport (IUT), and participating states and cities in planning, financing, implementing, operating and managing sustainable urban transport systems;
- Assisting states and cities in preparing and implementing demonstration 'Green Transport' projects.

The project is being implemented by Ministry of Urban Development (MoUD), Government of India, through a Project Management Unit (PMU) at the national level. Project activities are under the overall guidance of a Steering Committee, under the chairmanship of Secretary Urban Development.[19]

SUTP implementation started in 2010, and is spread over four years and the project has three main components:

National Capacity Development Initiatives The primary objective of this component is to explore options and carry out preparatory work towards establishing and institutionalising the National Urban Transport Policy (NUTP). UNDP is directly supporting this component and the MoUD is tasked with implementation.[20]

Demonstration Projects The aim here is to implement demonstration projects in selected cities. These projects will then be sustainable transport solution-based models for other cities to replicate. The projects focus on four themes:

- Public transport development
- Non-motorised transport development
- Intelligent Transport System (ITS)
- Integrated land use, transport planning and Transit-Oriented Development (TOD).

The World Bank started with an initial list of about 30 cities, and narrowed this down to four demonstration cities: Pune and Pimpri-Chinchwad (Maharashtra), Naya Raipur (Chhattisgarh), Indore (Madhya Pradesh), and Mysore (Karnataka).[21] The World Bank supports this component. The MoUD and participating states and cities are tasked with jointly implementing these projects.[22]

Project Management This component aims to provide technical assistance to the MoUD to strengthen its project management capabilities and enable it to successfully manage the implementation of SUTP.

Role of State Governments The participating state governments, through their designated Implementing Agencies (PIAs), are responsible for implementation of their city demonstration projects. Each PIA has a Project Implementation Unit (PIU), which is led by a full-time project manager. The manager is responsible for day-to-day project implementation activities such as procurement, financial management, social and environmental management, as well as monitoring and evaluation.

Pimpri-Chinchwad, Raipur, Indore, and Mysore are also participating in the Sustainable Urban Transport Project (SUTP) jointly funded by Government of India and the Global Environment Facility (GEF), which includes formation of a UMTA as part of the set of activities for 'pilot cities.' (Box 5.1).

Available information suggests that even the older UMTAs are in the early stages of institutional devel-

19. https://www.pcmcindia.gov.in/sutp/, accessed 21 August 2012.
20. http://www.nayaraipur.com/SUTP/Pages/SUTP.aspx, accessed 29 August 2012.
21. http://www.dnaindia.com/bangalore/report_transport-mysore-makes-a-smart-move_1588173, accessed 2 September 2012.
22. http://www.nayaraipur.com/SUTP/Pages/SUTP.aspx, accessed 2 January 2013.

Urban transport planning remains fairly insulated from urban residents' inputs. Local economic and political stakeholders have neither a clear voice with which to share information, nor to advocate solutions

opment. According to Agarwal and Chauhan (2011), the Guwahati initiative held one meeting and the original Delhi Transport Planning Group never met. Both were established by executive order, but did not gain traction once their political champions were moved. Mumbai's MTA was also created by executive order, but meets more regularly. The Hyderabad UMTA is reportedly the strongest: it has the power to approve projects and the Chief Secretary plays an active role in convening the various stakeholders. (More specific details of transport planning in Bengaluru, Mumbai, and Chennai are discussed in Annexes to Chapter 5, Volume III on Urban Transport).

State and urban governments appear to be creating, for the most part, committees or committee-like structures in their efforts to integrate transport planning across the many stakeholder agencies and departments. These committees may improve information flow and interagency negotiation, but do not address the deep need for the technical capacity required to evaluate technology options, assess and compare likely impacts of collections of projects, and otherwise generate integrated policy and investment packages to meet urban and regional development goals. Committees are also by definition evolving organisations with limited investment in maintaining knowledge bases or documenting organisational learning. They are no substitute for an organisation with a standing professional staff as well as a core, spatially referenced database on urban development.

Metropolitan planning, the backdrop for integrating transport investments for regional development, is similarly underdeveloped. Four of the 18 states with urban areas that should, according to the Constitution, have Metropolitan Planning Commissions[23] (MPCs) to integrate land use planning, regional development, and infrastructure among other tasks, do not have enabling legislation. Most of the enabled MPCs have not actually been set up[24]. No state has provided its MPCs with adequate sovereign authority to actually consolidate the draft development plan of the metropolitan areas and some of the statutes still contradict the 74th Amendment Act[25].

The state of urban transport planning varies across cities in India, but there are some common features. India's urban governance currently has fragmented authority, limited institutional support and capacity for creating a transport system that can be leveraged for urban planning, environment, and social goals (including, in particular, limited scope for coordination between land use planning and transport system development), and lack of channels for broad input from local citizens and businesses.

Transport planning and efforts to meet environmental goals are often disconnected. Some cities have implemented emission reduction plans by court order (e.g. Delhi's switch to CNG), and all have a formal legal framework for setting air quality norms and enforcing vehicle emissions standards. However, the level of actual enforcement varies, and there is no institutional mechanism for building environmental targets into broader plans for transport investment. Even if all fuel and vehicle-related norms were fully enforced, the fact of traffic and idling would continue to lead to higher than necessary emissions.

Transport development agencies do not currently face direct pressures to ensure that their investments reduce traffic sufficiently to meet air quality norms. Some cooperation occurs: for instance, the Karnataka State Transport Department has agreed to work with the Karnataka State Pollution Control Board (KSPCB) to use IT to track vehicle emissions and identify offenders so that fuel and engine norms can be enforced. However, there are no similar pacts to invest in comprehensive traffic management in the state. The Karnataka Traffic Police and the Karnataka Road Development Corporation (KRDC) have joined forces in the Bangalore Traffic Improvement Project (B-TRAC 2010), but the systems that the KRDC will implement are more concerned with managing the existing vehicles on the roads than substituting public transport for private vehicles or planning land use to reduce the need to move to obtain what one wants.

Finally, urban transport planning generally remains fairly insulated from urban residents' inputs. The ongoing efforts to integrate urban transport planning are driven in large part by state initiatives, where decision making is politically removed from the concerns of particular cities. Local political and economic stakeholders, who may have strong incentives to direct investment into transport infrastructure that supports their cities' integration with the region as well as efficient mobility within the city, have neither a clear voice with which to share information on mobility needs or advocate particular solutions. State governments may very well choose integration-enhancing infrastructure in the interests of the regional or state economy, but there is little scope for businesses or citizens' knowledge of the economy and its potential to be formally considered. There is also no forum to balance varying constituencies' preferences over investment in mobility and

23. 'Metropolitan area means an area having a population of a million or more, comprised in one or more districts and consisting of two or more municipalities or panchayats or other contiguous area, specified by the Governor by public notification to be Metropolitan Area for the purposes of this Part'.
24. Sivaramakrishnan and Maiti (2009). Updated by web search by MJ Vishnu, Research at IIHS.
25. Planning Commission (2011).

goods transport. Debates over the prioritisation of investment in an expressway or an expansion of rail or bus-based urban transport, for example, happen in editorial pages if at all.

Unresolved inter-governmental allocation of powers over land use planning and urban administration affects the prospects for coordinated thinking about land use and infrastructure development. This is the case across India. The ongoing discussion about allocation of planning authority between the Bangalore Development Agency and the Bruhat Bengaluru Mahanagara Palike (BBMP) is a high-profile example of the unresolved institutional framework for urban planning in general, but it is not unique[26]. Planning Commission (2011) spells out the national impediments to 'urban strategic planning': urban planning without attention to regional development and the urban periphery, 'rigid master planning' that is not integrated with spatial planning including transportation and land use planning, utopian plans without basis in financial and operational realities, 'inadequate institutional clarity,' and lack of capacity and enabling tools such as GIS and GIS-enabled management information systems.

To some extent this fragmentation is a natural consequence of ad hoc efforts to invest in urban transport in the absence of a clear institutional 'home' as well as the rapid pace of some cities' growth and need to accommodate larger flows of goods and people. As we discuss below, it is also not unusual in comparative perspective.

This collectivity of institutions is expected to absorb and allocate up to Rs 1 trillion per year for the next 20 years in the service of urban India's circulatory system[28]. Questions about which levels of government (if any) will raise, direct, disburse, and use these resources are still open in political and bureaucratic terms. The 1992 74th Constitutional Amendment strengthened municipal governments in principle, but states have been slow to devolve the personnel, resources, and powers for urban planning, finance, infrastructure development, and other city administration to cities.

India's challenge will be to selectively improve policy coordination in order to address impacts that are necessarily interrelated through technology or individual decision-making. Land development choices and mobility needs, for example, are linked through peoples' living and working patterns–policy management can take place in silos, but one cannot help but affect the other. Most transport technologies

The 74th Constitutional Amendment strengthened municipal governments in principle, but states have been slow to devolve the personnel, resources and powers to cities

produce emissions that damage health, agricultural yields, and affect the climate. Environmental policy and transport investment can ignore each other, but they cannot avoid affecting each other. As we discuss later, urban transport governance should recognise, address, and shape these relationships. It should not, however, substitute monolithic bureaucratised bottlenecks for the present fragmentation.

SUMMARY

The subsections discuss the role and responsibilities of various levels of government. National government agencies include the Prime Minister and Cabinet, the Planning Commission, as well as 5 Ministries, one for each mode of transport, and their sub-agencies. The Planning Commission's Transport Division (PCTD) currently functions as the main coordinating body on transport investment as part of its efforts to combine State Plan requests, the broad Plan vision as well as the recommendations of sector working groups and Mid-Year Reviews. Transport infrastructure investment, particularly decisions on programmatic approaches or financially large projects is also a subset of the work overseen by the Planning Commission Secretariat on Infrastructure and the Cabinet Committee on Infrastructure. Mode-specific industries oversee investment programmes and policy for the modes under their jurisdiction.

The Planning Commission is formally charged with undertaking long-range intermodal planning, but there is not currently any entity undertaking these exercises with data and required expertise. The policy frameworks for optimising use of the facilities are overseen by Ministries, affected by fiscal policy, and enforced by regulatory bodies to the extent that they exist. Maintenance is under Ministries' or state agencies non-Plan budgets. Second, most of the Planning Commission's work revolves around a five-year cycle for the Plan. Within this context, there is limited scope for gathering the data or building the technical team for longer-run projections and visioning. Transportation planning on a regional (multi-state) scale currently takes place through ad hoc coordination between national Ministries focused on particular modes of transport, and state level transport related departments focused on the areas where their jurisdiction and the transport corridors overlap.

26. The Bangalore Development Agency (BDA) is responsible for planning under the current statutory provisions of the State Act on Planning and related laws. However, this goes against the premise of the 74th Constitutional Amendment Act that suggests that these functions be vested with the urban local body, BBMP in this case. While both BBMP and BDA come under the umbrella of the Urban Development Department (UDD), Government of Karnataka, the BDA is currently dominant. As a para-statal, it is not answerable to BBMP. BBMP, on the other hand, follows the Zoning Regulations and Land-use Plan prepared by BDA in according building plan and other such approvals. Public representation by civil society as well as PILs in the High Court have called for shifting more powers and responsibilities to the BBMP.
27. Planning Commission (2011).
28. According to estimates from the MoUD, HPEC (2011).

In the roads sector, financing and project selection are not always linked. Road policy and investment is often a key tension point in intergovernmental relations.

State governments play a larger role in constructing, maintaining, and regulating the road transport system and some ports than in other transport sectors. Their direct role in capital-intensive transport investments such as airports or large urban transport systems tends to be limited to being a minority partner with the national government and private investors in joint ventures. They have little formal influence on railway investment or operations. Connections between state-led transport systems (such as urban public transport) and airports are determined case by case. Indian Railways is divided into zones for investment planning, but these coincide with neither administrative regions (state or metropolitan) nor economic catchment areas relevant for transport system planning. Rural local governments' role in transport is currently limited to contributions to the district rural roads plans and responsibility for maintenance of some rural roads.

Urban transport planning is a 'constitutional and institutional orphan' according to the Report of the Working Group on Urban Transport[29]. It takes place as a collective but not necessarily collaborative effort between national, state, and, to a lesser extent, city government agencies. The specific constellation of agencies involved in urban transport planning varies between states due to their role in defining the financial and human resources of local government institutions, and within states by city size.

COMPARATIVE PERSPECTIVE

The division of different transport modes between ministries at the national level stands in stark contrast to international practice. Nearly all of the 100 largest economies, all of the OECD countries, and all of India's emerging market 'peers', the BRICS countries, have a Ministry of Transport or similar integrated equivalent rather than the collection of mode-specific ministries found in India. Some of these consolidated national agencies are also combined with the Ministry (or equivalent) of communication, a categorisation reminiscent of India's early post-independence structure. Iran, one of the remaining countries with separate ministries for different forms of transport merged its Ministry of Housing and Urban Development with its Ministry of Roads and Transportation to form a Ministry of Housing and Transport in 2011. While many of the public finance aspects of transportation, such as fuel taxation, design of appraisal for investments, and approvals for liabilities incurred in public-private partnerships remain under the Ministry of Finance or its equivalent, the trend is clearly toward consolidating planning for various modes of transport into one agency (Annex 5.2).

Railways seem to be one of the last modes of transport to be integrated into system-level planning, particularly in countries with significant histories of rail-based transport. In Brazil and Japan, this 'integration' took place through corporatisation, privatisation, and then policy formation by the integrated ministry. China, until recently, still had a Ministry of Transport and a Ministry of Railways. The Ministry of Urban-Rural Development also oversees some rural road infrastructure.

Many of these integrated national bodies adhere to visions focused on outcomes with inputs or investments (in principle) prioritised across modes to meet mobility or freight goals. The United States' Department of Transport (DOT), established in 1966, oversees road, rail, maritime, aviation, and other parts of the transport system. Its stated mission is to 'serve the United States by ensuring a fast, safe, efficient, accessible and convenient transportation system that meets our vital national interests and enhances the quality of life of the American people, today and into the future.' (http://www.dot.gov/, accessed 2 May 2012). The United Kingdom's Department of Transport states: 'Our vision is for a transport system that is an engine for economic growth, but one that is also greener and safer and improves quality of life in our communities.' (http://www.dft.gov.uk/, accessed 15 May 2012). The South Africa Department of Transport notes, 'Transport is the heartbeat of South Africa's economic growth and social development!' (http://www.transport.gov.za/, accessed 26 September 2012).

Annex 5.2 shows the division of responsibilities between levels of government in several federations comparable to India. India certainly has a relatively more centralised system. Most federations retain some national government oversight of constructing and maintaining facilities for civil aviation, railways and ports, though few retain the level of national control over civil aviation that India has. South Africa's national Department of Transportation, for example, oversees national and international airports, but the provincial governments have jurisdiction over local airports. Brazilian states and even municipalities oversee some of its airports. Many of Brazil's airports are operated by a national government-owned company, Infraero, but it operates as a concessionaire to the sub-national governments and these governments are free to choose other service providers. Most of the United States' commercial airports are owned by state and local governments, although the national government often subsidises airport development and continues to regulate the

29. NTDPC (2012).

Box 5. 2

State and Federal Relations: Ebb and Flow of National Authority over Roads in the US

The United States' road network was based on state plans and administrations for much of its history. The national government did provide financial support: first in the form of land grants in the 1800s that states could then auction to finance transport or other improvement projects; later grant support for roads that the state could apply as it wished[30].

The Eisenhower Interstate System was the first major national government entry into planning the road network. Even then, the Bureau of Public Roads (BPR), the predecessor organisation of the current Federal Highway Administration, consulted state highway agencies to determine possible routes in the initial planning process. The final network placement was approved by the BPR. Substantial funding for it was proportioned and dispatched to the state agencies under the Federal-Aid Highway Act of 1956 with the federal government paying for 90 per cent of the project.

Later, in the 1990's, with aims to expand the Interstate System and subsume it under the newly proposed National Highway System (NHS), the FHWA again provided state agencies as well as metropolitan planning organisations a substantial amount of planning power. This included the identification of key routes, elevating existing routes to Interstate status and the ability to choose new technologies such as Intelligent Transportation Systems (ITS). This was done as the FHWA recognised that the lower-level agencies would have a better knowledge of their key resources and that there should be a concordance between national, state and local transportation plans. However, state and local agencies do need to provide required evidence and justification for their proposals ensuring that accountability and participation would be extended to all levels.

The link between FHWA and the states also extends to sharing of transportation data, which has a large impact on planning for the future. The lack of transportation data in India could be remedied with such a system being put into place in state and local governments in the country.

The United States has continued the move back to a more decentralised approach by reducing restrictions on federal funding provided to states. The 'Moving Ahead for Progress in the 21st Century' (MAP-21) bill consolidated most of the federal transfers to states for specific aspects highways into a single, more flexible stream of funding. The US National Department of Transport describes state DOTs as 'the largest units of government that develop transportation plans and projects'[31].

Source: http://www.fhwa.dot.gov/programadmin/interstate.cfm, accessed 12 October 2013
http://www.fhwa.dot.gov/publications/publicroads/96spring/p96sp2.cfm, accessed 12 October 2013
http://www.fhwa.dot.gov/planning/national_highway_system/dfitm.cfm, accessed 12 October 2013
http://www.fhwa.dot.gov/legsregs/directives/fapg/cfr0470a.htm#470113, accessed 12 October 2013

airports as well as oversee air traffic control and safety.

Similarly, planning for road networks is generally divided between levels of government by tier: higher-speed national interconnections under national highway programmes; state highways, sometimes including higher-traffic ring roads or links between urban and rural areas under state governments; and local government oversight of the lower-use local roads. Financing arrangements and decision-making about the location of road investments often cut across this general intergovernmental relationship: national governments sometimes give states specific funds for surface transport; state governments sometimes guide the location of national investments; national and state governments finance some local roads to ensure access to remote populations; and the balance of authority over roads varies over time (Box 5.2). Financing and project selection are also not always linked. Road policy and investment is often a key tension point in intergovernmental relations given the investment requirements well as the networks' economic and social importance[32].

30. Dilger (2012). 'Federalism Issues in Surface Transportation Policy: Past and Present,' Congressional Research Service Brief (United States).
31. The Federal Road-Aid Act of 1916 was limited to support for 'post roads,' which were mentioned in the Constitution as eligible for national support. States later accepted federal funding for other categories of roads in the 1921 and 1944 Federal Highway Acts, but project selection remained in the hands of state officials.
32. U.S. Department of Transportation (2009). A Guide to Transport Decision-making. Available online at http://www.fhwa.dot.gov/planning/publications/transportation_decision_making/decisionmaking.pdf, accessed 22 January 2013.

While there is agreement on the 'ideal' in urban transport, 'best practice' seems to be elusive. India is not alone in having fragmented and sometimes contradictory systems in this area.

India's governance of regional transport corridors is also somewhat more centralised than international practice for intergovernmental division of responsibility. In some cases, multi-state transport corridors are federal responsibilities, in which the Ministry of Transport or equivalent sets up a sub-agency or a less permanent working group or fund to facilitate inter-state, intermodal coordination. The Saint Lawrence Seaway Development Corporation under the US Department of Transportation, for example, was set up to oversee an important inland shipping route through the Great Lakes. Brazil's national Ministry of Transport has identified eight transportation corridors to be developed to connect inland agricultural areas to ports for export through multiple modes of transport.

In other cases, states or the equivalent first tier of subnational government cooperate to invest in or manage transport infrastructure across state lines, often in collaboration with the national government. The Port Authority of New York and New Jersey (PATH), which oversees bridges, tunnels, terminals, airports in the two-state region, is an example of the latter. It was established in 1921 after a dispute between the national Interstate Commerce Commission ordered New York and New Jersey to find a solution to their disputes over rail and port freight boundaries. The two states formed the authority by interstate compact under a Constitutional clause that permitted such agreements with Congressional consent. The interstate agreements for some aspects of transport in the National Capital Region (NCR) of Delhi are in some ways similar.

The British Metropolitan Areas are another example of voluntary regional coordination for transport systems. These authorities were created (or allowed to continue in existence after the Local Government Reform of 1985) by agreement between the district authorities and were responsible to Boards of Management representing the districts, which had become the highest level of local government in the metropolitan areas after the reform of local government. The metropolitan area of Greater Manchester, one example of this form of organisation, consists of 10 District Councils; Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Stockport, Tameside, Trafford and Wigan. Each District Council has the primary responsibility for providing services in its area but contributes finance from local taxes and appoints local councillors to the Greater Manchester Integrated Transport Authority to represent its district. The Authority decides on public transport policy for the county. The Greater Manchester Integrated Transport (GMITA) has less strategic power than TfL (Discussed in Box 17 in Chapter on Urban Transport) and is restricted to public transport management[33].

While there is substantial agreement on the 'ideal' in urban transport, 'best practice' seems to be elusive. Boarnet's (2011) summary of good practice describes aspirations succinctly: 'The intra-metropolitan systems should be governed at a metropolitan scale. Metropolitan transport institutions should have the authority to balance modes, link to land use, price the system, and adjust plans and infrastructure to fit local tastes and contexts and stages of urban development…Anything that empowers metropolitan-scale governance in user pricing (which within urban areas will include congestion pricing and marginal cost pricing of other externalities), land value-capture tax financing, and integrating land use plans and transport infrastructure should be encouraged. This implies that the governance structures at the metropolitan level should have sufficient tax, pricing, and planning authority to meet those objectives.'. Other general proposals for transport investment planning make similar points. Asian Development Bank (ADB) (2009) recommends integrating decision-making by creating a 'Sector Investment Organisation' for transport and other areas. This should be under the umbrella of 'Strategic Development Corporation' aka entity with regional planning authority.

However, India is not alone in having a fragmented and sometimes contradictory institutional setting for urban transport. The 'conventional wisdom is easy to state. But, as far as I know, it is not implemented anywhere in the world,' writes one researcher[34]. Nigeria, for example, has more than 100 agencies across three levels of government involved in providing urban transport infrastructure or services. Most develop and implement their policies and programmes in isolation[35].

Coordinating bus and rail systems appears to be a common challenge for countries as diverse as Mexico, Hong Kong, Vietnam, and the Philippines. In each case, local governments either run buses or award concessions, while national governments plan rail[36].

Colombia's efforts to simply override incumbent bus providers by offering redundant but better service offer another illustration of the challenges of operating without a comprehensive strategic authority. The national government sought to simply build a new, high-quality Bus Rapid Transit (BRT) system in parallel to a politically entrenched bus system, hop-

33. Gwilliam (2011).
34. Frug (2007).
35. Gwilliam (2011).
36. Gwilliam (2011), Perkins (2012).

ing that the new system would replace/co-opt the old one. De facto policy support for the BRT, however, has been mixed, with the Secretary of Transport allowing the old buses to operate in parallel to the BRT (with additional flexibility in route). Older bus companies have been encouraged to bid for feeder routes, but the regulated routes in the traditional bus system have not been restructured to serve as feeders for the BRT. Gwilliam (2011) attributes the outcome to politics–that the older bus companies 'captured' their regulator--but regardless of the cause, the outcome of clashing systems within the public sector shows the importance of imposing 'peace' via a forward-looking 'referee' for urban transport.

Cities that have succeeded in developing integrated public transport systems still face the challenge of coordinating strategy across investment, maintenance, and regulation of different transport infrastructures. New York City, for example, has a city Department of Transport with 4,500 employees, a Metropolitan Transportation Authority (MTA) operating public transport, and the Port Authority of New York and New Jersey. The first runs subways, buses, and suburban rail to the east of the city, while the second runs the airports, suburban rail to the south, and connections between airports and the rest of the public transport system. A third entity, New Jersey Transit, also run trains and buses into New York and a fourth, the NYC Taxi and Limousine Commission licenses cabs. Transport infrastructure (tunnels, roads, bridges) is overseen by five agencies across two states. Transport for London (TfL) is a prominent example of an agency that has successfully created a seamless passenger experience across subways and buses in the London metropolitan area, but London's boroughs retain authority over a large part of the city's road construction and maintenance. TfL can and does propose integrated policies for reducing congestion and increasing safety on London's roads, host public consultations including on roads development, and develop model contracting and project management frameworks for the boroughs to use, but the boroughs are not legally required to collaborate.

China has moved toward integrating land use and transport infrastructure with a focus on mobility rather than specific modes, but local governments have not caught up with this direction. Most municipal governments oversee a geographic area larger than current built-up area, which has helped with strategic spatial development planning including transport investments, but the integration of decisions about modes of transport is weaker. Local governments still focus on accommodating cars rather than promoting alternatives. Urban bus and metro systems are managed by separate agencies with no formal mechanism for integration, and rail tends to be financially and politically dominant.

Cities that have succeeded in developing integrated public transport systems still face the challenge of coordinating strategy across different transport infrastructures.

Transfers between the two systems are often problematic and inconvenient. Some major cities, such as Kunming, still have no focal strategic planning institutions.

Conflicts between various interests in urban development are inevitable and being resolved on an ongoing basis even in some of the most 'advanced' systems. The Netherlands, for example, pioneered a zoning system that coordinated transport and land-use policy. In practice, local governments sometimes succumb to pressure from large employers and taxpayers to re-classify zones for transport-intensive uses. City and regional plans for land use and transport development in Zurich, Switzerland, were in conflict for about a decade in the 1980s and 1990s. (Perkins, 2012) The typical titles of case studies on urban transport make this clear: Wilkinson (2002) on South Africa asks, 'Integrated planning at the local level? The problematic intersection of integrated development planning and integrated transport planning in contemporary South Africa.' Low, Gleeson and Rush (2003) on Australia, call their study 'Making Believe: Institutional and Discursive Barriers to Sustainable Transport in Two Australian Cities.'

KEY CHALLENGES

This section discusses some of the key challenges that India's institutional environment creates for integrated transport governance. An integrated planning framework and more in-depth research and data collection could help quantify and avert two additional intra-modal challenges stemming from the intergovernmental division of responsibilities.

INTERMODAL COORDINATION OF INVESTMENT

The effects of ad hoc multi-agency coordination are apparent at various scales in India. Facility performance is affected. For example, traffic through Chennai port is growing quickly, but infrastructure projects to connect the port to road and rail networks have been stalled. This is a common occurrence whenever large new facilities such as ports and airports are constructed. Many issues have converged to affect shipping through the port[37]. First, environmental: some of the cargo, such as coal, is dusty, and Madras High Court banned handling of these cargoes. The national Supreme Court then appointed a committee with representatives from state and national environmental regulators, academics, and the relevant state and national top bureaucrats to resolve the issue. The committee has given a list of stringent pollution control measures that the port

37. As reported in Anand (2012).

The current division of responsibilities between levels of government affects the prospects of each transport mode to achieve its potential efficiency. This seems particularly important for India's road network and ports.

will have to complete before it is allowed to handle coal. Second, the State Public Works Department is behind schedule in linking the port to roads by widening near the gate and an elevated expressway to a Chennai suburb. The Ennore-Manali Road, a joint venture of the state government, two national ports, and the National Highways Authority of India, is also behind schedule. Third, bidders for the container terminal are waiting for security clearance from the Central government. The result: 'Every time a top government official visits the Chennai Port, new hope is kindled among stakeholders for the revival of connectivity projects…And often, such hope fades away soon after the visit'[38].

On the larger urban scale, projects often need to be resolved by diplomacy. Informal coordination between the many agencies involved in Bangalore's transport worked well before the inauguration of the new International Airport at Devanahalli, when the state government constituted a High Level Task Force to Airport Connectivity, under the guidance of an Additional Chief Secretary to ensure there was better connectivity to the new international airport from city centre. Inter-agency agreements have also functioned well. The Bangalore Metrorail Corporation (BMC) and the Bangalore Metropolitan Transport Corporation (BMTC) signed an MoU for Common Day Metro-Bus transit passes in February 2011. BMTC introduced a metro feeder bus service in October 2011, when the first line of the Metro was inaugurated. Nevertheless, coordination by MOU does not resolve all of the challenges.

Ad hoc coordination creates an opening for the more politically powerful and/or better-financed transport organisations to disproportionately affect the transport system. The Delhi Metro Rail Corporation (DMRC), for example, reportedly forced the Delhi Transport Corporation to stop operations along some of its routes. It has also opposed proposals for new BRT lines to come up in the same corridors. Such overlapping routes, however, can help ease congestion in the longer run as well as cater to varying client bases.

Diplomacy is also a weak basis for resolving coordination problems that extend across state and national governments. This problem is particularly pronounced for rail-based public transport, which is currently divided among state and national oversight and, within the Union government, between the Ministry of Urban Development and Ministry of Railways. Land use and re-use of existing rights of ways and tracks are one challenge. The BMC and Indian Railways have sparred over land use for points where the two rail networks converge. The Metro's North-South Corridor is stalled because the South West Railways is asking for additional compensation for Railways land to be used by Metro[39]. There have been extended delays over transfer of land to Metro by Karnataka State Road Transport Corporation (KSRTC) and vice-versa for construction of Central Station at Majestic by Metro and Intermodal Bus Terminal at Peenya by KSRTC respectively. The matter appeared in at least two meetings of the Bangalore Metropolitan Land Transport Authority and has been finally resolved. The state government has now resorted to special purpose vehicles (SPVs) to ensure that various projects proposed under the comprehensive traffic management plan move forward[40].

Intermodal fragmentation can also affect regional-scale projects. The Working Group on Roads for the NTDPC reports (NTDPC, 2012) that the Delhi-Mumbai Industrial Corridor Project (DMIC) has been 'persistently making requests to the Ministry of Road Transport & Highways to give special emphasis for development of road corridors necessary for…efficient hinterland dispersal traffic generated on account of the Dedicated Freight Corridor (DFC) and anticipated future demands on account of proposed development of [Investment Regions] and [Investment Areas]' approved by the Government. There has been limited coordination between ministries on developing plans for DFCs and the National Highways Development Programme, although both are important components of the national backbone for freight transport.

INVESTMENT PRIORITISATION WITHIN MODES

The current division of responsibilities between levels of government also affects the prospects for each mode of transport to achieve its potential overall efficiency. This appears to be particularly important for India's road network as well as its ports.

The returns on investment in a kilometer of road depend substantially on what that stretch of road is connected to. The impact of a National Highways project, for example, is affected by the quality of State Highways and Major District Roads that link to it; while the return on upgrading a Major District Road depend on the Highways and rural roads it connects. The funding streams for each tier of roads, however, are distinct and there is limited

38. Anand (2012).
39. http://articles.timesofindia.indiatimes.com/2012-04-18/Bengaluru/31361004_1_railway-land-swr-metro-workers, accessed 2 May 2012.
40. The Bengaluru Airport Rail Link Limited, another Special Purpose Vehicle (SPV) under the Infrastructure Development Department was set to study the feasibility for high speed rail to airport, monorail/ light rail as proposed in Comprehensive Traffic and Transportation Plan (CTTP) and then take on its construction similar to the relationship between BMC and the Metro. In a more recent move, the state government has established Hubli-Dharwad BRTS Company Limited (registered in the first week of May 2012) for taking up the BRTS between Hubli-Dharwad in northern Karnataka.

potential to transfer funding across primary, secondary, and rural networks based on the contribution of an improved kilometer to the network. State implementing agencies could, in principle, integrate decisions about investment in second tier roads and rural roads funded by the PMGSY, but re-allocating funds between national and state highways would be nearly impossible even if the capacity to evaluate alternate uses of funds in a network perspective existed.

There does not appear to be a comprehensive study of the potential to increase the road network traffic capacity and flow rate through selected targeted investments in roads linking to national highways. However, it is clear that state roads are not always developed in the same timeframe as the national investments, nor do they meet quality standards. The Working Group on Roads for the NTPDC notes that most of the state highways and major district roads, which link state capitals and rural areas with National Highways are not capable of handling the extra traffic that would come from connection to a National Highway system: 65 per cent of the state highways have less than two-lane standards and many have narrow bridges and culverts as well as encroachments where roads pass through towns and villages. Nearly all (90 per cent) of the major district roads also have less than two-lane standards. (NTDPC, 2012b). Road conditions are in part a consequence of the Plan/non-Plan separation of maintenance and capital investment budgets, but inconsistent widths along the same road reflect inefficient allocation even within budgets for capital investment.

Some National Highways have also been a weak link in the network. Bihar's Chief Minister, for example, requested permission to take over development and maintenance of some stretches of National Highway so that these could be brought to the same quality as State Highways. The state unilaterally invested in maintenance from its own budget[41].

The division of regulatory authority over India's major and minor ports affects the potential for competitive development of the overall ports system as well. The differences in regulatory oversight between the two sets of ports mean that the policy environment–labour laws, differential effort to attract private investment, tariffs and returns on investment allowed for private operators, affect private investment decisions in addition to the areas' natural potential as ports or their prospects for serving an unmet freight need. KPMG-CII (2008) notes this bifurcation of regulatory oversight as an important 'distortion in an emerging competitive market'[42].

Checkpoints for collecting sub-national taxes and tolls, lack of access control for highways, and varied state and local traffic enforcement affect the capacity of India's road network.

POLICY INFLUENCES ON CAPACITY OF THE PHYSICAL NETWORK

A transport network's performance depends on the policies governing access to and use of the network in addition to the physical infrastructure. This section provides some examples to illustrate the externalities that fiscal regimes and regulatory policy have on India's transport system. It is in no way a comprehensive inventory of all opportunities to improve the carrying capacity of India's physical transport infrastructure, but is meant to establish the existence of substitutability between investment and policy change and make the case for India to invest in building the institutional capacity to identify, quantify, and reduce these impacts faster.

Checkpoints for collecting sub-national taxes and tolls, lack of access control for highways, and varied state and local traffic enforcement affect the capacity of India's road network, for example. One widely-cited study by IIM Calcutta and Transport Corporation of India estimated that delays at checkpoints led to time and fuel wastage of Rs 870 billion[43]. Deloitte (2012) reported similar findings in a study on the logistics in India[44]. While octroi checkpoints have been nearly entirely phased out along with the tax, tolls and checkpoints for overloading remain. The new category of federally-funded expressways include built-in access control, but states are otherwise in control of preventing incursions on National Highways and the enforcement is complicated by absence of physical barriers. Similarly, traffic control decisions and investments–designation of one-way streets, investments in curbs or dividers, signal timing–affect flow rate and as such can be seen as substitutes for investment in road length or width.

The regulatory and fiscal regimes for civil aviation, fuel, and industry services also affect the impact that investments in airports have on the overall transport system capacity. Landing rights, for example, affect airlines' decisions about routes to serve. The NTDPC Working Group on Civil Aviation considers the slots akin to a 'natural resource,' an essential input for provider decisions on par with spectrum for telecom services (NTDPC, 2012c). There is currently regulatory overlap in slot assignment, some inconsistencies in slot allocation processes across airports, and no provision to trade slots. The gener-

40. Srivastava (2012).
41. KPMG-CII (2008).
42. The document was not publicly available. IIM-Kolkata press release available online at http://iimcal.ac.in/iim-calcutta-study-indicates-huge-loss-countrys-economy-due-shoddy-road-checkpoint-system, accessed 10 January 2013.
43. Deloitte & Indian Chamber of Commerce (2012).

Fixation of economic levels of rail tariffs, for both freight and passengers, is a constant struggle in the current politicised system that distorts modal distribution of freight traffic.

ally high, but state-varying price of aviation turbine fuel, may also affect route decisions. The Report of the NTDPC Working Group on Civil Aviation notes that ATF accounts for 40-50 per cent of airlines' operating costs. India's fiscal regime also discourages development of domestic maintenance options, affecting flight planning by forcing Indian carriers to take their aircraft to Dubai, Singapore, Malaysia, and other MRO centres. According to the Working Group (NTDPC, 2012c), Indian MRO players have to suffer an additional tax burden of nearly 40 per cent over foreign MROs due to import duties on equipment and spare parts, VAT, and service tax. Domestic MROs also find it difficult to bring experts into India for urgent repairs due to security and visa restrictions. Service aircraft are 40-50 per cent more expensive in India than in neighbouring countries. Spare parts are also not always kept in stock because customs, VAT, and octroi are high for third-party MROs.

Finally, the politics of railway pricing are an obvious factor in the modal distribution of freight traffic. Freight tariffs, kept high in order to cross-subsidise passenger traffic, may be lower at times than the costs of road transport, but they are not sufficiently lower to offset the inconvenience of shifting from rail to road for the last mile of transport. Fixation of economic levels of rail tariffs, for both freight and passengers, is a constant struggle in the current politicised system of fixing rail tariffs.

INDIA'S TRANSPORT GOVERNANCE: 2023

India's transport governance must move toward five significant changes over the next decade:

(i) Creating a consolidated Transport Ministry to focus on systemic performance;
(ii) Setting up an Office of Transport Strategy (OTS) to coordinate transport policies at the national level.
(iii) Clearly decentralising policy and planning authority, including urban transport, to the constitutionally recognised urban and metropolitan governments;
(iv) Building a comprehensive regulatory environment to govern transport flows, and
(v) Building an interdisciplinary cadre of transport experts.

This chapter focuses primarily on the first three challenges, leaving the other two to the chapters on Regulatory Issues and Research and Human Resource Development. Each of these is representative of broader institutional challenges beyond transport.

SET UP A UNIFIED MINISTRY OF TRANSPORT

CENTRAL GOVERNMENT

India needs to have a single unified ministry with a clear mandate to deliver a multi-modal transport system that contributes to the country's larger development goals including economic growth, expansion of employment, geographic expansion of opportunities, environmental sustainability, and energy security. The current collection of ministries creates a list of mandates to deliver particular types of transport infrastructure, with little incentive or ability to consider how these pieces interact as a circulatory system for moving goods and people.

Transport planning is too big a job for a dedicated 'Group of Ministers.' These are designed for coordination of existing plans and do not have the standing technical staff or information base to undertake integration of plans at the design phase. It is also too big a job to be left to the Planning Commission, as is the current de jure arrangement. As discussed earlier, the transport system involves much more than capital investment and strategies must be developed over a longer time horizon than the 5-10 year period that most of the Planning Commission's work focuses on. It is possible but unlikely for a particularly skilled individual from the Planning Commission or Prime Minister's Office (the two entities with a mandate for inter-ministerial coordination) to broker a set of productive exchanges and concessions. And in any case, this would be short-lived.

That said, the Transport Ministry must be carefully designed to create and maintain an incentive structure that encourages technical excellence, open-minded consideration of all available options, and consistent attention to transport system goals rather than particular means. Concentrating transport authority in one entity creates the potential for more coordinated–larger scale–failure as well as success. This objective implies two essential structural features:

- Explicit distribution of accountability between Ministers and the Ministers of State, with the Minister being responsible for systemic outcomes and 'first among equals.'
- Investment in an integrated monitoring and public reporting system that tracks system performance above and beyond achievements within particular modes. The common data repository would also support improved communication between departments.

The Transport Minister should be held responsible overall for the transport system's contribution to development goals articulated by the Government. The Ministry's consolidated data collection and reporting should be designed to monitor these goals and should measure system-wide performance on access, energy efficiency, cost, and other parameters. It should also include a Secretary of 'Transport Affairs' or similar, and a professional staff, similar to the Department of Economic Affairs, to support this focus on system-wide performance and develop broad policy and investment frameworks for investments in particular modes.

The existing ministries should become Departments focused on delivering effective transport infrastructure and services for each mode. Each would be led by a Minister of State with support from a Secretary and a technical staff. Each of these Departments must have the technical ability and procedural standing to make a credible case for investment and policy in its mode of transport to meet the broader framework set at the Ministry level. This distribution of authority and technical expertise is important to maintain an ongoing, constructive discussion of various means for meeting transport development goals.

Day-to-day operations should be overseen by Divisions within these Departments, headed by Joint Secretaries. The number and structure of these divisions should be determined on the basis of transport needs, corporate structure, and technical requirements when the Transport Ministry is formed.

Nearly every other country in the world, and every one of India's perceived peers, has moved in this direction. Railway systems have also been included as part of this unified Transport Ministry or equivalent. China's integration of rail into the larger Transport Ministry is underway. Most of these integrated ministries retain the basic division of labour across departments focusing on different modes of transport, with additional 'integrative' sections looking at energy efficiency, innovation, and other cross-cutting functions. This may be for political feasibility, and international experience with integration should be reviewed in more detail after the concept of a single Transport Ministry is accepted in principle.

Consolidation of all or some parts of various ministries into a single Transport Ministry will be difficult in an era of coalition politics, but it must be done. As discussed earlier, the trend in transport governance in India in recent decades has been in the other direction, and any effort to consolidate has been overturned. Fragmentation of responsibility runs throughout the government. Each election brings some form of ministerial re-

Consolidation of all or some parts of various ministries into a single Transport Ministry will be difficult in an era of coalition politics, but it needs to be done. Unfortunately, the trend in recent decades has been in the other direction.

structuring to create the requisite number of cabinet portfolios.

However, politics and the preference for the path of least resistance cannot continue to hold public sector transformation hostage. Other committees have also suggested similar consolidation: the High Powered Expert Committee on Urban Infrastructure, for example, called for merging the Ministry of Housing and Urban Poverty Alleviation and the Ministry of Urban Development. It is time to examine these various suggestions in aggregate and negotiate a comprehensive restructuring. The settlement should also include provisions that restrict the Government's ability to re-allocate business, as a way to prevent the problem from recurring.

STATE GOVERNMENTS

A similar process of integration of transport planning and policy into a single department must happen at the state level. Given states' relatively limited jurisdiction (mainly roads, urban transport, and ports), the main focus must be on integrating investment planning and policy across urban and rural areas, with particular emphasis on serving high-density peri-urban areas. The near-term priority is to develop the states' capacity and ability to articulate transport requirements, improve urban transport and its links to regional economic networks, and provide feedback for national transport investments.

Consolidating transport planning across modes takes time, even when there is some history of coordinated decision-making. Russia, for example, has re-consolidated all of its transport ministries, but is still said to have fragmented decision-making. Central planning involved intermodal coordination among a set of mode-specific industries before the 1990s. The government replaced this arrangement with a single integrated Transport Ministry for all modes except rail when it liberalised in 1990, but then re-divided this Ministry into separate ministries for each mode in 1996. This led to 'overlaps of responsibilities, policy incoherence and most significantly gaps in policy, notably with respect to sustainable development and intermodal containers'[44]. The government attempted to coordinate these Ministries by forming committees (more than 50 of them over four years, but ultimately decided to reunite the ministries in a new Ministry of Transport in 2000.

44. Perkins (2012). 'Seamless Transport Policy: Institutional and Regulatory Aspects of Inter-Modal Coordination,' World Bank—International Transport Forum Working Paper, May 2012.

Railways came under the Ministry in 2004 when railway operations were corporatised and re-established as a state-owned company. Simply re-labeling institutions, however, has not been enough. According to Perkins:

'The earlier fragmentation of the sector is, however, still felt as many decisions on fiscal policy, funding and regulation are taken in other ministries or in industry associations. The cultural change involved in transitioning from a fragmented model of modal ministries to an integrated ministry with separate corporatised transport service operators is bound to take time and meet resistance, so authority for policy making across the modes has to be identified clearly in government – either in a comprehensive transport ministry or a ministry or inter-ministerial authority for economic reform of some areas of policy are not to be captured by vested interests.'

Later in this chapter, we discuss some early investments in integration.

IMPLEMENT THE 74TH AMENDMENT, INCLUDING, IN PARTICULAR, THE METROPOLITAN PLANNING COMMITTEES

Metropolitan[45] governance is particularly important, given India's new trends leading to expansion around metropolitan cities, in which new employment and investment are increasingly locating on the outskirts of large cities[46]. Economically contiguous (or economically relevant) areas in Indian cities are nearly always much larger than the formal Urban Land Body (ULB) boundaries, and it appears that the large 'near-urban' population is expanding. Some have estimated that as many as 200 million more people live in 'near-urban' conditions on the periphery of metropolitan areas or in large towns that other countries might classify as urban areas.

The new Metropolitan Urban Transport Authorities should be financially independent and have some authority over allocation of funding for urban transport projects, to ensure that they can exercise their statutory role in integrated planning across geographies and modes.

Urban transport governance has several critical elements: expertise for generating feasible policy alternatives and evaluating them on technical merit, discussion fora for evaluating these options in light of multifaceted urban development goals (e.g. sustainability, equity, economic growth), credible authority for sanctioning plans as well as modifying them in light of new information, and the ability to implement the chosen plans efficiently. People need to be capable of generating sound policy options, politics need to hold them accountable for contributions to urban development, and finance has to flow once decisions are taken.

India will need to invest in the people and information systems for urban transport planning as well as delegate the financial authority to act on these strategies. We recommend establishing urban transport as a state responsibility in general, with devolution of authority to metropolitan governments of larger cities. Unified Metropolitan Transport Authorities (UMTAs) must be made independent and given the technical capacity and access to financial resources for effective, responsive metropolitan transport planning.

State governments or their sub-agencies, the Development Authorities, are currently the only platform for such institutional investments, and some of the nascent UMTAs act as subsidiaries of these entities. While the Development Authorities are charged with metropolitan area development, they are politically accountable to the state government. Calls to route more funding for urban transport projects through existing UMTAs operating within Development Authorities could reinforce state dominance over urban transport. International experience demonstrates that consolidating urban transport is a long run (many-decade) institutional construction project in any case; thus, it should start on a firm foundation.

The NTDPC therefore recommends the formation of new statutorily and financially empowered agencies, the Metropolitan Urban Transport Authorities (MUTAs). These are discussed in more detail in Chapter 5, Volume III on Urban Transport. The core point is that these bodies should be financially independent and have some authority over allocation of funding for urban transport projects. The latter is essential for ensuring that the MUTAs can exercise their statutory role in integrated planning across projects, geographies, and modes that may also be influenced by other actors in urban governance.

STRENGTHEN AND COMPLETE THE SET OF INDEPENDENT REGULATORS

A separate chapter addresses the principles and proposed design of transport regulation to oversee various aspects of access to and usage of transport infrastructure, including maintaining competiveness, de-politicising pricing and subsidies, protecting consumers, and governing public-private partner-

45. 'Metropolitan' regions are defined in the Constitution as 'areas having a population of a million or more, comprised one or more districts and consisting of two or more municipalities or panchayats or other contiguous area, specified by the Governor by public notification to be Metropolitan Area for the purposes of [Article 243]'
46. World Bank (2012).

ships in delivery. We note two points here. First, regulation is a complement to the transport system and substitute for particular transport infrastructure investments. It must be used this way to conserve scarce resources. Emissions regulation, for example, increases the cost of operating a private car, and increases the attractiveness of public transportation. The extra customers swayed toward using the metro or bus system can help improve the financial sustainability of that system. Shifting passengers to public transport can also ease congestion in the same way that widening a road or building a flyover would–in fact, it is likely to be a more sustainable fix since capacity is easier to adjust. Similarly, railway pricing for freight–currently a political decision but at some point a regulatory decision–also affects the use of road versus rail infrastructure and the congestion on each mode for a given level of capacity.

Second, the regulatory framework should comprise a mix of general-purpose and sector-specific regulators as required to leverage expertise effectively. Some topics, such as monitoring and preventing anti-competitive behaviour, for example, draw on a general body of institutional design and economic knowledge and should be governed by law or multi-sector regulators in collaboration with sector experts. Other aspects of infrastructure regulation, such as the means to creating a level playing field given the technologies in use, are arguably more sector-specific and require deeper specialised expertise to be deployed within broad guidelines. India should not simply create sectoral regulators expected to cover all aspects of regulation within a sector-specific silo.

This report recommends sector-specific regulators to identify and allocate valuable inputs between public and private investors as well as between private providers, since understanding the amount, dynamics, and possible divisibility of economic value created by infrastructure development or service provision requires sector-specific expertise.

However, many of the regulatory issues related to transport come down to restricting anti-competitive behaviour, and detection of anti-competitive behaviour is arguably a more general skill. Strengthening the Competition Commission of India (CCI) and clarifying its jurisdiction could support more efficient use of existing infrastructure. Aggregating oversight and enforcement of competitive behaviour also retains flexibility to look into interactions between technologies that may functionally overlap (e.g. different modes of transport). Consolidating competition oversight in the CCI would limit fragmentation of scarce expertise and avoid inconsistent policies across sectors that may be administratively distinct but technologically inter-related. It would also reduce the potential for regulatory jurisdiction-shopping.

Consolidating competition oversight in the Competition Commission would limit fragmentation of scarce expertise and avoid inconsistent policies across sectors.

BUILD AND MAINTAIN A HIGH-QUALITY INTER-DISCIPLINARY PROFESSIONAL BODY OF TRANSPORT PLANNING EXPERTS

Comprehensive transport planning requires a range of expertise to be drawn from different academic disciplines and put into practice. Such expertise is needed to enable the development of feasible, cost-efficient policy options for national, state, and urban local bodies' consideration. Civil engineering and materials science, construction management, project management, financial structuring (whether PPPs are involved or not), economic and other social science analysis of impacts, systems science and agent-based modeling (in turn familiarity with programming and mathematical theory), geography, and other areas of expertise, all have roles to play. This is a medium to long-term goal because it will require both demand-side administrative reform to create attractive positions for transport professionals, as well as investments in the supply side, human resource development.

As discussed in the chapter on Research and Human Resource Development (Chapter 11, Volume II), India must also build up its research capacity. Most Asian and European countries (EC, France, Netherlands, Sweden, Japan, and South Korea) visited in a 2008 study tour undertaken by the United States' Federal Highways Authority believed that 'if you aren't doing transportation R&D, then you won't be globally competitive.'[47] Research and policy analysis also create important feedback loops for transport policymakers as well as those in other agencies (such as revenue) whose decision affects the system. It is not possible to integrate all factors that affect transport outcomes into one institution; research and policy analysis create an alternate means for information to flow between decision-makers. Transport data and analysis also play an important role in modulating the market response to transport policy and investment: investors and customers who are aware of their options are logically more likely to behave like the optimising individuals often assumed in models.

47. Office of International Programs, U.S. Federal Highway Authority. Report available at http://international.fhwa.dot.gov/pubs/pl09015/02.cfm, accessed 13 October 2012.

INDIA'S TRANSPORT GOVERNANCE–FIRST STEPS: 2013

This report recommends establishing a national 'Office of Transport Strategy' (OTS) to host data and technical expertise for developing, monitoring, and refining longer-range strategies for transport as the Ministry of Transport comes together. This OTS could be thought of as a standing version of the NTDPC, with a permanent secretariat, budget, and ability to request and generate data. In the short run, it would both develop alternatives and convene the relevant policymakers to consider options. In the long run, the OTS could perhaps be absorbed as the technical secretariat for the Minister of Transport. However, arguments could also be made to keep the OTS associated with the Planning Commission in order to promote greater professional independence and coordination with overall planning.

State-level transport agencies would perform a similar technical role in designing transport programmes, leaving implementation to the existing Departments of Public Works. It would work closely with the State Urban and Rural Development Ministries as well as the Chief Minister on transport planning to address state development, and be the primary liaison to the national government for intergovernmental coordination of transport investment and policy. As state transport planning capacities are built, we recommend that state governments be given greater statutory responsibility for airports and rail-based urban public transport. This is particularly important as smaller regional airports are developed in the coming decades, so that complementarities between airport location and state investments in road networks, tourism infrastructure, and market hubs can be exploited.

In the long run, there is no substitute for establishing financially independent, well-staffed urban governments that would undertake transport among other roles.

OFFICE OF TRANSPORT STRATEGY: INTEGRATING NATIONAL TRANSPORT DEVELOPMENT

Given the political challenges of consolidating India's existing division of responsibilities in the short run, India must focus on the most essential part of the groundwork for integrated transport governance: establishing a 'Strategy Secretariat' with the resources to build a technical team; aggregate, manage, and analyse transport data; and assert itself as a compelling advocate of policies that leverage transport for development goals.

The proposed Office of Transport Strategy should be set up as an independent agency along the lines of the Independent Evaluation Office of the Planning Commission[48]. The IEO has been constituted to review progress more than set forward looking strategy, but, most importantly, it has the freedom to conduct independent analysis, hold open consultations, and publish its research in any way that it sees fit.

The OTS mandate would be to build on the work of the NTDPC by providing ongoing technical support for sectoral investment programmes as they are accepted, evaluating alternatives for the institutional reforms, setting up new entities as proposals are accepted, and updating the Committee's analysis in coming years. Strategic transport planning is not a one-time exercise, particularly in times of economic and political uncertainty.

The OTS should also have the mandate to overhaul India's system of transport statistics in preparation for the creation of a Ministry of Transport. The simple act of measuring and tracking outcomes is a necessary foundation for moving investment and policy away from processes and projects to systemic impact[49] outlines the evolution of transport policy's focus:

'Over recent decades there has been a growing focus in transport policy making towards service delivery to end users, in both freight and passenger transport. The policy focus has shifted from intermediate goals such as annual plans and budgets for public transport corporations and annual spending on infrastructure, to final goals in terms of the effectiveness of transport services in providing access to jobs, housing and leisure activities, aiding the competitiveness of businesses and creating the conditions for economic growth.'

This transition cannot happen in a context where progress is measured by project completion or process guidelines. Perkins goes on to emphasise the importance of developing new data on transport to inform policies and investments in the system:

'This [emphasis] is reflected in a range of initiatives including requirements for public transport services to publish key performance indicators, governments providing public support for the development of advanced logistics management tools, increasing political interest in congestion and a new transport policy focus on reliability of service and, in a few administrations, the development of analytical tools to focus on the end-to-end journey.'

An OTS with a mandate to produce and disseminate policy options focused on leveraging transport investment and policy as tools for development and the powers to obtain the required inputs and ensure that its analysis is considered in key decision-making fora would fill an important gap in India's transport governance. As technical agency, it would effectively

48. The first Director General of the IEO, Ajay Chibber, was appointed in August 2013.
49. Perkins (2012).

Box 5. 3

Factoring Life Cycle Energy and Emissions Costs in Transport Decisions

Environmental impact assessment exercises and other environmental analyses carried out to support decision-making in transport sector do not consider the full life cycle energy and CO_2 costs/impacts of transport modes and focus on the tailpipe impacts only. It is, however, necessary that a holistic approach is adopted while analysing the impacts of the sector. Different transport modes involve varying degrees of construction and maintenance activities; while some modes may be highly material and energy intensive, the others may be comparably low intensive. Material and energy consumption at various stages of a transport project i.e. construction, operations and maintenance, needs to be examined in order to fully understand its impacts on the environment. Life cycle analyses (LCA) are typically used to assess such holistic/full-life impacts of various products, systems, projects, etc. ISO 14042 defines LCA as a systematic way of evaluating the environmental impacts of products or activities by following a 'cradle to grave' approach. It involves identification and quantification of material and energy consumption and emissions which affect the environment at all stages of the entire product life cycle.

Application of LCA to the transport sector becomes important as transport impacts are not limited to tailpipe only. Full life cycle impacts of transport need to be accounted and recognised while taking policy decisions related to 'greening' of the sector. Understanding of the life cycle energy consumption and CO_2 emissions associated with various life stages of different transport modes can help make informed choices for climate-friendly and energy-efficient modes for the country and for suggesting intra-mode improvements to reduce these impacts.

The LCA in the transport sector should aim to understand the energy and emissions equivalent impacts of at least the following activities in life cycle of any transport project[50].

1. Production of construction materials used in transport construction activities
   - Embodied energy and CO_2 emissions in construction materials
2. Transportation of construction materials to site
   - Direct energy consumption and CO_2 emissions due to fuel consumption by vehicles transporting construction materials
   - Embodied energy and CO_2 emissions in fuels used
3. On-site construction activities
   - Direct energy consumption and CO_2 emissions due to on-site fuel consumption (by construction machinery)
   - Embodied energy and CO_2 emissions in fuels used (by construction machinery)
   - Carbon sequestration potential lost due to removal of vegetation on site
4. Operations of rolling stock/vehicles
   - Direct energy consumption and CO_2 emissions by rolling stock/ vehicles
   - Embodied energy and CO_2 emissions in fuels used
   - Energy consumed and CO_2 emitted due to manufacturing and maintenance of rolling stock
5. Annual and periodic maintenance works for fixed infrastructure
   - Material consumption (embodied energy and CO_2)
   - Energy use on site

Source: TERI (2012).

complete the triad of capabilities required for transport strategy: generation of sound policy options (OTS), review of consistency with social goals (Government), and implementation (existing Ministries-cum-Departments of the Ministry of Transport). It would leave existing agencies to pursue their current mandates, but within a clearer strategic framework. The Planning Commission, for example, would continue to coordinate investment planning across ministries and states. Each ministry would continue to be the nodal agency for policies and investments in its jurisdiction.

The OTS should be granted a number of powers in order to pursue its mandate. These include:

- Mandate to recommend formation of a High-Powered Committee, Group of Ministers, Expert Group/Task Force or similar to further coordination of projects and transport

50. TERI (2012).

Box 5. 4

Facilitating Informed Choices of Urban Transport Modes

An understanding of the life cycle energy and emission costs resulting from the above listed activities in the life cycle of a transport project can help make informed and objective choices of transport modes and technologies in our policies and plans, especially in urban transport plans where different urban transport options are evaluated for meeting the mobility needs of the cities. As stated earlier, traditional environmental impact analysis exercises carried out to support decision-making in transport sector do not consider the full life cycle energy and CO_2 impacts of transport modes.

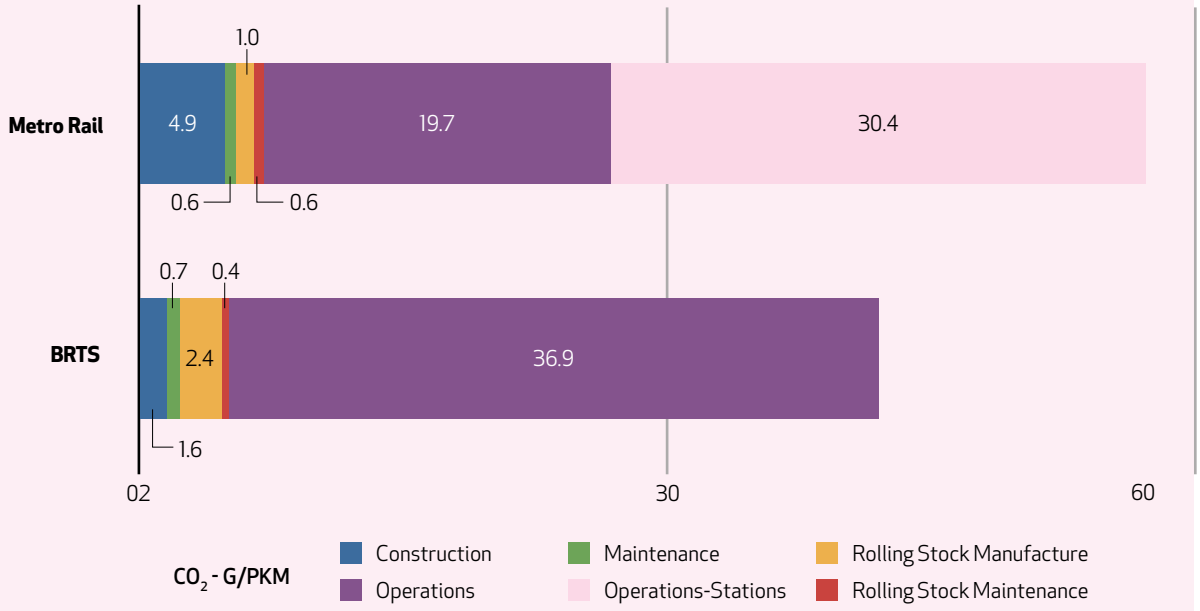
It is important that decisions related to choice of transport modes, especially in urban transport plans, consider the life cycle impacts in terms of energy and CO_2 emissions in addition to other financial, technical, and environmental criteria used today. This becomes important in today's context when energy security and climate change have been recognised as areas of concern and measures to address these challenges are being deliberated upon. Consideration of modes that are least energy and carbon intensive throughout their life period can help address these challenges to some extent.

Considering life cycle energy and emission costs in urban transport modal choices can change the way we conventionally go about making choices for different transport modes in our cities. While cities may choose high capacity public transport systems like metro rail as the least carbon emissions generating technology for public transport because they generate zero emissions at tail pipe, an evaluation based on life cycle analysis indicates that a metro system generates more CO_2 emissions/PKM on a life cycle basis compared to for example a BRT system, which can also offer high levels of capacity to carry urban commuters (Figure 5.4). The same metro system, however, is more energy efficient (on a per PKM basis) for its full life period, when compared to a BRT system (Figure 5.5). Introducing life cycle impact considerations can hence bring more detailed understanding of the overall impacts of a system/proposed infrastructure project that are not limited to just tailpipe or a particular city and help make informed choices based on the economic, social and environmental objectives/goals set by national, state or city governments.

Source: TERI (2012).

Figure 5. 4

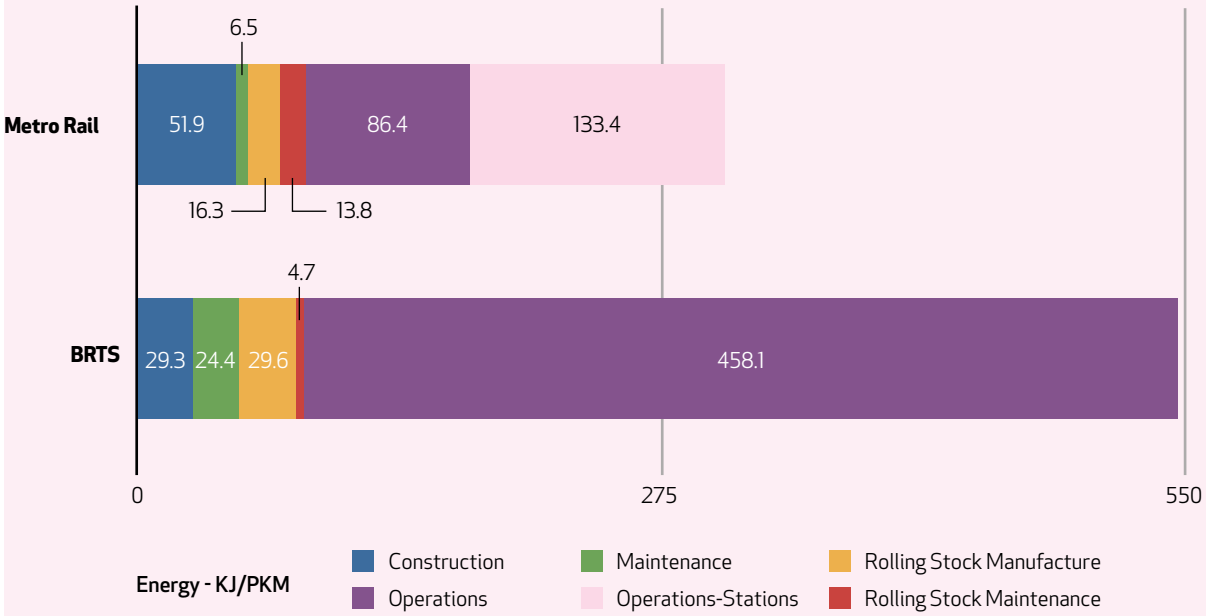
Life cycle CO2 emissions (Per PKM): Ahmedabad BRTS and Delhi Metro Rail (Phase I and II) Projects



Source: TERI (2012).

Figure 5.5

Life Cycle Energy Consumption (Per PKM): Ahmedabad BRTS and Delhi Metro Rail (Phase I and II) Projects



It is important to note that the LCA results cannot be generalised. While in smaller cities, high capacity systems like metro rail may not look desirable from a life cycle energy and emissions impact basis (per PKM) on account of the low ridership, the same systems may be highly desirable in very large cities having very high levels of ridership. The choice of a particular mode in each city hence needs to go through such detailed analysis exercise to arrive at the most context-specific and economically and environmentally feasible choice.

As stated earlier, there are significant energy and CO_2 impacts due to construction and maintenance of transport infrastructure. Construction and maintenance of transport infrastructure involves consumption of materials and fuels, some of which are highly energy and carbon intensive and lead to significant contribution to life cycle energy and CO_2 impacts of a particular transport mode. LCA, if carried out, can indicate the materials and fuels that should be replaced by alternative materials and fuels that are less energy and carbon intensive, if available. The LCA can also indicate the impact of using locally available materials in reducing life cycle energy and emissions impacts, as the transportation related energy and emissions costs are reduced due to the use of locally available materials. Some possible areas where energy reduction can be achieved during the life of a transportation system are:

- Reducing energy and CO_2 intensity of conventional materials used,
- Using alternative materials that are comparatively less energy and CO_2 intensive,
- Using locally available materials,
- Using energy efficient processes and machinery during construction and maintenance,
- Optimising resource utilisation during construction and maintenance, especially for transportation of materials (using locally available materials, reducing idling, using rail for bulk transport of materials, etc.),
- Promoting inter-modal shift (towards more energy efficient modes),
- Improving efficiency of rolling stock, and
- Reducing energy and material intensity during manufacturing and maintenance of rolling stock.

LCA also indicates that if life of projects is enhanced, then the energy and CO_2 impacts due to reconstruction can be reduced/deferred, especially in the case of road-based projects that tend to have shorter life. Life of the projects can be enhanced by continued maintenance. Maintenance of constructed assets should hence be given due importance; it will help reduce both monetary and environmental costs on a life cycle basis.

Source: TERI (2012).

Investment in technical expertise and a professional culture could help insulate the Office of Transport Strategy from the political pressures that will inevitably follow its role in deciding on large public investments.

initiatives that are not solely within the jurisdiction of another ministry or state agency. This is similar to the mandate of other expert bodies such as the Finance Commission. (We note, however, that the Finance Commission is a constitutional body). Government agencies would be required to accept the recommendation or provide a formal written reason for rejection.

- Statutory authority to obtain any and all available data related to transport from Union and state government authorities within a specified time.
- Representation on all government committees or other bodies related to infrastructure planning at the national level, including the Cabinet Committee on Infrastructure, the National Investment Board/Cabinet Committee on Investment, High Powered and High Level Committees concerning Transport. Integrated transport planning may be more focused on policies about infrastructure use than public investment in some of the wealthier countries where core infrastructure has already been fully developed[51], but India still requires significant investment and choices made about capital investment will have long-run consequences.
- Director General to have the rank of Minister of State, and can be drawn from a global labour pool. This is an increasingly common practice for technical positions, including politically sensitive ones. The United Kingdom, for example, appointed Canadian Mark Carney as the Governor of the Bank of England.
- Personnel policy to enable hiring of experts from a global labour pool for at least the initial 10 years while research programmes and expertise in India are being strengthened. This is also important for ensuring exposure to a variety of perspectives, training backgrounds, and experience in the formative early years of the OTS-cum-Ministry of Transport. It should also allow for independent selection of performance norms to enable creation of an institutional culture linking employees to global transport research and practice as well as close attention to Indian context and priorities.
- Independent budget authority to ensure autonomy in hiring, selection and commissioning of research, and utilisation of resources for establishing and maintaining a data centre.
- An R&D budget sufficient to commission independent analysis on strategic questions that cut across modes of transports, jurisdictions of different levels of government, and/or involve trade-offs between investments in physical infrastructure and policy changes. For instance, Box 5.3 on Life Cycle Analysis for an example of a relevant approach. Box 5.4 applies the approach to illustrate some intermodal decisions integrating environment impacts that the OTS could undertake or commission and supervise.
- Dedicated budget for establishing and maintaining an integrated data centre for the proposed Ministry of Transport. This should focus on converting data into decision support tools for prioritising national, state, and metropolitan investments and for examining shadow-financing scenarios independent on the Plan-non-Plan division. It is not sufficient to simply compile data, at a minimum it should be posted online in machine-readable format so that interested groups from private sector, civil society, and academia can use it for evaluation, modeling, and development of decision support tools.

The OTS should be visibly technocratic in order to minimise accusations of politicisation. Its cost-benefit analysis and 'system impact assessments' for individual projects should be rooted in transparent analysis and credible data. Its policy advisory functions should be backed by significant in-house expertise as well as research generated by 'centres of excellence' around the country. Investment in technical expertise and professional culture could also help insulate the institution from the political pressures that will inevitably follow its role in decision making over large public investments with potentially significant private benefits. Various historians argue that the apolitical image of United States Bureau of Roads, for example, was in part due to its reputation for technical expertise even as it oversaw one of the major flows of national funds to state infrastructure[52].

STAFFING OF THE OFFICE OF TRANSPORT STRATEGY

It difficult to give credible targets for numbers of staff, since this will depend on the organisational structure and procedural requirements, the division of responsibilities between Union and state governments, and the extent of reliance on short-term or contract employees for specialised expertise. However, some orders of magnitudes are relevant. The United States Department of Transportation has about 60,000 professional staff. This is in addition to the State Departments of Transportation, whose mandates include overall safety as well as setting State transport goals across modes, including road investments, interconnections

51. Perkins (2012).
52. Seely (1987).

with rail, ports and airports. California has 22,277 permanent staff (www.dot.gov, accessed 11 December 2012), and Texas 12,000 (http://www.txdot.gov/, accessed 11 December 2012). New York State has 10,000 plus another 4,500 staff members in the New York City Department of Transportation. (http://www.dot.ny.gov/, accessed 11 December 2012).
The Directorate-General of Transport for the European Commission, an agency that mainly coordinates strategies across member nations through technical advice and is thus probably the most comparable in mandate, has 2,272 employees and is the largest Directorate-General (9.6 per cent of Commission Staff) of the European Commission.

Such numbers are obviously very crude comparisons, particularly since the support functions of financial management and process compliance vary widely as do the organisational structures. They also do not take consultant/contract expertise into account. Indian agencies involved in transport planning can and do rely on consultants and outside experts for policy formulation.

STATE TRANSPORT REFORMS: OTS AND DEVOLUTION

Indian states are important economic and political actors by global let alone national standards. Many would be large countries, in territory and population if not yet economies. The subsidiarity principle of federal design and international practice suggest that they should play a strong role in planning state-level multi-modal transport networks. Indian states also have substantial electoral and competitive incentives to leverage transport investments effectively as a tool for development. Lall, Wang, and Deichmann (2010) find that transport infrastructure, especially ports and highways that link locations to large internal markets, is one of the most significant factors in attracting new private investment[53].

Creating state anahotlogues of the national OTS would be an important first step toward building the capacity to respond to these performance incentives. Second, state OTSs would also provide an important counterweight to the national OTS and Ministry of Transport by ensuring that states can be effective advocates for regional development needs and choices of mode and location for investment. A group of strong state OTSs could help offset the risk that the national OTS would be captured by particular interests.

The features of the state OTS would be analogous to those of the national OTS, including:

- Mandate to recommend formation of state-level committee or similar to further coordination of projects and transport initiatives that are not solely within the jurisdiction of another state agency. It could also recommend that the national OTS initiate intergovernmental working groups in cases where state and national investments overlap. The OTS and state agencies would be required to accept or provide formal rejection of the request with reasons.
- Statutory authority to obtain any and all available data related to transport from state government authorities within a specified time.
- Representation on all government committees or other bodies related to infrastructure planning at the state level, including in consultations with the national government.
- Director to have the rank of Minister, State Government and can be drawn from a global labour pool.
- Personnel policy to enable hiring of experts from a global labour pool for at least the initial 10 years. Experts from the OTS-cum-Ministry of Transport could also be rotated through State OTS, to encourage development of expert networks across levels of government.
- Independent budget authority to ensure autonomy in hiring, selection and commissioning of research, and utilisation of resources for establishing and maintaining a state data centre, following guidelines established by the national OTS. Government of India to provide specific-purpose funding for an integrated data centre.
- An R&D budget sufficient to commission independent analysis on strategic questions that cut across modes of transports, jurisdictions of different levels of government, and/or involve trade-offs between investments in physical infrastructure and policy changes.

Creating state analogues of the national OTS would provide an important counterweight to the national OTS and Ministry of Transport by ensuring that states can be effective advocates of regional development needs.

States could choose whether to affiliate the OTS with the Chief Minister's office, the state Planning Commission, or make it an autonomous statutory agency. The important parts are the convening of expertise and data, alignment with the national OTS, and the ability to work as 'first among equals' with other transport-related agencies at the state level.

The OTSs would be especially important if further action were taken to reallocate responsibilities within various modes of transport to bring India's transport governance more in line with principles of subsidiarity.

53. Lall, Wang and Deichmann (2010).

Box 5.5
Rail vs Bus: Mutually Exclusive or Complementary?

The choice between rail metros and bus rapid transit systems depends on several factors: construction time and cost, estimated ridership, existence of radial corridors, and ability of the public to afford rail transit. Although often presented as a strict dichotomy, rail and bus systems can be combined to good effect.

Rail metros are very expensive, with standard Asian costs around $75mn/km (elevated) and $180mn/km (underground), although these costs are substantially lower in China (roughly half at 2008 prices). This means that metro systems rarely cover their full operating costs (Fouracre et al. 1990). At-grade alignment is approximately half the cost of elevated alignment systems, which are in turn approximately half the cost of underground alignment systems. Revenues must be approximately twice operating costs for systems to be financially viable, but only large cities with concentrated corridor flows and high revenues per passenger (this is associated with higher incomes) come close e.g. Santiago (revenue/op cost=1.84), Singapore (1.67) (World Bank, 2002).

Metro projects are **typically public sector** endeavours, with a poor record of keeping to budget (capital costs typically increase 50-100 per cent from forecasts) and schedule (implementation times up to 50 per cent longer than expected). Ridership is often less than forecasts suggest, and projections may be inflated by municipalities to attract higher investment (Pickrell 1992). **Private sector partnerships** in six concessions in Bangkok, Kuala Lumpur and Manila have led to successful implementation of metros which might otherwise not have been developed (although capital costs are higher and some problems still arise).

Bus Rapid Transit (BRT) is increasingly salient, after success in Brisbane and Latin America. It is much cheaper in terms of capital than metros, since existing road infrastructure at grade already in public ownership can be modified to accommodate bus lanes. It can thus be rolled out rapidly and can be operated without subsidy at affordable fares. BRT systems can be either open or closed (restricted access to special bus lanes) and usually run on trunk and feeder systems. Although they operate at a slower speed than metros, BRTs facilitate closer stop spacing. Private involvement is much more common: many Latin American systems have a single government control agency and multiple operators.

Chinese Example BRT systems are encouraged, and metro development is encouraged only in 'large cities with better economic conditions but more serious problems of traffic congestion'. In intermediate cases, light rail transit is developed. Buoyant demand, lower costs, and a central government willing and able to invest in infrastructure mean that viability of metros is easier to justify. The central government has defined protocols (Decree 81, 2003) for MRT technologies (three are specified), approval procedures, construction standards and safety requirements, as well as management systems for construction and operations. This standardisation improves costs and efficiency. Criteria were established for metro development in cities (see table below): high population (>3m), high GDP (>RMB100bn p.a.), high passenger demand (>30,000 passengers/hour/direction). Cities are also required to invest 40 per cent equity in metro projects to guard against excessive borrowing.

CRITERION	METRO	LRT
City population (Million)	>3	>1.5
City GDP (RMB p.a.)	>100bn	>60bn
City GDP (USD p.a.)	>16bn	>9.6bn
City GDP per capita (USD p.a.)	>5,333	>6,400
City budget income (RMB p.a.)	>10bn	>6bn
City budget income (USD p.a.)	>1.6bn	>0.96bn
Passenger demand (passengers/hour/direction)	>30,000	>10,000
City equity investment (this guards against excessive borrowing)		>40 per cent

N.B. USD-CNY exchange rate as of October 2012
Source: Developing Public Transport, Ken Gwilliam, August 2011.

States are, for example, the logical level of government for overseeing urban rail-based transport. They are large enough to consider regional and financial externalities, but small enough to also have a strong incentive to pay attention to local development requirements. Aggregating urban transport expertise at the state level is also a logical staffing choice. A big enough group can be formed to have the professional interactions, deliberate on the challenges, and also be deployed to help cities of all sizes. Declaring urban transport a state subject would also clarify ongoing ambiguity in authority and responsibility for urban public transport. The Ministry of Urban Development has been the line ministry for urban transport since 1986, but Railways retained authority over safety and technical advice. The potential for conflict was realised during the development of the Delhi metro, in which the Managing Director of the Metro and Railways disagreed over the gauge to be used. Railways prevailed in that case, but the question of jurisdiction was re-examined by a Group of Ministers. The GoM and the Cabinet decided that urban transport should be a state subject, but with national guidance in the form of a Model Law to be drafted by the Ministry of Urban Development. The so-called 'Guided Urban Transport Act' was drafted, circulated, but not passed. The Metro-Railways Act was revised in 2009 to reinstate urban transport as a Union subject, as before with safety oversight by the Ministry of Railways.

As mentioned earlier, India's level of national government control over airport development is unusual among large federations. State governments can propose new airports or expansion of existing airports but cannot currently initiate these developments without national approval. Devolving greater autonomy in airport development would enable closer integration of planning for rural road transport with air connectivity, and is consistent with the chapter on Civil Aviation's (Chapter 3, Volume III) emphasis on the importance of remote connectivity. To quote from the Report of the Working Group on Civil Aviation:

'Airports cannot be built in isolation. There is a need for seamless coordination with other state agencies to develop ground support and logistics to provide surface connectivity. Appropriate access through road connectivity is an essential part of airport infrastructure. Delays in building road connectivity to New Bangalore airport, for example, resulted in negative implications for the facility. There is therefore a need for effective coordination between road development agencies both at the Centre and in the states, besides coordination with the railway authorities to enable seamless intermodal connectivity for passengers and cargo to and from the airports' [54].

India's level of national government control over airport development is unusual. Devolving greater autonomy to states would enable closer integration of planning for rural road transport with air connectivity, and also ensure better remote connectivity.

Devolution of authority would create both incentives and the institutional basis for such 'seamless' connectivity.

URBAN TRANSPORT: BUILD EXPERTISE, PUBLIC AND PRIVATE

National government policy has followed two main approaches for encouraging more integrated, programmatic urban transport planning: conditionalities for intergovernmental transfers and constitutional mandates to create new integrative agencies. Neither has been effective, nor will they be until metropolitan transport authorities have access to sufficient technical expertise to respond to regional transport needs. Independent Unified Metropolitan Transport Authorities should serve as institutional focal points for extensive investments in expertise in cities above one million, while state governments support smaller urban areas. Such investment should be centred at the metropolitan level, in keeping with principles of subsidiarity and international 'best practice.'

More autonomous metropolitan planning committees, as currently required by the Constitution but only partially enacted, are also required for more general management of India's larger cities. We reiterate others' calls to move forward on the constitutional mandate for devolution. Here, we propose three interim actions.

BUILD CITY-LEVEL CAPACITY BY ESTABLISHING A 'CENTRE OF EXCELLENCE IN URBAN TRANSPORT' IN EACH MILLION+ CITY

Local think tanks, research institutions, and universities can play an important role in generating and evaluating policy options as well as providing policymakers with information from comparative experience. Technical support for the existing UMTAs already comes from outside the government, including expertise from multilateral development banks (World Bank in Mumbai), civil society inputs (such as Chennai City Connect and Institute for Transport and Development Policy in Chennai), and academic insitutions (e.g. TRIPP at the Indian Institute of Technology, Delhi).

There are no bars to funding city-specific initiatives with researchers aligned with metropolitan interests, at least as residents. These centres will take some time to become 'excellent,' but would be valuable assets

54. NTDPC (2012c).

Box 5.6
Operator Collaboration: The German Verkehrsverbund

All of the major German speaking urban areas in Europe (i.e. Germany, Austria and Switzerland) have a quasi-independent Verkehrsverbund (VVB). The largest of these, the Verkehrsverbund Rhein-Ruhr, covers the area of the Rhine-Ruhr, an area of some 5,000 km² with more than seven million inhabitants, and encompasses several cities. Others are more dispersed. For example, in the Rhein-Neckar region, the Verkehrsverbund Rhein-Neckar (VRN), which was founded in 1989, initially served the Rhein Neckar Area, but has since grown beyond its borders to cover an oblong area of 10,000 km² with a population of three million, including Mannheim and Ludwigshafen, Heidelberg, Kaiserslautern, the entire Palatinate Forest and the northernmost parts of Baden-Württemberg. VRN is owned by the three states, cities and rural districts whose area it serves. Some, like the VV Overelbe around Dresden, are more simply concentrated on a central city and perform the function of integrating the city with its suburbs and dependent rural areas.

The development of the VVB since 1970 has been in three phases. In the first phase, the VVB was simply a tariff association (public transport companies accepting each others' tickets leading to associated tariffs). In the second phase, the VVB moved on to be a broader transport association, being involved in coordination and increase of transport planning and marketing, as well as coordinated timetables for public transport. Finally, in its more advanced stage, the VVB became involved in shared timetables and common tariff setting on a contractual basis. The larger VVB now typically plans services, sets fares and timetables, markets services, coordinates fare integration between modes, and procures bus services from private sector operators. A consequence of the harmonisation of fares and aggregation of income in a single collection is that some operators gain and some lose. Hence the VVB in its most advanced form has needed to become a kind of clearing house, allocating income between the different operating agencies.

The legal structure of the VVB has developed with its functions. In the first phase, as is still the case in Warnow, the VVB was simply a voluntary association of operating companies. Later it became an association involving operators and local government representation. Finally, and now most commonly, it has become a non-operating company, jointly owned by the local authorities, regions and states, all of which have some involvement in the financing and management of urban transport.

To give an example, the Verkehsverbund Oberelbe serves an area of more than 4,800 sq km., stretching along both sides of the Elbe River from the Czech border in the south to the state border with Brandenburg in the north. The entire area has a population of 1.2 million. The Upper Elbe region has traditionally had one of the densest public transportation networks in Europe. For local rapid transit, there are 3 S-Bahn (urban railway) lines, 21 regional lines and two narrow-gauge railways. The city and the regional public transportation systems are also above average. There are currently 208 regional bus lines, 13 tram lines, 66 city bus lines, 19 ferries and two mountain railways that regularly service the VVO area. Passengers can use a total of 3,800 train stations and other stops to get into and out of their chosen means of transport.

The Verkehrsverbund Oberelbe uses more than 1,000 vehicles (buses, trams and trains). All together the buses and trains travel more than 62 million scheduled kilometres per year (as a comparison: the distance from the sun to the earth is 149 million kilometres.) The buses, trams and trains drive on a network that has a total length of almost 7,000 km. Every year, DB Regio, the local traffic subsidiary of the Deutsche Bahn (German rail), travels more than 8 million kilometres on behalf of the VVO. That is around one-third of the total rail traffic in Saxony..

In an integrated public transport system, task sharing between he public transport authorities and the operators is crucial. The VV Oberelbe, is organised on three levels. On the strategic level, political responsibility lies with Zweckverband Verkehrsverbund Oberelbe (Z-VOE), which makes political decisions and establishes guidelines for the development and performance of public transport. Z-VOE is guided by the associated district administrators and city mayors. On the tactical level, Verkehrsverbund Oberelbe GmbH (VVO GmbH) is the direct partner of public transport operators and other economic partners and is responsible for the development of tariff, network, service and marketing issues. It manages public service contracts and the integrated public transport system. On the opera-

tional level, the individual public transport companies are responsible for the performance of the railway, tram, bus and ferry services. In some cases, as in the Rhein Neckar VVB network, the operators are also organised in a company form, Unternehmensgesellschaft Verkehrsverbund Rhein-Neckar GmbH (URN)..
The distinguishing features of the Verkehrsverbund approach are (i) the organic way in which they have grown and expanded their aspirations; (ii) the continued emphasis on voluntary collaboration between independent operators. (iii) the limitation of the activities of the VVB to public transport, and (iv) the very wide and disparate areas over which they operate.

Source: Excerpted from Annex 2 of Gwilliam, Kenneth, 2011. 'Institutions for Urban Transport,' Paper 5 prepared for the NTDPC and World Bank. August 10, 2011.

for the metropolitan government as it consolidates. Public funds could also have additional leverage if urban-interested private citizens and state governments co-invest. This strategy of autonomous capacity-building also does not create a lasting bureaucratic imprint and potential to cement state dominance of urban transport. This geographic focus may be considered as part of the HRD strategy.

INVEST IN UNIFIED METROPOLITAN DATABASES

Urban transport generally impacts areas larger than a city's administrative jurisdiction, hence regional officials should often be involved in setting priorities. Finally, implementation ability can also come from public or private organisations and need not always be locally rooted. The key is that the collection of public and private institutions be able to share information at all stages of a transport plan–from project and technology identification to implementation and maintenance–and have a clear process for discussion and decision making as well as incentives to deliver their part of the overall plan.

TRIAGE FOR PUBLIC TRANSPORT

Transport governance can be successfully created even in relatively newly formed metropolitan entities, but public transport will need to improve even faster, before metropolitan governance is consolidated, to prevent a difficult-to-reverse shift to private vehicles as incomes rise. Rapid improvements in public transport are especially important for diverting the ongoing transition from non-motorised to private motorised transport, especially two-wheelers.

Hanoi's experience in managing the growth in two-wheelers illustrates the consequences of disconnects between various forms of public transportation[55]. The city attempted to attract new motorcycle/car users to rely on public transportation instead of private transport but failed because the public transport alternative that it developed was not integrated across bus and rail, and the bus system failed to keep up with demand for both quality and quantity of service. Gwilliam[56] attributes this problem in part to role of the incumbent public transport company (bus) in operation of bus routes, the lack of a coordinating agency to oversee segregation of bus routes from other traffic and coordinate investment in BRT when these were being made. He also cites delay in creating a comprehensive transport authority and limited capacity of the body that was eventually designated responsible for strategic planning.

This kind of outcome could be stopped with early attention to a subset of urban transport governance–coordinating existing public transport–as the broader frameworks evolve. Local efforts to integrate could be supported by demand-driven national challenge grants to pay for systems integration for ticketing and scheduling, investment in pedestrian and shelter facilities at points of interchange, small feeder buses, or other equipment as needed to improve mobility. Unified ticketing to create a seamless customer interface could also help articulate demand for public transport more clearly by helping providers track route use and passenger habits more consistently. Operator collaboration can also evolve into important contributions to the overall governance framework, as the German example in Box 5.6 illustrates.

Such a move would also be important for sustainability. Schipper, Banerjee and Ng[57], cited in project that energy consumption in Indian urban transport will grow from 1.6 EJ in 2000 to 6.1 EJ in 2030 if the current movement to private transport continues. But more than 25 per cent of the energy use expected in a business-as-usual scenario could be saved if cities shift their trajectory toward more public and non-motorised transport.

Second, it will be important to establish the basis for more deliberate and informed comparisons of costs and benefits of rail and bus-based systems.

SUMMARY

The first two parts of this sub-section discuss immediate steps toward creating national and state institutions with the authority and ability to coordinate forward-looking investments in the backbone of the transport infrastructure as well as guide regulation

55. Gwilliam (2011).
56. Ibid.
57. Cited in Hidalgo et al. (2011).

and other policies to ensure effective utilisation of the physical infrastructure across the country. It also recommends establishing a national 'Office of Transport Strategy' (OTS) to host data and technical expertise for developing, monitoring, and refining longer-range strategies for transport as the Ministry of Transport comes together. In the long run, the OTS could perhaps be absorbed as the technical secretariat for the Minister of Transport.

The state-level transport agencies would perform a similar technical role in designing transport programmes, leaving implementation to the existing Departments of Public Works. It would work closely with the State Urban and Rural Development Ministries as well as the Chief Minister on transport planning to address state development, and be the primary liaison to the national government for intergovernmental coordination of transport investment and policy. It should have sufficient financial resources to undertake comprehensive studies and data collections within its jurisdiction, maintain a high quality professional staff and access specialists from around the world as needed.

In the long run, there is no substitute for establishing financially independent, well-staffed urban governments that would undertake transport among other roles. In the short run, however, we focus on building the information base and capacity, inside and outside government to enable more informed decision-making by the current collection of stakeholders, including the urban citizens who have emerged as a more vocal political force in recent years. .

CONCLUSION

India faces three main institutional challenges in developing the governance infrastructure to support a transport system that will meet its needs over the coming decades. First, India will have to shed the old version of directive planning to move to a new skill of facilitation, recognising that capital investment in transport infrastructure and regulation or policy are instruments to affect the transport system rather than decrees that determine its final shape. Ultimately, mobility for passengers and services for freight are the products of individual responses to existing infrastructure and policy structures. Similarly, the transport system is one of many contributors to an emerging economic and social geography that is also the product of millions of households' and businesses' decisions about investment, living, travel, investment, and consumption.

Second, it will have to integrate decision-making across agencies that have historically focused on particular modes of transport and between elements of the system. Policies concerning physical infrastructure, its use, and investments in rolling stock have historically been undertaken in different parts of the federal system and agencies within each level of government. India's fragmentation of transport investment planning between modes of transport stands out in comparative context: it is the only country among the hundred largest economies that continues to maintain separate ministries for each mode of transport. India's allocation of responsibility across levels of government and separation of decision-making about investments in physical infrastructure versus efforts to system capacity through better management of existing facilities is more in line with international practice, but leaves much room for improvement. This fragmentation is deeply rooted in India's bureaucracy and will be difficult to overcome, but the process must begin.

'Integration' does not mean centralised decision-making, but rather setting up of systems for information flow, knowledge generation, and continuous, interactive dialogue between relevant organisations throughout the project cycle. This challenge is an old one. To quote from Hayek (1945)[58]: the 'problem of what is the best way of utilising knowledge initially dispersed among all the people is at least one of the main problems of economic policy—or of designing an efficient economic system.' We must move toward decentralised coordination, enabled by information flow among agencies with clear responsibilities and the financial and human resources to carry out their mandates. Transport planning is far too complex a problem to be conclusively solved by algorithm, even if data and reliable projections were available. It would be dangerous to rely on such an approach.

Third, it will have to reconsider the division of authority between levels of government. Transport governance in India is far more centralised than international practice, in part because of constitutional divisions of authority that have become monopolies on oversight rather than designation of leadership among collaborators, in part because of the power that fiscal centralisation awards to the Union government, and in part because of the allocation of and adaptation to scarce technical capacity. The changes we recommend here start to re-align transport governance with the principles of subsidiarity in federal design.

THE ROAD AHEAD

It is extremely important to understand that an 'integrated' approach to transport planning does not mean centralised decision making, but rather setting up of systems for information flow, knowledge generation, and continuous, interactive dialogue between relevant organisations throughout the project cycle. This chapter emphatically argues for a move toward decentralised coordination based on the principle of subsidiarity, enabled by information

58. Hayek (1945).

flow among agencies with clear responsibilities and the financial and human resources to carry out their mandates.

India's transport governance must move toward five significant changes over the next decade:

i. *Creating a consolidated Transport Ministry to focus on systemic performance;*
ii. *Setting up an Office of Transport Strategy (OTS) to coordinate transport policies at the national level.*
iii. *Clearly decentralising policy and planwening authority including urban transport to the constitutionally recognised urban and metropolitan governments;*
iv. *Building a comprehensive regulatory environment to govern transport flows, and*
v. *Building an interdisciplinary cadre of transport experts.*

	IMMEDIATE REFORMS	LONGER RUN GOALS	BRIEF RATIONALE
National	Formation of high-level, independent Office of Transport Strategy (OTS)		Required to move toward investment and strategy for transport as an integrated system
	National Transport Infrastructure Finance to be neutral with respect to means of delivering mobility, sustainability, and inclusion goals.		Principle of subsidiarity, enables experimentation and responsiveness to varied needs.
		Merge existing mode-specific Ministries into a single Transport Ministry	
State	Establish urban transport as a subject to state level.		Principle of subsidiarity. Reduce current fragmentation across road, rail, paratransport, non-motorised modes. Integrate infrastructure investment and regulatory/management oversight.
	Develop formal mechanisms for state participation in decisions about initiation, siting, size, and other aspects of airports and rail-based transport that have significant impact on regional transport systems.		
	Formation of state-level counterparts to the OTS, with particular focus on urban transport		See above. Also builds counterparts for communication between levels of governments and states
Metropolitan	Creation of UMTAs with statutory authority, independent budgets, expert personnel in all urban agglomerations with population greater than three million.		Immediate need for strategic approach to transport in mega-cities to ensure continued economic dynamism, extension of jobs creation, inclusion.
		Creation of UMTAs with independent statutory authority, independent budgets, expert personnel in all urban agglomerations with population greater than one million.	Move over time to global standard, especially as metropolitan governance is strengthened.
	Formation of metropolitan planning committees as per Constitutional mandate.		Important to integrate transport in a broader planning and investment framework. Principle of subsidiarity. Long-standing Constitutional mandate. Basis for innovative, responsive urban governance; global standard practice.
	Creation of public-private centres of excellence in urban transport in all cities larger than one million.		Builds urban transport expertise with local interests and roots as a resource for metropolitan transport authorities
	Invest in unified metropolitan databases		Facilitates transport system and other planning as well as de facto integration of planning across multiple agencies using the same images of the city.

Annex 5.1

Transport Decision Makers by Mode in India

MODE	FIXED FACILITIES			OPERATIONS		
	CENTRE	STATE	LOCAL	CENTRE	STATE	LOCAL
Roads	Ministry of Road Transport and Highways	PWD/ RD/Roads Departments	Panchayats and ULBs (maintenance)	Ministry of Road Transport and Highways	Road Transport Corporations	Local Bus Transport Corporations (although leadership often appointed by state government)
	National Highways Authority of India	Road Development Corporations		Ministry of Environment and Forests	Legislative Assemblies	
	Ministry of Urban Development	Land Development Authorities		CBCP	Transport Corporation Authorities (e.g. Metro)	
	Planning Commission	Transport Corporation Authorities (e.g. Metro)		Parliament: (Motor Vehicles Act 1988, Central Motor Vehicle Rules 1989)	RTOs	
	Border Roads Organisation					
	Ministry of Rural Development					
Civil Aviation	Ministry of Civil Aviation	State JVs for some airports		Airports Authority of India,	State Departments of Civil Aviation	
	Airports Authority of India			Directorate General of Civil Aviation		
	Airports Economic Regulatory Authority (AERA)			Bureau of Civil Aviation Security (BCAS),		
				Airports Economic Regulatory Authority (AERA)		
Ports	Ministry of Shipping, National Shipping Board	State Governments of maritime States	Involved in decisions about expansion of connecting infrastructure.	Directorate General of Shipping, Tariff Authority for Major Ports, Indian Coast Guard	State Governments (Minor Ports)	Involved in decisions about use of connecting infrastructure.
		Committee of Maritime States				
		Private companies (captive ports)				
Rail	Ministry of Railways, Zonal Railways	Metro Rail Corporations	Inputs on Metro/ Urban Rail	Ministry of Railways, Commission of Railway Safety, Indian Railway Catering and Tourism Corporation Ltd.		
				Zonal Railways (Southern Railway, South Central Railway and others)		
Inland Waterways	Inland Waterways Authority of India			Inland Waterways Authority of India, Indian Coast Guard	State legislation for registration and permits, e.g. Kerala Inland Vessels Rule	

Annex 5.2

Division of Responsibilities in Other Federations

SOUTH AFRICA Overarching Entity: Ministry and Department of Transport						
MODE	**FIXED FACILITIES**			**OPERATIONS**		
	CENTRE	**STATE**	**LOCAL**	**CENTRE**	**STATE**	**LOCAL**
Roads	South African National Roads Agency	Department of Transport (for most provinces). However, they only handle road transport.		Cross Border Road Transport Agency, Road Traffic Management Corporation, Road Accidents Fund, Road Traffic Infringement Agency	Department of Transport	Municipal Transport Authority, City Department of Transport
Civil Aviation	South African Civil Aviation Authority			Airports Company South Africa, Air Traffic & Navigation Services		
Ports	National Ports Authority			South African Maritime Safety Authority, Ports Regulator		
Inland Waterways						
Rail	Passenger Rail Agency of South Africa			Railway Safety Regulator		

ARGENTINA Overarching Entity: Ministry of Transport						
MODE	**FIXED FACILITIES**			**OPERATIONS**		
	CENTRE	**STATE**	**LOCAL**	**CENTRE**	**STATE**	**LOCAL**
Roads		Provincial Road Department			Provincial Road Department	City Governments
Civil Aviation	National Civil Aviation Administration	Office of Provincial Air Navigation Management		Regulatory Body of National Airports System		
Ports	National Secretariat of Ports and Navigable Ways			General Ports Administration		General Ports Administration
Inland Waterways	National Secretariat of Ports and Navigable Ways					
Rail	Privatised, major public carriers include Ferrobaires (Rail Buenos Aires)					

NIGERIA Overarching Entity: Federal Ministry of Transport						
MODE	**FIXED FACILITIES**			**OPERATIONS**		
	CENTRE	**STATE**	**LOCAL**	**CENTRE**	**STATE**	**LOCAL**
Roads		State Ministry of Transport	State Metropolitan Area Transport Authority	Federal Roads Maintenance Agency	State Traffic Management Authority	State Metropolitan Area Transport Authority
Civil Aviation	Nigerian Civil Aviation Authority			Nigerian Civil Aviation Authority		
Ports	Nigerian Ports Authority			Nigerian Maritime Administration and Safety Agency		
Inland Waterways	Nigerian Inland Waterways Authority	State Waterways Authority		Nigerian Inland Waterways Authority	State Waterways Authority	
Rail	Nigerian Railway Corporation			Nigerian Railway Corporation		

CHINA Overarching Entity: Ministry of Transport and Ministry of Railways						
MODE	**FIXED FACILITIES**			**OPERATIONS**		
	CENTRE	**STATE**	**LOCAL**	**CENTRE**	**STATE**	**LOCAL**
Roads	Highway Bureau					City Municipal Committee of Transportation
Civil Aviation	Civil Aviation Administration of China					
Ports			City-level Port Authority	China Ports and Harbors Association, China Maritime Safety Administration		City-level Port Authority
Inland Waterways	Water Transport Bureau, Yangtze Navigational Authority, Pearl River Navigational Authority					
Rail	Ministry of Railways	Regional (Not provincial) Railway Boards			Regional Railway Boards	

MEXICO Overarching Entity: Secretariat of Communications and Transport						
MODE	**FIXED FACILITIES**			**OPERATIONS**		
	CENTRE	**STATE**	**LOCAL**	**CENTRE**	**STATE**	**LOCAL**
Roads	Directorate General of Road Development		Department of Public Works	Directorate General of Road Maintenance		(City) Ministry of Municipal Utilities, Department of Public Works
Civil Aviation	Directorate General of Civil Aviation			Airports and Auxiliary Services		Airports and Auxiliary Services
Ports	Directorate General of Ports					Port Authority
Inland Waterways						
Rail	Directorate General of Railways and Multimodal Transport			Privatised		

USA Overarching Entity: Department of Transport						
MODE	**FIXED FACILITIES**			**OPERATIONS**		
	CENTRE	**STATE**	**LOCAL**	**CENTRE**	**STATE**	**LOCAL**
Roads	Federal Highways Administration (Federal Lands Highway Program)	State Department of Transportation, State Bridges Authority, State Thruway Authority	Metropolitan Transit Authorities	National Highway Traffic Safety Administration, Federal Motor Carrier Safety Administration	State Transportation Commission, Traffic Safety Commission	Metropolitan Transport Authorities, Quasi-Private agencies (eg. South Jersey Transportation Authority),
Civil Aviation	Federal Aviation Administration	State Aviation Administration			State Aviation Administration (or multi-state group as in the case of the Port Authority of NY and NJ)	City Transportation Division, Quasi-Private agencies
Ports	Maritime Administration Office of Infrastructure Development & Congestion Mitigation		Port Authority (working alongside with a consortium of private firms)			Port Authority
Inland Waterways	U S Army Corps of Engineers	State Waterways Advisory Board			State Departments (for eg. Washington State Ferries), State Canal Corporations	
Rail	Federal Railroad Administration			National Railroad Passenger Corporation (Amtrak), Alaska Railroad Corporation		

CANADA Overarching Entity: Transport Canada						
MODE	**FIXED FACILITIES**			**OPERATIONS**		
	CENTRE	**STATE**	**LOCAL**	**CENTRE**	**STATE**	**LOCAL**
Roads	Transport Canada	Provincial Ministry of Transportation		Road Safety Directorate		City-level Transport Commissions (eg. Toronto)
Civil Aviation						
Ports		Local Port Authorities	Canadian Coast Guard		Local Port Authorities	
Inland Waterways					Provincial Ministries of Transport	
Rail	Via Rail, Privatised, major players include Canadian National Railway and Canadian Pacific Railway					

BRAZIL Overarching Entity: Ministry of Transportation						
MODE	**FIXED FACILITIES**			**OPERATIONS**		
	CENTRE	**STATE**	**LOCAL**	**CENTRE**	**STATE**	**LOCAL**
Roads	National Agency for Land Transportation, National Department of Transport Infrastructure	State Road Transport Department		National Road Transport Department, National Transit (Road Transportation) Council	Road Transport Department	
Civil Aviation	National Civil Aviation Agency of Brazil					
Ports	National Department of Transport Infrastructure, Port Authority, National Agency for Waterway Transportation			National Department of Transport Infrastructure		
Inland Waterways	National Agency for Waterway Transportation			National Department of Transport Infrastructure	Private Entities	
Rail	National Agency for Land Transport, VALEC Engineering, Construction and Rail			Privatised		

Annex 5.3

Transport Planning Responsibilities: Union Government

PLANNING COMMISSION TRANSPORT DIVISION (discussed at length in main text)

Ministry of Civil Aviation: (http://www.civilaviation.gov.in/)

'This Ministry exercises administrative control over attached and autonomous organisations like the Directorate General of Civil Aviation, Bureau of Civil Aviation Security and Indira Gandhi Rashtriya Udan Academy and affiliated Public Sector Undertakings like National Aviation Company of India Limited, Airports Authority of India and Pawan Hans Helicopters Limited. The Commission of Railway Safety, which is responsible for safety in rail travel and operations in terms of the provisions of the Railways Act, 1989 also comes under the administrative control of this Ministry.'

Ministry of Shipping (http://shipping.gov.in/)

'The Ministry of Shipping encompasses within its fold shipping and ports sectors which include shipbuilding and ship-repair, major ports, national waterways, and inland water transport. Ministry of Shipping has been entrusted with the responsibility to formulate policies and programmes on these subjects and their implementation.'

Ministry of Road Transport and Highways (http://morth.nic.in/)

'An apex organisation under the Central Government, is entrusted with the task of formulating and administering, in consultation with other Central Ministries/Departments, State Governments/UT Administrations, organisations and individuals, policies for Road Transport, National Highways and Transport Research with a view to increasing the mobility and efficiency of the road transport system in the country. e Ministry has two wings: Roads wing and Transport wing.'

National Highways Authority of India (www.nhai.org)

'The National Highways Authority of India is responsible for the development, maintenance and management of National Highways entrusted to it and for matters connected or incidental thereto.'

Ministry of Railways (http://www.indianrailways.gov.in/)

Oversees and manages all aspects of rail infrastructure, rolling stock, service, operated by Indian Railways and overseen by the Railways Board.

Ministry of Rural Development/Department of Rural Development (http://drd.nic.in/)

'Keeping in view the fact that Rural Roads are vital to economic growth and measures for poverty alleviation in the village, Government have launched a 100 per cent Centrally Sponsored Scheme called the Pradhan Mantri Gram Sadak Yojana (PMGSY). The Programme seeks to provide connectivity to all unconnected habitations in the rural areas with a population of more than 500 persons through good All-weather roads by the end of the Tenth Plan Period. In respect of the Hill States (North-East, Sikkim, Himachal Pradesh, Jammu & Kashmir, Uttaranchal) and the Desert Areas, the objective would be to connect habitations with a population of 250 persons and above.'

Ministry of Urban Development (http://urbanindia.nic.in/)

'The Ministry of Urban Development is responsible for formulating policies, supporting and monitoring programmes and coordinating the activities of various Central Ministries, State Governments and other nodal authorities in so far as they relate to urban development issues in the country. The work allocation includes Urban Transport among other areas of infrastructure and services.

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