INFRASTRUCTURE IN THE 12TH PLAN

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"The acuteness of our infrastructure problems is equaled only by our resolve to tackle them. One of the major planks of this budget is to provide strong stimulus to the infrastructure sector through larger public and private investment in these sectors."

-Shri Y. Sinha, Budget Speech, 1998–99

"The next 10 years will be India's decade of development. To achieve this objective our strategy must encompass the following elements….[including] a sustained assault on infrastructure bottlenecks in power, roads, ports, telecom, railways and airways."

-Shri Y. Sinha, Budget Speech, 2000–01

"Provision of efficient and world class infrastructure is critical for our growth aspirations."

-Shri Y. Sinha, Budget Speech, 2002–03

"But neither in agriculture, nor in industry, shall we be able to attain our objective, if infrastructure, both physical and social, is not rapidly and efficiently developed."

-Shri J. Singh, Budget Speech, 2003–04

"Sustainable growth depends upon the availability of efficient infrastructure. Government is committed to removing the inadequacies in infrastructure facilities through a mix of policy and fiscal measures."

-Shri P. Chidambaram, Budget Speech, 2004–05

"The importance of infrastructure for rapid economic development cannot be overstated. The most glaring deficit in India is the infrastructure deficit."

-Shri P. Chidambaram, Budget Speech, 2005–06

"The National Common Minimum Plan also mandates the Government to augment infrastructure."

-Shri P. Chidambaram, Budget Speech, 2006

"Among the other objectives of the Plan are …. ensuring access to basic physical infrastructure …. I have kept these objectives in mind while allocating resources to various sectors."

-Shri P. Chidambaram, Budget Speech, 2007–08

"Budget 2008–09 is about raising our sights and doing more and doing better."

-Shri P. Chidambaram, Budget Speech, 2008–09

"The investment in infrastructure for the growth of economy is critical. I have urged my colleagues in the Central and State Governments to remove policy, regulatory and

institutional bottlenecks for speedy implementation of infrastructure projects. I, on my part, will ensure that sufficient funds are made available for this sector."

- Shri Pranab Mukherjee, Budget Speech, 2009–10.

"Accelerated development of high quality physical infrastructure, such as roads, ports, airports and railways is essential to sustain economic growth."

- Shri Pranab Mukherjee, Budget Speech, 2010–11.

"Infrastructure is critical for our development. For 2011-12, an allocation of over Rs. 2,14,000 crore is being made for this sector, which is 23.3 per cent higher than current year."

- Shri Pranab Mukherjee, Budget Speech, 2011–12.

Lack of adequate infrastructure is a major constraint on our growth. …. During the Twelfth Plan period, infrastructure investment will go up to Rs. 50 lakh crore.

- Shri Pranab Mukherjee, Budget Speech, 2012–13.

Abstract

India's infrastructure remains poor in spite of the annual reiteration of its importance, the promises to devote more public funds, and the efforts to attract private investment in infrastructure. Intentions and allocations are clearly not enough to meet current needs, much less the projected needs of one of the world's largest and (still) faster-growing economies. The country's ability to produce the national infrastructure networks that it will need for environmentally and socially sustainable development over the coming decades is a function of the political, administrative, and market processes governing public and private investment. These processes appear to be broken in India. This paper attempts to identify a set of national policy actions that could start to repair the system in the 12th Plan Period. These actions and their rationale are summarized below.

Our analysis is speculative at this point, given the dearth of data on infrastructure decision-making and the difficulty of constructing experiments in the context of ongoing policy efforts in a unique political and administrative setting. However, we hope that it will provoke further research as well as reflection on how to set credible, feasible, yet high-impact policy targets.

Action	Rationale
1. Land acquisition: continue to move forward on the national land acquisition, rehabilitation and resettlement law (LARR), but create room for alternate efforts to develop land acquisition norms for particular purposes or geographies to be upheld as the national regime evolves.	Land acquisition affects all forms of infrastructure and developing a consensus process that confirms legitimate public purpose is essential. However, the LARR is a comprehensive legislation and could take years to enact. State experiments may not only allow incremental improvement but also be informative precedents. The risk of re-creating a fragmented land acquisition regime could be managed by setting stringent standards for declaring initiatives compatible with the eventual LARR.
2. Strengthen the political autonomy and technical expertise of the Competition Commission of India and clarify its jurisdiction as the regulator in charge of competition issues in infrastructure as well as other sectors.	Creating a more stable business environment. It is not always clear whether sector policy bodies, regulators, or CCI can rule on or resolve cases of anti-competitive behavior. Clarifying this could speed up resolution. Concentrating authority in one regulator would also help build up a cluster of experts available to all sectors.
3. Opening more senior infrastructure management positions to non-IAS appointments, with competitive pay scales and lateral recruiting for specific and verifiable skills.	Improving public sector performance. Better leveraging of national talent pool. Governments are currently able to hire consultants, but enabling longer-term, employee-like contracts could help build institutional knowledge.
4. Abolish the distinction between Plan and non-Plan public expenditure.	Improving public sector performance. Distorts incentives to invest in maintenance (especially important for roads) and otherwise manage public expenditure across project lifecycles.
5. Develop and follow a transparent process for government, regulator, and industry dialogue on spectrum pricing.	Creating a more stable business environment. This would allow for more predictability about spectrum allocation, while retaining the flexibility to adapt to new technology as well as new practices.
6. Rework the terms of access to the Universal Service Obligation Fund to create	Improving public sector performance by creating competition for the incumbent. Leveraging public funds to attract more private co-investment,

more incentives for multiple public and private telecoms providers to participate in converting the funds to rural broadband infrastructure.	project management and execution skill, etc.
7. Reaffirm TRAI's status as the regulatory counterpart to the Department of Telecommunications as well as its authority over BSNL as a telecommunications service provider.	Creating a more stable business environment, leveling playing field between BSNL and others.
8. Undertake comprehensive study of factors behind state variation in electricity tariffs in order to identify the factors behind state reforms and leverage these dynamics for further distribution sector reform.	Past efforts to use carrot and stick approaches to motivate states to increase tariffs have not worked. A new approach is needed, but should be grounded in states' experience rather than developed in the abstract.
9. Explore options for a joint state-centre electricity regulatory commission as a means to achieve greater regulatory autonomy for the sector.	SERCs vary in autonomy and expertise as well as policy. Centralizing regulatory authority would help concentrate talent to be available across states as well as ensure a more uniform approach to electricity regulation. Keeping it as a joint ERC could help reinforce autonomy from both levels of government and would be in keeping with the constitutional division of responsibility for power sector.
10. Proactively monitor transmission investments' progress to identify challenges before they become bottlenecks for scale.	Transmission investments have historically been on track, but this plan envisions significant scaling up.
11. Automate systems for preventing states from drawing from the interstate grid outside of specified operating parameters.	Technological reinforcement of apolitical grid management – no discretion in allowing over/under drawing if states are not managing their internal grids according to plan. The resulting "hard constraint" may motivate states to improve intrastate grid management.

12. Revise PPP templates and tariff-based bidding norms to allow some pass-through of fuel price risk.	Until non-market fuel risks can be reduced or eliminated, forcing power producers to bear all risk makes some projects unviable from the start (can't attract finance) and leaves others with no choice but to leave plants idle when fuel costs are too high, even if some customers would pay for higher-priced power. CIL FSAs could be a tool to motivate the company to improve its performance, but should not be symbolic contracts destined to be broken.
13. Develop fuel supply agreements for CIL that are feasible, but a stretch for the organization – force it to commit to better performance, but avoid high-powered incentives that become non-credible because they will inevitably have to be renegotiated after widespread failure.	
14. Move to market-linked gas pricing with transparent subsidy for particular uses as required for policy goals.	Current practice of mingling subsidy goals with fuel purchase practices and production sharing agreements disincentives exploration and extraction.
15. Integrate national transport investment under a high-profile Office of Transport Strategy and the power to convene senior officials from relevant Ministries.	Policy and investment currently spread across multiple Ministries and the Planning Commission. Full institutional merger is unlikely, but this would strengthen coordination for the national grid.
16. Create a challenge fund to support state and city proposals for developing metropolitan transport strategy offices.	Build on existing and moderately successful experiments in metropolitan transport governance in a context of weak overall metropolitan governance.
17. Establish an independent regulator for setting rail tariffs.	Price rationalization essential for IR financial viability, rebalancing transport across modes for energy efficiency.
18. Replace Indian Railways' accounting with more standard corporate format including profit-center accounting and line of business structures.	Create transparency about business operations, cross-subsidies. Enable evidence base for restructuring and more informed policy proposals.
19. Create a highway patrol authority to create and enforce controls on access to	Improve traffic flow and safety on existing highways, increasing capacity without the need for extensive additional land acquisition.

highways.	
20. Strengthen and clarify the jurisdiction of the Airports Economic Regulatory Authority.	Essential for setting the terms for the next round of airport PPPs and building trust after ongoing examination of Delhi airport, clarify operating environment and route/landing slot allocation for carriers.
21. Review and generally reduce taxes on fuel, maintenance services, and other aspects of the airline operating environment.	Reduce tax burden on airlines and remove incentives that distort route choices.
22. Invest in equipment and human resources for air traffic control.	Allow more efficient use of existing facilities, ensure safety as sector grows.
23. Allow the contest between state and national ports to continue to play out rather than imposing a common tariff regime without further research on its consequences. Focus instead on connecting all ports to national infrastructure networks.	Connections would ensure that existing facilities can be used more efficiently, also clarify what part of ports' poor performance is due to port practices vs congestion in moving freight out of ports. Sector challenge is to increase and reinforce competition across state and national ports, the common regime will have to be carefully designed.

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1. INTRODUCTION

The gaps in the physical foundation for India's development are striking. The Prime Minister's Office proudly tweeted in August that one in ten households has a computer, but just over 1 in 20 has an internet connection faster than 256kbps.[3] Transport, the circulatory system of the economy and society and the enabling infrastructure for manufacturing (a.k.a. employment generation), commuting (read opportunity), and coal shipment (read electricity) is no better. India is the one country in South Asia that does not have a deepwater seaport, freight delays are an oft-cited constraint on the business climate, and the airlines make the headlines for all the wrong reasons. Some cities have developed impressive new metros and bus rapid transit systems, but "urban transport" is increasingly defined as a motorcycle. Urban transport planning remains nascent, with responsibilities split between national, state, and local agencies. This summer's grid failures brought systemic weaknesses in electricity to international headlines, but many of the underlying problems have been building for decades.

The best thing that can be said about these gaps is that they create an opportunity to invest in new infrastructure systems that could motivate and support

[1] Founder, Okapi Research (www.okapia.co)
[2] Member of Parliament, Government of India (Rajya Sabha)
[3] There were just under 14 million fixed broadband subscriptions as of March 2012, a penetration rate of 5.6% of households. Data on fixed broadband subscriptions (13.79 million) from the Telecom Regulatory Authority of India (TRAI); Number of households (247 million) from the Census of India, 2012. If one assumes that most or all of these are urban connections, there would be 17.5 subscriptions per 100 urban households. Figures on mobile broadband subscriptions do not appear to be available, but the service is available mostly in urban areas.

more environmentally and socially sustainable economic growth. India has historically had relatively low-carbon growth and could use the opportunity to maintain this pattern rather than be forced to re-engineer the existing patterns of transport, information pipelines, and electricity production.

Infrastructure development is clearly recognized as a policy priority. The Twelfth Plan Approach paper states, "The Twelfth Plan must continue the thrust [in the Eleventh Plan] on accelerating the pace of investment in infrastructure, as this is critical for sustaining and accelerating growth." (1.35) Furthermore, "To achieve rapid growth, the economy will have to overcome constraints posed by limited energy supplies, increase in water scarcity, shortages in infrastructure, problems of land acquisition for industrial development and infrastructure, and the complex problem of managing the urban transition associated with rapid growth." (1.55). It considers "improved infrastructure services, including reliable power and better logistics for transport," to be especially important for small businesses (2.7) and emphasizes the importance of extending the broadband network, reliable power, and transport for rural development.

The opportunities are also recognized to some extent. The Prime Minister's National Transport Development Policy Committee (NTDPC) will consider increasing energy efficiency of transport among its goals. The !2th Plan Approach Paper emphasizes energy efficiency as an important part of the solution for the gap in power supply, again citing concerns about energy security (3.5). An Expert Group on Low Carbon Strategies for Inclusive Growth has been formed, and the interim report estimated that the emissions intensity of India's GDP could decrease by as much as a third from 2005 levels by 2020, while maintaining high growth targets.[4]

Recognition and intention, however, will not be enough. Accelerating infrastructure and directing investment toward environmentally sustainable configurations will require more than allocating public capital budgets. The last Plan's

[4] The report has been criticized. The Centre for Science and Environment's review, for example, states that "there is a lack of ambition in the Interim Report and there is no overarching strategy for low carbon strategies for inclusive growth." Noted at http://www.cseindia.org/category/thesaurus/low-carbon-strategy

targets for critical sectors including electricity, railways, roads and ports were not met. Funds allocated for investment in rural roads, extension of the broadband network, and other programmes essential for inclusive development often go unspent. One of the new Finance Minister's first actions in August was to enlist the Department of Economic Affairs to track down the reasons for delays in a few hundred larger projects. The report is not yet[5] publicly available, but press statements indicate that a complex mix of regulatory hurdles, financing constraints, challenges in environmental and other clearances from national and state entities, and land acquisition problems affect projects. Lifting these barriers will be a challenge; developing a system that encourages long-range thinking about energy use and environmental and social impact even more so.

The recent political turmoil has only added to the challenge of fixing India's infrastructure production system. It has slowed legislative decision-making and, more importantly, affected the context for collaboration between public and private sectors in infrastructure development. The (often justifiable) scrutiny of all transfer of value and risk between public and private sectors discourages even well intentioned efforts to build partnerships in critical aspects of infrastructure delivery including coal extraction, land use, and project management.

This paper takes a step back from the immediate political discussions and proliferating lists of reform agendas to examine India's infrastructure production system. The country's ability to produce the national infrastructure networks that it will need for environmentally and socially sustainable development over the coming decades is a function of the political, administrative, and market processes governing public and private investment. These processes appear to be broken in India. There is an insufficient supply response to meet demand including wants expressed through the market, social priorities as determined through observation and anticipation of need,

[5] The Finance Ministry will reportedly set up a project tracking system that will provide details of clearances, financing, and other stages in project clearance by the end of September. http://www.indianexpress.com/news/fm-to-help-cut-delay-in-loans-to-191-infra-projects-at-friday-meet/1001840/0

and political preference aggregation. Neither markets nor political systems are effectively aggregating the demand for infrastructure, and policy analysis that could inform long-run strategy is either absent or ignored.

We attempt to identify a set of national policy actions for the 12th Plan Period that might directly accelerate infrastructure or set off a dynamic that eventually leads to a more responsive infrastructure production system.

The next section of the paper lays out our approach. Reform proposals for infrastructure are often long lists of "necessary actions" or sharp calls for emergency overrides of the current process. The first are overwhelming, the second hard to scale into sustainable approaches to infrastructure. The Twelfth Plan Approach paper, for example, calls for professionalization of the civil service, total quality management, IT systems, social mobilization, strengthening of local institutions, coordination between institutions, institutionalization of project management capabilities, and infrastructure debt funds and other measures to support private investment. What comes first?

The Honorable Finance Minister, on the other hand, has recommended a National Investment Board under the Prime Minister to decisively clear large projects: "Once the final decision is taken by the NIB, no other Ministry or Department or Authority should be able to interfere with that decision or delay its implementation."[6] NIB review will be a labor-intensive process. Ashwani Kumar, Minister of State for Planning, gives an illustrative example:

> "Let's say for a Rs 2000 crore power plant project in Chhattisgarh, you need to have a fuel-supply agreement, a power purchase agreement and various environmental clearances. All the conflicting viewpoints of the members and line ministries will go before this board and decisions will be taken there and then … And remember, this board is going to be headed by the Prime Minister."[7]

[6] Honorable Minister of Finance P.C. Chidambaram, statement to the full meeting of the Planning Commission on September 15, 2012. Reported by PTI in "FM pitches for PM-led Investment Board to speed up projects," September 15, 2012.
[7] Interview with Ashwani Kumar in "Trial by media is a very real issue today," *Mint* September 22, 2012.

We try to strike a middle path, focusing on policy and administrative action that could reduce bottlenecks in the expression of financial and political incentives to convert money into physical infrastructure.

Section Three of this paper applies this framework to three national-scale infrastructure networks: power, telecommunications (data networks in particular), and transport. Each subsection identifies major bottlenecks in the articulation of and response to demand for infrastructure and outlines potential reform paths to remove or erode these bottlenecks. The resulting reform agenda is not a comprehensive list of all changes required, but rather a proposal for the first set of priorities that may then set in motion a change in the incentives for public and private investors to invest, build, and operate national infrastructure networks.

Section Four concludes by summarizing the agenda and discussing its links to broader questions about India's reform trajectory and comparative political economy. Our recommendations for national policies to unblock India's infrastructure impasse fall into four broad categories: tie your hands, learn from states, focus accountability, and be realistic even if it means incremental change. Policymakers must also pay close attention to repairing the political culture, particularly levels of trust between the State and civil society, in order to create a context that allows for continued experiments in public-private collaboration for development.

2. FRAMEWORK

We seek to identify a list of critical reforms that would have a dynamic effect on India's ability to meet the goals outlined in the 12th Plan Approach paper as well as other recent strategy documents by:

- Removing distortions in public and private decisions about the location, amount, and nature of investment in infrastructure and services.

- Creating stronger performance incentives for existing public and private infrastructure providers.
- Setting off a chain reaction of further change as public sector and private sector respond to the new pressures and seek additional policy change, build capacity to meet new opportunities. Rather than present a laundry list of reforms, we focus on those that could logically re-align incentives for others to take place.

Our analysis starts with the question: "What seems to stand between the obvious demand for infrastructure and a supply response?" In other words, what prevents the articulation of the need for infrastructure as either a market to be served or a policy to be implemented? And once a policy is defined or a budget allocated, what seems to block its implementation?

This is distinct from the common approach of defining the infrastructure agenda in terms of physical outputs required or financing requirements. Traditional planning seeks to intermediate between demand and supply by identifying demand or need, estimating the cost, and then separately examining how the funds can be raised. We focus on how that need for intermediation can be lessened by creating more opportunities for the producers and users of infrastructure to interact. Transactional relationships with customers can be substitutes for policy or planning oversight from above, for example. Public guidance and financial support is important - the needs of the poor may not emerge in a market where capacity to pay determines the voice that the supplier hears, and environmental and other externalities are not priced – but it is not the only source of momentum for developing infrastructure. The supply response to anticipated demand is a potentially powerful force for prioritizing infrastructure investment, and likely to be at least as evidence based as public planning and investment based on projections.

Next, we examine potential relationships between the bottlenecks to try to identify which ones might be shielding other ones from pressure. We do not assume that bottlenecks are static or immutable. Technology change, competition, intensifying

need, and other aspects of the infrastructure contract could erode them over time. The policy questions are first, how to speed up this pressure and second, which bottlenecks to approach directly in order to accelerate erosion of others.

There are a number of ways in which removing one bottleneck could have a dynamic effect on other challenges in the production of infrastructure. Policy change that increases transparency, for example, creates more room for public, including academic, scrutiny to create pressure for sensible policy and management choices both through political oversight as well as technocratic investment planning processes. Improving implementation will require increasing accountability as well as the capacity to respond to incentives, but focusing on accountability at least as early as capacity would be more effective sequencing since stronger performance incentives would increase policy implementers' efforts to build their own capacity.[8]

We also assume that clearer articulation of demand will increase the incentives for suppliers to overcome or advocate policies to diminish supply side obstacles. For example, there are obvious supply and demand side bottlenecks in the power sector. Fuel supply, land acquisition, environmental clearances, financing, and other factors constrain efforts to develop generating capacity. On the demand side, state electricity boards are often unreliable customers and power purchase agreements restrict suppliers and consumers ability to share fluctuations in fuel prices and input costs. Removing the supply side bottlenecks would logically lead to more private investment in generating capacity, but it is hard to see how they would affect the demand side bottlenecks. Removing some of the demand side bottlenecks, on the other hand would also increase the incentive for investors to not only overcome these hurdles but also work to reduce them. The pull of a market tends to be a stronger force than the push of extra supply.

[8] There are important exceptions to this point. High-powered incentives to achieve particular outcomes can diminish effort in settings where outcomes are not highly correlated with effort – the possibility that one might work hard yet not be rewarded because factors outside of one's control affect the outcome is discouraging.

From this analysis, we try to identify two or at most three top priorities for each sector for the 12th Plan period. Our discussion of reform options also assumes that there are many ways to achieve the same short-term targets, but that different combinations of policy and institutional change have varying dynamic properties. A policy decision to change the price of diesel could mimic the immediate effect of dismantling the administered price mechanism (APM), but implies a very different future trajectory of prices. Similarly, increasing railway passenger fares may take less time than setting up an apolitical regulator to make the same decision, but have much less effect on the financial outlook.

Although the framework draws on insights from new institutional economics and game theory, the essay is more of an extended opinion piece than a rigorous academic analysis. Our answers are based on deductive logic rather than formal models or empirical estimates of bottlenecks in infrastructure production for several reasons. First, there are few counterfactuals. When we argue that the current policy framework for using the Universal Service Obligation Fund handicaps the development of rural broadband, for example, our conclusion is based on application of general insights from industrial organization about how arrangements of that type should work rather than lessons from alternative governance regimes. Second, we can observe infrastructure investment undertaken, but only infer forgone investment. How many merchant power plants would have been built to feed the market for traded power if the transmission grid had been more reliable, access charges had been transparent, and SEBs had been more reliable paying customers? Hard to say. Third, many aspects of infrastructure are not well documented and what is recorded is not always readily accessible. How much capacity is idle in captive power plants because PPAs are below operating costs, for example? This could be estimated, but with formidable data collection.

As Douglass North admits, "Throughout history humans have typically gotten it (at least partly) wrong in 1) their understanding of the way the economy works, 2) the synthetic frameworks they construct, or 3) the policies they enact (at best blunt

instruments to serve their purposes) which produce unanticipated consequences."[9] But we have to start somewhere.

This paper is a first draft of what we hope will be a more in-depth analysis of ways that Indian can strengthen its governance infrastructure to bring public and private organizations together in sustainable development.

3. THE IMPASSE & RESPONSE

The cumulative complaints about the past few decades of policy change seem to be coming to a head in current political events. "Coalition politics" have been blamed for the varied pace of reforms since the late 1990s, but the past few years have demonstrated a new level of political wrangling as regional parties have started to exert their electoral strength as well as take advantage of India's particular version of parliamentary government.[10] More importantly for infrastructure, both civil society and government watchdogs have started to scrutinize the flow of assets – both physical such as mineral rights and regulatory such as exclusive development rights - between public and private sectors. The political platforms for reasoned debate have not yet emerged, nor have administrative procedures that provide some acceptable guidelines for managing public resources and the interface between the government and private sector.

While the recent spate of infrastructure-related scandals has prompted efforts such as the Public Procurement Act of 2012 (introduced in May) the political meltdown has also delayed legislative action on cable television regulation, expansion of the

[9] Douglass C. North (2008). "Institutions and the Performance of Economies Over Time," in Menard, Claude, and Mary Shirley, eds. *Handbook of New Institutional Economics.* Berlin: Springer-Verlag.
[10] India's version of the vote of no confidence, for example, is relatively extreme. Most other Parliamentary democracies make some distinction between criticism and votes of no confidence. Germany, Spain and (since 1995) Belgium, for example, require an explicit constructive vote of no confidence in which the Parliament elects a new government simultaneously with dismissing the old. Conventions in Denmark, Finland, Ireland, and Sweden require an absolute majority of Members of Parliament to vote to censure the government. Seddon, Jessica (2008). "India's Parliament as a Representative Institution," *India Review* April-June 2008.

National Highways Authority, establishment of a Road Safety and Traffic Management, and other aspects of the infrastructure investment and operating environment. Most importantly, it has affected the progress of the Land Acquisition, Rehabilitation, and Resettlement Act that would at least clarify the land acquisition process even if many believe that it would affect projects' viability. The consensus is that policies are "in paralysis" until 2014.

The political meltdown has also affected administrative decisions. The fact that the heated debates between and within political parties examine administrative practice as well as policy decisions creates strong incentives to avoid any risks. The policy on spectrum auctions, for example, was delayed for months. The shuffling of leaders between key Ministerial positions after the then Finance Minister became President did not help. The current climate of distrust[11] also creates incentives to avoid any decision that may lead to any appearance of the transfer of value between public and private sector. This is problematic for any public-private partnership built on sharing risk. Ex-ante, a contract may allocate expected value evenly; ex-post, one may see unequal returns from the partnership.

This section provides a brief overview of the challenges affecting the conversion of public and private funds into high-quality infrastructure and specific policy changes that could start to unravel these bottlenecks. The first subsection discusses policy priorities that cut across infrastructure sectors. The next subsections discuss telecommunications, power, and transport respectively. Section 4 summarizes the resulting agenda and discusses its feasibility.

3.1 General Challenges for Infrastructure Development in India

[11] Prominent advocate Harish Salve, in a much-quoted interview with Bloomberg later published in *Mint* newspaper, characterised the situation as leading to a "French revolution kind of situation," adding that "It is lack of credibility in governance because of which everything becomes suspect." (August 20, 2012)

There are several general challenges that cut across the three infrastructure sectors we discuss here

- Land acquisition
- Competition policy and its enforcement
- Public and private sector capacity: from contract design to construction
- The Plan/non-Plan separation of in public finance for capital investment versus operations and maintenance
- Attracting private finance along with public investments.

Land acquisition has been a significant obstacle for decades, but the stakes have increased as the urban real estate prices have boomed and the value of "developed" versus undeveloped land has increased. The government's willingness and ability to acquire land for infrastructure, much less industrial use, has also diminished as protests have become better organized, more vehement, and more widely reported. Land acquisition has also come under greater scrutiny as the Right to Information Act has enabled new insights into allocation and groups from civil society to the Comptroller and Auditor General have raised public inquiries about the distribution of returns on land use. More than half of the stalled capital projects over the past two years were put on hold due to problems with land acquisition.[12]

There is no easy solution. The national Land Acquisition, Rehabilitation, and Resettlement Bill (LARR) introduced in 2011 has become a lightning rod for debate about the distribution of gains from growth as well as an illustration of the institutional challenges in actually enacting this distribution. The Bill's proponents see it as protecting the rights of the poor; critics argue that the compensation levels required would deter further investments that would directly and indirectly benefit a broader group of the poor. The developer's share of the increase in land value is the unspoken elephant in

[12] According to Mahesh Vyas, CEO of the Centre for Monitoring the Indian Economy, based on analysis of CMIE's CapEx database of projects. "How much will PM Manmohan Singh's reform boost private investment?," *Economic Times* September 17.

the room. The Bill appears to view private gain as detracting from public good, recommending that governments desist from helping PPPs as well as private projects acquire land. "Infrastructure projects" are currently considered as within the public purpose and worthy of help, but there is some debate between the Standing Committee and the Government on how restrictive the definition of "infrastructure" should be.[13] The Bill also front-loads compensation to affected groups, perhaps a reflection of the difficulty of establishing longer term contracts for sharing both risk and return in land development. There are also many exceptions to its provisions, making it possible for land buyers and sellers to shop across land acquisition regimes and potentially disagree on the framework for negotiation even before getting to the point of negotiation.

It is not clear when or in what form it will emerge from Parliamentary debate to become law. At the time of writing, a Group of Ministers headed by Agriculture Minister Sharad Pawar are expected to consider the bill and it will introduced in Parliament in the winter session. In the meantime, the ambiguity about the eventual rules for decisive land allocation continues to affect infrastructure and other projects. It also affects the prospects for state or other governments to develop creative solutions because these could be overruled by the eventual comprehensive act.

The government should develop a transparent process to recognize and legitimate some State efforts to develop alternate frameworks for land acquisition in particular circumstances. States may develop creative ways of building legitimacy and agreement on land acquisition and norms for public purpose. They also have the option to carve out specific and less contentious subsets of the land acquisition challenge. Although there are always disputes about where infrastructure should be placed and everybody would prefer that their neighbor's rather than their land be used for the public good, these are more clearly "public purpose" investments than are industrial estates. There is also more scope for experimentation on a small scale. Kerala, for

[13] Standing Committee Report Summary for LA&RR 2011. *Parliamentary Research Services.* May 17, 2012. Available at http://www.prsindia.org/uploads/media/Land%20and%20R%20and%20R/LARR%20Bill%202011%20-%20SCR%20Summary%20-%20FINAL%20.pdf

example, is considering providing transferable infrastructure bonds to those whose land is acquired for infrastructure projects.[14] The Tamil Nadu government is seeking ways to revise the Highways Act to allow land pooling in designated development areas so that the increased value of land adjacent to that acquired for highways can be shared with the owner of the land used for the road.[15] Some of these state experiments could inform an eventual national policy framework.

This approach does run the risk of re-creating a fragmented and arbitrary context for land acquisition, however, so the terms under which a new arrangement could be certified as "compatible with the eventual LARR" should be stringent.

Competition Policy There have been extensive public debates about the merits of sector-specific infrastructure regulation and general regulation, and there are obviously trade-offs involved in choosing between the two models. In this paper we generally recommend 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 provisions does require sector-specific expertise. However, detection of anti-competitive behavior is arguably a more general skill. Aggregating oversight and enforcement of competitive behavior also retains flexibility to look into interactions between technologies that may functionally overlap (e.g. cable, internet, and telephones in telecommunications or different modes of transport).

We recommend strengthening Competition Commission of India's political autonomy and technical expertise clarifying its role in maintaining competition in infrastructure. Consolidating competition oversight in the CCI would limit fragmentation of scarce expertise and avoid inconsistent policies across sectors that may be

[14] Reported in a discussion including state Industries and Revenue Ministers. "Infrastructure Bonds to Make People Partners," *IBN Live*. Feb 22, 2012. http://ibnlive.in.com/news/infrastructure-bonds-to-make-people-partners/232619-60-123.html
[15] Announced in 2012 Budget Speech, reiterated by Secretary, Transport, Government of Tamil Nadu in CMDA Conclave "Planning for Chennai's Mega Region," August 9, 2012.

administratively distinct but technologically inter-related. A clearer and stronger process for identifying and punishing anti-competitive behavior could also address a number of prominent "sector" policy issues that affect the context for private investment.

Private participation in inland container depots and logistics is technically open, but on terms set by the Railways Ministry. Private participants compete with India Railways and some have sued. Kribhco Rail Infrastructure and Aril Rail Infrastructure, for example, took a case to the Competition Commission of India arguing that CONCOR and Indian Railways work as a group entity and engage in discriminatory pricing. The CCI dismissed the case, arguing that CONCOR and Indian Railways could not be treated as a group entity and neither was dominant. It is hard to understand the logic of this decision.

An empowered, well-staffed CCI could also help disentangle the effects of sector-wide policies from anti-competitive behavior in airline ticket pricing. Domestic airfares have increased over the past year. Airlines have argued that this is the consequence of fuel price, logistics costs, and other factors discussed below. Others, including the Corporate Affairs Ministry, have argued that it might reflect collusion. The Ministry reportedly requested the CCI to look into airline ticket pricing in July 2012. The CCI, however, denied having gotten any such instructions.[16] The vacillation may be related to the ambiguity about whether seat pricing falls under the CCI's jurisdiction or the Directorate General of Civil Aviation (DGCA).

The CCI is also starting to look into pricing regimes at cable landing stations, a policy area that TRAI has also weighed in on with its open access regulation. Airtel and Tata Communications own most of the landing stations, and other domestic and foreign telecoms providers first appealed to TRAI to set fees. Airtel and Tata, in return, argued that it was a competitive market. Telecoms stakeholders then turned to call on CCI in August 2012. Which regulator should be acting and will its decisions be binding? The

[16]"Corporate affairs ministry asks CCI to probe rise in air fares," Economic Times July 18, 2012. This may reflect concerns about

investigation is underway now, and the relationship between the two entities will be telling.

Capacity-Building*:* Capacity-building is a perennial and well-recognized challenge. The scale of the "capacity gaps" seems to be a mystery - early all Ministry working groups for the ongoing Prime Minister's National Transport Development Committee requested a consultant to estimate capacity gaps in response to the terms of reference asking them to discuss the problem – but it is clearly large.

We recommend opening more senior positions in key infrastructure management to competitive pay scales and lateral recruiting on the basis of specific and verifiable skills. The IAS entrance exam and practice of frequent rotation through assignments selects for and reinforces highly skilled generalists. This policy would complement the existing civil service by enabling a smaller cadre of specialists. The opening would also strengthen the job market for students of disciplines such as urban planning, transport planning, contract law, public sector accounting and control, among others, which could in turn increase the investment in training institutes. It would also displace the current practice of hiring consultants for specialized policy advice or implementation, perhaps paving the way for building more sustained and sustainable capacity within the public sector. Anecdotal evidence and basic organizational design logic suggest that a high turnover of consultants affects data management, organizational learning, and incentives for experts to transfer knowledge to their colleagues and employees.

Plan/Non-Plan division of Expenditure**:** The distinction between Plan and non-Plan expenditure distorts project planning. The system shortens time horizons to one or at best five years, emphasizes inputs rather than outputs or outcomes, and complicates holistic consideration of total project costs, particularly when funding for different aspects of the project lifecycle come from different sources. The system is especially detrimental for roads, a sector in which construction may come from central

government funds while operations and maintenance are expected to come from state or local sources. The Working Group on Roads for the National Transport Development Policy Committee reports a 40-50% shortfall in allocation of maintenance for State Highways and Major District Roads.

Abolishing the distinction is the first recommendation of the Planning Commission's High Level Expert Committee on Efficient Management of Public Infrastructure. We agree.

3.2 Telecommunications[17]

India's mobile phone network has expanded rapidly over the past decade. India had 919.7 million mobile subscriptions as of March 2012, of which 74% were active.[18] There are fewer actual subscribers - richer and more urbanized areas such as Delhi, Himachal Pradesh, Tamil Nadu, Punjab, and Kerala had teledensity of more than 100% - but still, this is a success story.

Data networks, on the other hand, are lagging. The vast majority of Indians do not have access to broadband or even mobile data services today and the prospects for expanding and improving reliability of broadband access remain murky. There were just under 14 million fixed broadband subscriptions as of March 2012, a penetration rate of 5.6% of households.[19] Most of these are concentrated in urban areas: as of 2010, 60% of the country's fixed line broadband subscriptions were in the ten largest cities, and just 5% of the connections were in rural areas.[20]

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[17] This section draws on Seddon's earlier research on the context for cloud computing in India, forthcoming in Cowhey and Kleeman, eds. (2013)
[18] TRAI (2012). "Highlights on Telecom Suscription Data as on March 2012," *Press Release* 86/2012.
[19] Broadband is defined as download speed of at least 256 kbps in these data. The new National Telecom Policy revises this definition to at least 512 kbps and 2 mbps by 2015. Data on fixed broadband subscriptions (13.79 million) from the Telecom Regulatory Authority of India (TRAI); Number of households (247 million) from the Census of India, 2012. If one assumes that most or all of these are urban connections, there would be 17.5 subscriptions per 100 urban households.
[20] Telecom Regulatory Authority of India (TRAI) (2010). "Recommendation on National Broadband Plan," 8th December, 2010. Available at http://www.trai.gov.in/WriteReadData/Recommendation/Documents/Rcommendation81210.pdf,

The growth rate of new fixed line data subscriptions appears to have slowed over the past few years from 60-70% over 2000-2010 (with a triple digit boom between 2004-5) to just a 25% increase between 2010 and 2012. Just 1% of the population had mobile broadband subscriptions in 2010 according to BSA (2011).[21]

The government has clearly laid out its priorities. The Approach Paper to the 12th Plan notes that,

> "internet is, however, slowly emerging as an integral component of service delivery in number of sectors. Government services are beginning to be delivered through electronic channels making these services more and more transparent and efficient. ICT infrastructure and services are becoming all pervasive. This scenario offers a unique opportunity to leverage upon this strength of the country in all facets of ICT in next five years. A focused and coordinated push in the ICT sector during 12th Plan period will help India achieve inclusive and accelerated growth not only in knowledge and service sectors, but equally in industrial, economic and social sectors."

The Telecom Regulatory Authority of India's proposed National Broadband Plan targets 45 million subscribers by 2012 and doubling that by 2014 (75 million and 160 million total including mobile broadband).[22] The 2012 Telecom Policy envisions providing "Broadband on Demand" and discusses "working toward a Right to Broadband." (1.2) The specific targets are 175 million connections with a minimum download speed of 2 Mbps by 2017 and 600 million by 2020.[23] It also proposes enabling high speed and high quality broadband for all village panchayats (village government

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accessed June 15, 2012. The report notes that internet services with slower connections are more evenly distributed, but does not elaborate

[21] Business Software Alliance (2012). *Country Report: India*.

[22] The National Broadband Plan was circulated for discussion in 2009, for execution by 2013. It was reportedly cleared by the Department of Telecoms in April 2011, and expected to be cleared by the Cabinet in August 2011, but appears to still be under consideration.

[23] Available at http://www.dot.gov.in/ntp/NTP-06.06.2012-final.pdf.
The proposed minimum download speed is 2 mbps by 2015 and 100 mbps on demand.

offices) by 2014 and expanding from this core to make connections available to all villages and habitations (smaller than villages) by 2020.

The communications network will play an essential role in India's efforts to meet its goals for sustainable, inclusive development. High-profile policy initiatives ranging from education to UID-enabled reform of public management assume and rely on the infrastructure for data, more than just voice, to flow throughout India. The network is also critical for labor markets and economic opportunities. Markets are growing, thriving, and deepening where there is a communications infrastructure. ICRIER (2012), for example argues that a 10% increase in mobile phone penetration has a 1.5 percentage point impact on growth because so many services and opportunities have been made available over phones (including low-end phones).[24] ICT is also a key part of emerging business models to improve health care, access to finance, education, business and market information, and other services to support businesses and workforce in rural areas.

What does India need to do to consolidate and build on its gains in mobile phone access, but more importantly develop its broadband network during the Twelfth Plan? The core problem in the sector is that too many people are in charge of most of the critical policies, meaning that nobody actually credibly holds the reins. The one area where the power structure is clear – the administration of the Universal Service Obligation Fund – is probably the policy area where it needs to be changed the most.

Two changes need to occur to restart the sector. First, Spectrum and other information service license pricing need to become clear, credible, and reasonably predictable. Recent policy announcements have addressed the immediate concerns of both mobile and cable/DTH industries, but the process was far from a model of reasoned policy discussion about development priorities, sector interests, and regulatory feasibility. Spectrum policy is inevitably political. The International

[24] While the study estimate the overall growth using state level data on economic growth, internet and mobile phone access, it also looks at case studies on impacts of internet and mobile phone based applications in a number of sectors to "trace the pathways that translate into growth at the macro level."

Telecommunications Union's "ICT Regulator's Toolkit" notes "Developing spectrum pricing strategies invariably involves alignment with the government's and regulator's revenue goals and objectives, setting targets, and discussion with key stakeholders such as the Ministry of Finance and key sector groups – telecommunications service providers." The politics must be transparent and decisive. Second, governance of the Universal Service Obligation Fund needs to be changed to create more attractive opportunities for private companies to participate in utilizing the funds for rural infrastructure development. Both could be achieved through policy or regulation in the short run. Strengthening TRAI's oversight vis-à-vis the Department of Telecommunications and public sector incumbent BSNL will be essential for long-run development of India's telecommunications infrastructure.

This section is not a comprehensive tour of all telecoms policy. There are many other issues under discussion, including setting and maintaining network security policies, facilitating land acquisition for towers, creating incentives and possibilities for more environmentally sustainable power supplies for towers,[25] and implementing safeguards on exposure to radiation from towers. In the interest of directing attention, however, we focus on the regulatory and competitive environment as well as the deployment of public funding for broadband expansion. The first appears to be private investors' top concern and source of hesitation in investing in India. The second could start to create competitive pressure for faster use of public funds.

Spectrum and Licensing The physical infrastructure for expanding fixed-line connections is weak, leaving cable or the mobile network as main growth options for linking more households to the network. TRAI (2010) estimates about 40 million copper loops in the country, but Marcus and Jain (2012) report "conservative industry estimates" that half

[25] Cell phone towers are the second largest users of diesel in the country.

of these are not sufficient to support DSL connections.[26] Twenty million connections would need to be upgraded, and at least 5 million new last-mile connections would need to be installed to meet this year's targeted number of subscriptions. There are few competitive pressures to develop these connections. Public sector incumbents BSNL and MTNL still control 80% of the fixed-line subscriptions and thus the local loop. (TRAI, 2012)

The cable network, which has 80 million subscribers according to TRAI (2010) but as many as 140 million according to industry sources (Marcus and Jain, 2012), could offer an alternate route to fixed-line broadband connections. However, cable in general is a fragmented industry with many small players who may not have the technical, managerial, and financial capacity to provide broadband services.[27] Much of the infrastructure outside of the larger cities is also still analogue.

December 2011 legislation mandates a nation-wide move to digital addressable systems capable of supporting broadband by December 31, 2014.[28] Implementation is off to an uneven start. The Ministry of Information and Broadcasting is seeking complementary policies to provide financial support and technical expertise to cable providers, and some of the industry leaders have voluntarily moved to digitization faster in order to better track their subscribers and attract investment. On the other hand, the first wave of mandatory digitization of the major metros (Delhi, Chennai, Mumbai, and Kolkata) is running behind: the initial deadline of March 2012 was first moved to June 2012, then recently extended by another four months.

The September 2012 increase in FDI caps in cable and DTH (to 74% foreign ownership from 49%) will increase the potential supply of finance, but the business and

[26] Marcus, J. Scott, and Rekha Jain (2012). "Fast Broadband Deployment in India, What Role for Cable Television," Regional International Telecommunications Society India Conference **2012**, New Delhi, India, February 22-24

[27] TRAI (2010a) reported 6000 Multi System Operators (MSOs), "around 60,000" Local Cable Operators (LCOs), 7 DTH/ satellite TV operators and several IPTV service providers.

[28] The Information and Broadcasting Ministry is also seeking various forms of financial and capacity-building support support, from loosening restrictions on FDI to providing capacity-building and other December 2011 Cable Television Networks (Regulation) Amendment Bill

policy environment for private investment in these networks remains uncertain. The 2012 NTP proposes moving toward unified licensing, but does not say what would happen to existing licensees or what fees for migration to a new unified license would be. Section 1.7 speaks of "enabling provisions in the current regulatory framework" to encourage optimal use of cable TV networks. However, it is not clear what these are. Foreign investors' response to the recently announced increase in the FDI limit will be one indicator of the effect of the uncertainty (both about subscriber base and profitability after digitization) as well as regulation. Comcast Ventures, Liberty Media, and Time Warner Cable, have done due diligence but not invested.

The ambiguity over spectrum policy affects the prospects for mobile broadband to overcome the lack of open access for the last mile of fixed lines and also allow rapid expansion of broadband access in less densely populated rural areas. In the wake of a major corruption scandal involving allocation of 2G spectrum, regulation and policy have been volatile and, at times, in conflict. The Supreme Court revoked 122 of the 2G licenses that had been awarded as part of the first-come, first-served arrangement and the Minister of Communications and IT (also the Minister of HRD) reneged on important terms of use for 3G licenses, stating that existing inter-operator roaming agreements for data were "permissible" but not "permitted." Various proposals under discussion would require operators to give back unused spectrum to be re-auctioned, double-tax operators that own towers, and otherwise change the (high) costs of doing business in India. A *Forbes* magazine calls it "Death by Regulations: Indian Telecom."[29] Although domestic giants Airtel and Reliance Infocom are continuing with their plans to roll out 4G networks using spectrum they currently own, some international telecoms providers reportedly are scaling back their investment plans for combined voice and data services.

Spectrum pricing policy and an auction start date of November 12 has been announced, to industry criticism of the high reserve price and the plan to 're-farm' some parts of the spectrum by administrative fiat. Spectrum re-farming is always disruptive,

[2929] http://forbesindia.com/article/briefing/death-by-regulations-indian-telecom/33124/1

but administratively determined re-allocation is less flexible than market-based reallocation in which the old and new owner determine the timing and price of the re-allocation.[30] "Spectrum re-farming may draw litigation and could be disruptive from the perspective of consumers and operators," according to Rajiv Sharma, telecom analyst with HSBC Securities and Capital Markets (India) Pvt. Ltd.[31] The scope of the auction continues to evolve as the Department of Telecommunications' Wireless Planning and Coordination Wing reviews the available spectrum in various circles.

While the auction may create some clarity in the short run, the process leading up to setting the policy highlights some of the challenges for the sector moving forward. The auction guidelines and dates were postponed several times, the Department of Telecoms and the Telecommunications Regulatory Authority (in principle, the regulator) publicly disagreed with each other on the reserve price, and an Empowered Group of Ministers that went through several reconstitutions ended up determining the final policy. The fumbling could be blamed on the unusual circumstances of a recent public scandal, a shift to a new pricing framework, a Presidential election that moved an active politician to new duties, but it also **highlights the need to set up a process that provides more insulation from the next set of unusual circumstances to arise**. **Reaffirming TRAI's position as the sector regulator and its status as at least a peer of the Department of Telecommunications could be a start.**

Revise guidelines for access to USO Fund for investment in rural networks.

The evolution of telecoms policy appears to be reducing rather than increasing the scope for private involvement in building the core or last mile of the fiber backbone. The NTP appears to have been watered down in the drafting process. Section 1.4 simply

[30] ITU & Infodev. *ICT Regulation Toolkit*. Section 2.4.9, available at http://www.ictregulationtoolkit.org/en/Section.1527.html
[31] Cited in "DoT plans steps to ensure auction of all airwaves," *Livemint* September 18, 2012. http://origin-www.livemint.com/Politics/7C9bIgnsjzBeq1GKBJF7hP/DoT-plans-steps-to-ensure-auction-of-all-airwaves.html

states that India will "Provide appropriate incentives for rural roll-out," while section 1.6 proposes to "encourage Fibre To The Home (FTTH) with enabling guidelines and policies." An earlier public draft of the policy had been more explicit about favoring private investment, or "Independent Infrastructure Providers." Paragraph 1.8 obliquely refers to significant challenges in obtaining right of way for laying fiber with a proposal to "establish appropriate institutional framework to coordinate with different government departments/agencies for laying and upkeep of telecom cables including Optical Fibre Cables." The final NTP omits earlier drafts' explicit calls for coordination between specific Ministries and departments in State and local government to establish right of way.

The NTP and the draft National Broadband Plan envision filling the gaps in the data infrastructure through public investment in an optical fiber network, financed by the Universal Service Obligation Fund. TRAI had proposed setting up national and state optical fibre agencies to oversee the roll-out of the fiber network, but both the Department of Telecoms and the National Telecoms Policy have identified BSNL as the lead agency.[32]

BSNL could potentially work quickly since it would not have to coordinate with any other players, would probably have an easier time than private or state entities in getting right of way, and already has a large core and access infrastructure. However, the arrangement creates significant incentive problems: BSNL would be an internet service provider, implementing agency for the creation of the fiber network, and, according to the draft NBP, a member of the High-Level Committee deciding the funding requirement, work plan, and time-frame for creating the network. [33] **Access to the USO**

[32] . BSNL also figures prominently in other broadband-enabled development plans. The National Mission on Education through ICT, for example, suggests that BSNL might host the content as the nation moves toward "free broadband for all" as a public service provided by BSNL. Government of India, Ministry of Human Resource Development (2009). *Mission Document – National Mission on Higher Education throught ICT.* 9 February 2009.
[33] TRAI publicly and vehemently disagreed with the DoT's suggestion to make BSNL the lead implementing agency for the NBP. See TRAI (2011), Annexure D and E.

Fund for broadband deployment needs to be reworked to enable an even playing field for public and private applicants for support.

3.3 Power Sector

The July 2012 grid failures brought the long-standing weaknesses of the power sector into stark relief. People have been used to living with power cuts and "power holidays." Businesses have grown accustomed to fending for themselves with everything from invertors to diesel generators to captive power plants. Commentators and policy wonks have repeated the same litany of challenges for a decade and a half: under-priced electricity, politicized allocation of supply enabled by outdated grid management, less-than-hoped-for addition of generation capacity, and inadequate maintenance as well as fuel supply challenges leading to under-use of existing capacity.

India's power sector is handicapped by two intertwined forms of politics: first, populist tendencies to provide free or underpriced power for agricultural and domestic users, and second, rent-seeking impulses to retain discretion not only over scarce electricity supplies but also under-priced (and, as a result, overly scarce) domestic fuel supplies. The Constitutional division of responsibility for electricity, including regulation, between national and state governments complicates prospects for overcoming populism in electricity pricing. Under-pricing of electricity, among other factors, complicates prospects for moving to market-linked (higher) energy prices that might motivate more investment in exploration. India's ability to keep power costs down rests on its ability to keep fuel costs down, but the market doesn't compromise and domestic resources don't liberate themselves from the ground.

Generation capacity addition has lagged behind the increasing demand from industrial and household consumers as the Indian economy has grown and incomes have increased. Figure 1 shows the gap between peak demand and peak supply over the past few years. The shortfall has hovered over 10%, and many expect it to increase. McKinsey (2007), for example, estimated that the gap could increase to 25% by 2012

under business as usual – the pace of capacity addition would have to increase five to tenfold in order to meet demand in the end of the 12th Plan.[34]

Figure 2 compares target and actual capacity addition over Plan periods. The gap between intended and actual generating capacity started to increase as India's growth rates accelerated, with significant missed targets in the late 1990s and 2000s. Capacity addition started to catch up to targets in the 11th Plan with the help of private investment, although public sector projects fell behind due to "poor project implementation, inadequate domestic manufacturing capacity, shortage of power equipment, and slow-down due to lack of fuel, particularly coal."[35] The proportion of private investment increased to nearly 35% of capacity added, in addition to investment in captive power that could potentially be fed into the grid.

The approach for the 12th Plan continues on this trajectory and increases the share of private investment to 50% of additional capacity. It also emphasizes investment in the transmission infrastructure, particularly building a policy framework to attract private investment in transmission. Will it be able to meet overall investment goals? The context for public sector investment is unlikely to change dramatically over the next plan period. As a Planning Commission spokesperson admitted in an interview with a BBC writer after the grid failure in July, "there is no shortage of money, and the problem is more 'in the delivery process than the system.'"[36] The same article cited government data showing an average of 15 months delay in new power plant construction. Restructuring public delivery of power generation capacity will require sustained organizational change and there are no quick fixes.

Policy effort must focus on improving the investment environment. This will not necessarily be easier, but it could have faster impact if it attracts the attention of global

[34] McKinsey (2007). *Powering India: the Road to 2017* Executive Summary available http://www.mckinsey.com/locations/india/mckinseyonindia/pdf/Power_Report_Exec_Summary.pdf

[35] GoI, Planning Commission (2011). *Faster, Sustainable, and More Inclusive Growth: An Approach to the 12th Plan.* (3.26)

[36] Soutik Biswas (2012) "Ten interesting things about India power," *BBC News* July 31, 2012. http://www.bbc.co.uk/news/world-asia-india-19063241

project development capacity. Investors considering power projects are currently caught between fuel price and supply risk on the one hand, deadbeat customers on the other, and legitimate concerns about being able to access transmission and distribution infrastructure. There are few viable consumers for large-scale public power plants. State Electricity Boards, still the main customer, continue to be financially weak nearly a decade after reforms meant to move them into a more commercial mode and half a decade after a bailout and incentive-based reform plan. Some states are able to – and Tamil Nadu just did – bail them out, but the losses are large enough in other cases to pose a potential fiscal hazard. Rajasthan's accumulated SEB losses as of 2012 are nearly 10% of this fiscal year's state domestic product. Nor can investors seek direct relationships with larger customers; many states have avoided implementing open access policies that would make it financially feasible for large industrial users to buy from private suppliers.

Fuel supply risk for coal and natural gas add to these woes. Indian power producers and potential investors must content with the possibility that domestic coal and gas may not be available, even if they have an in-principle commitment for fuel supply. Plants that are located near the infrastructure required to import gas or coal have a backup plan, but the additional costs of imported fuels generally cannot be passed on to consumers in PPAs. Plants that do not have this option become stranded assets.

As in other infrastructure subsections, we wish to reiterate that this is not a comprehensive list of reforms needed in India's power sector. We do not directly address rural electrification, for example. "Electricity for All by 2012" has obviously not come to pass, and energy access continues to be a critical issue for inclusive development. India can and should do more to support distributed power as well as extending the grid. The country also has an important opportunity to move to a more environmentally sustainable path as it builds its power supply. Economics suggests that fossil fuels, particularly coal, will continue to play an important role as it does now, but there is room to accelerate the development of renewable energy through fiscal

incentives, support for land acquisition, preferential power tariffs, and the usual array of policies including implementing some of the recommendations of the National Action Plan on Climate Change. The National Clean Energy Fund (NCEF), funded by a cess on coal, has accumulated Rs 8,200 crore (about $1.5 billion) to support clean technology development, but the guidelines for accessing it remain ambiguous. There is also substantial room to improve energy efficiency, even as access expands. We also do not specifically discuss prospects for nuclear power, even though it is obviously a potentially important energy source for India. It has unique diplomatic and political risks that would need to be explored in more depth.

We focus on "first things first." Much of rural and semi-urban India is connected to the grid, but endures regular power cuts.[37] Simply moving more customers away from diesel generators and fuel-oil based captive plants to even standard coal plants, much less supercritical steam plants or gas plants for peaking power would have a significant environmental impact relative to the current scenario. Strengthening transmission and enforcing open access are particularly important for nuclear or renewable energy, which may be located in more remote areas or could be aggregated through household and small-scale efforts to feed energy back into the grid. Electricity metering and the will and ability to enforce pricing are necessary pre-conditions for motivating a large-scale industry and household shift toward energy efficiency.

Cleaning up the Distribution Sector

Most of India's distribution companies are in dire financial straights after years of underpriced free power. Table 1 shows accumulated losses of some of the larger states' State Electricity Boards in proportion to state domestic product.

Table 1

[37] There are no comprehensive data on load-shedding, but the problem is pervasive enough to have motivated social entrepreneurs to establish powercut.in, a website to crowd-source information on scheduled and unscheduled power outages.

State	Accumulated SEB Losses FY12 (Rs bn)	% of FY 13E GSDP
Punjab	66	2.4
Tamil Nadu	398	6.1
Madhya Pradesh	156	4.6
Uttar Pradesh	318	4.4
Himachal Pradesh	31	4.6
Bihar	71	2.7
Chhattisgarh	30	1.8
Rajasthan	402	9.9
West Bengal	6	0.1
Jharkand	83	6
Haryana	110	3.1
Orissa	64	2.4
Maharashtra	100	0.7

Source: Compiled by Mehta (2012).

The figures are striking, all the more so because this is the financial context after two Summits (1996, 2001) to create a Common Minimum Action Plan on Power, a "one time settlement of SEB arrears" to central government utilities and fuel suppliers (e.g. Coal India Ltd) in 2002, the Electricity Act of 2003 and its provisions for state SEB restructuring (which states ignored), and two rounds of the Accelerated Power Development and Reform Programme, a central government incentive fund meant to motivate states to shore up finances by reducing their transmission and distribution losses.[38] Transmission and distribution losses, a combination of technical losses and unpriced power, also remain high: 27% on average, 40% in some states.

Another bailout is likely. A panel of secretaries headed by the Secretary to the Prime Minister publicly considered a bailout in February. By July, a proposal to restructure SEB debt by converting half of it to state bonds and restructuring the

[38] We discuss the history of distribution sector reforms in more depth in Seddon Wallack and Singh (2008). "India's Power Struggle" (mimeo) and Seddon, 2008. "India's Power Struggle," in Jagdish Bhagwati and Charles Calomiris, editors, *Sustaining India's Growth Miracle*. Columbia University Press.

remainder, was being publicly discussed. The Chairman of the Planning Commission urged state power ministers in a July 17, 2012 meeting to increase tariffs and reduce AT&C losses. In September, the conversation moved to how the debt restructuring would affect India's sovereign ratings. Not bailing them out could also be problematic. Reliable figures on the banking sector's direct and indirect exposure to SEB debt are hard to come by, but media reports and expert interviews cite figures in the 7% range.

At the time of writing, financial restructuring of SEBs seems imminent. The plan has not yet been approved, but Tamil Nadu jumped ahead with its own bailout package: a commitment to absorb 50% of the Tamil Nadu Generation and Distribution Corporation (still not unbundled in spite of Electricity Act 2003 mandate) SEB's short and medium term loans, extend guarantees to the Power Finance Corporation and Rural Electrification Corporation, and prepay a third of the subsidy the government had committed for power. Hope runs high: an editor at a business paper commented that "this is a significant move and may well be remembered in India's economic history as the milestone that marked the beginning of serious power sector reforms."[39] And intentions are firm: the Approach paper states "it is absolutely vital that the distribution system is made financially viable during the Twelfth Plan." (3.32) But the history is sobering.

The answer clearly lies with states, and the evidence suggests that policies are finally moving in the right direction even if slowly. Figure 4 shows the wholesale price of electricity for various types of consumers over the past 5 years. The trend is in the right direction, and prices are increasing more for agricultural customers than industrial and commercial consumers. Reliable consolidated data are difficult to find, but Mehta (2012) summarizes media reports on state policies showing that 16 states have increased tariffs by 12-44%, including a cumulative increase of 30% in West Bengal's power tariffs.[40]

[39] R. Sukumar (2012). "If that's all it takes, what was the problem?"
[40] Mehta, Gautam (2012). "SEB losses won't short-circuit states," *Financial Express* August 24, 2012. http://www.financialexpress.com/news/column-seb-losses-wont-shortcircuit-states/992445/0#

It would be worthwhile to document these changes in more detail as well as understand the political logic behind them and how it might be intensified. Past efforts to use both carrots and sticks have not succeeded, and it is time to consult states to develop more constructive approaches. The power crisis has become sufficiently obvious that shifting to higher priced but better value-for-money electricity may be possible. Household and business spending on generators, fuel, invertors, solar systems, and other coping equipment suggests that at least some would be willing and able to pay for reliable power if it were available. If this is true, then the main challenge is to solve the commitment problem – how can the government commit to a reliable supply of electricity, while customers commit to accepting price increases? States may have particular ways of solving this conundrum – Gujarat is famous for having solved it in agriculture – and these lessons would be valuable to collect in order to inform a reform program that contributes to solving the commitment problem.

General hardening of states' budget and power access constraints may help. However, it's not clear what would motivate states to respond to a fiscal squeeze by raising power prices versus other ways of cutting deficits. As we discuss below, grid management reforms that harden the power supply budget constraint by cutting off overdrawal could also help create more attention to creating an investment climate for new generation capacity.

A second option would be to renew the quest for creating an actual a-political, arms-length regulator and explore creative ways to unify regulation within the constitutional setting of concurrent responsibility. **The best solution may be to move toward a shared, arms-length management of the power sector in which both Union and State government tied their hands from interfering with the regulatory decisions required for a national grid and market to function.** Some form of jointly appointed "national" regulatory commission, with representatives appointed by Union and state governments could also ensure that regulatory talent is available across states. This is important because talent scarcity seems to have contributed to industry capture of regulatory bodies. There are few independent experts who can serve as regulators so

people with experience in and ongoing ties to the private sector often end up in a position to influence the regulatory framework for their industry.

While we have emphasized the importance of raising the level of pricing, India will also need to consider pricing strategies to encourage cleaner power, send appropriate signals for investment in base load and peaking capacity, move toward more options for demand-side management, and otherwise draw on accumulating international experience in managing electricity markets.

Transmission: Grid Expansion & Management

The prospects for strengthening the physical transmission infrastructure are reasonably bright. Leveraging this infrastructure as a platform for buyers and sellers to interact in a marker that attracts new investment and encourages energy efficiency, however, is another story, in part because of states' efforts to protect State Electricity Board finances.

India's power grid has come under increasing pressure as electricity demand has increased by 60% over the past five years. Average electricity demand has increased from 50 to 75-80 Terawatt-hours (TWh) a year since 2005, driven by increases in industrial use in particular but also some higher household use. (Figure 3) Investment plans have also accelerated and Power Grid Corporation of India (PGCIL), Ltd., proposes to double investment from Rs 55,000 crore to Rs 100,000 crore in the next plan Period, Market watchers seem to see the plan as credible. Citigroup, for example, rated PGCIL as its "top pick" in the Indian utilities sector and recommended "buy." About half of the investment will be in transmission lines to connect to independent power plants, in keeping with the expectation that additional generation capacity will come from private investment. PGCIL also recently announced plans to invest Rs 42,000 crore "green corridors" to develop transmission capacity grid management infrastructure for renewable energy. PGCIL will also continue to invest in technical aspects of grid

management, including control of line loading, line condition monitoring, timely repair and maintenance.

The company is sometimes criticized as a monopoly, and its capacity to adapt to meet the accelerated targets will be tested. It will also have develop partnerships with state transmission utilities with varying capacities in order to meet the next plan's targets. However, it has a good track record of meeting its targets, including capital expenditure in the 11th Plan. K. Shankar, Director of Institutional Equities at Edelweiss Capital, interprets that monopoly "as more of a reputation that has been earned rather than through limiting competition."[41] Competition from private companies including Reliance Infrastructure (Anil Ambani Group), Sterlite Technologies (Vedanta Group), and consortia of smaller firms has started to increase, though PGCIL held its own in competitive tariff-based bidding for projects from Power Finance Corporation and Rural Electrification Corporation in 2012. **We recommend proactive monitoring of the transmission investments to identify potential bottlenecks that may appear with scale, including right of way, supply of transmission and grid management equipment, and human resources and address them before they become serious constraints.**

Progress on some of the more politically charged aspects of grid management, those that might affect the state electricity boards' monopoly on distribution or political leaders' ability to direct scarce power to favored constituencies, has been more challenging. Electricity is a concurrent subject in the Constitution, and India is one of the few countries and the only developing country that has both central and state level regulation.[42]

The division of responsibilities between central and state electricity regulatory commissions affects the ability to develop the grid discipline and management required

[41] Jyoti Mukul (2012). "Can PGCIL Prevent Grid Collapse," *Business Standard,* New Delhi, August 15, 2012. http://smartinvestor.business-standard.com/pf/Pfnews-129242-Pfnewsdet-Can_PGCIL_prevent_grid_collapse.htm

[42] Other countries that used to have subnational policy influence over the power sector, such as Argentina, centralized electricity policy before moving toward privatization, private investment, and electricity markets.

for a multi-buyer, multi-seller system to exist below the national level. The Central Electricity Regulatory Commission introduced availability-based tariff (ABT) as a financial incentive for interstate grid discipline in 2000 and it was implemented in 2002-3 for all interstate grids. The Electricity Act of 2003 advised SERCs to implement the same for intrastate grid management within one year. States have taken their time. Tamil Nadu, for example issued a discussion paper on the possibility in 2006, and another one in July 2012. The absence of flexible balancing mechanisms for intrastate grids will become more problematic as the scale of power transmission increases and potentially spill over into national grid problems as states rely on unscheduled drawals from the national grid. State distribution utilities and load dispatch centres are also subject to political pressure to allocate available power to favored constituencies and to continue overdrawing from national grids to avoid power cuts.[43]

Unscheduled interchange (UI) charges are supposed to motivate states to avoid these circumstances in some way, even without the benefit of ABT. Technically, the CERC has also imposed limits on the operating range with in which states can even opt to deviate from their schedules, but the Unscheduled Interchange Charges Regulation (Amendments) Act of 2010 appears to be ignored. UI charges they are not always enforced, nor have states complied with provisions to make them enforceable by having state utilities give payment security (a letter of credit) in advance for power drawn under the UI. When the CERC imposed nominal fines (around Rs 1 lakh each) on 12 state utilities in September 2012, 3 states did not even send a representative or an advocate to the meeting.

States have also lagged in implementing open access. The Electricity Act of 2003 mandated open access, or "The non-discriminatory provision for the use of transmission lines or distribution system or a associated facilities with such lines or system by any licensee or consumer or a person engaged in generation in accordance with the

[43] Chaturvedi Committee Report, state distribution officials' testimony to the Northern Region Load Despatch Centre, and news reports such as "A word from Sonia means 24x7 power," (alleged request to maintain power supply to Gandhi constituencies in late August 2012).

regulations specified by the Appropriate Commission." (2.47) The "Appropriate Commissions," or Central State Electricity Regulatory Commissions, have been slow to specify these regulations and sometimes unreasonable in defining the terms of open access. The National Electricity Policy of 2005 and Tariff Policy 2006 reinforced this provision by spelling out principles for charges for open access, but, in the words of the 2009 Task Force on Implementing Open Access, "Despite the mandatory provisions of law, non-discriminatory open access to distribution networks has failed to materialise." (Foreword). The Union Government Power and Law Ministries issued a number of letters urging regulators and distribution companies to either clarify or reduce charges for large industrial customers seeking to use the transmission and distribution to buy power from alternate suppliers before invoking Section 107 of the Electricity Act in April 2012 to direct the at least the CERC to act. State governments could avail of an analogous Section 108 to urge SERCs to provide open access at reasonable cost to the T&D system to enable new supplies to be connected to unmet demand. Such a move is unlikely since it would lead to further erosion of SEB and state finances.

In short, state regulatory policies are a bottleneck in opening the transmission and distribution infrastructure as a platform for buyers and sellers. Their reluctance or inability to move forward on new forms of tariffs could complicate grid management if open access were somehow imposed. Solving the pricing impasse and bring more capacity online so that discretion over scarce resources no longer mattered could help to relieve these bottlenecks. Alternatively, removing the soft budget constraint on power availability from the regional grid could act also help motivate more responsible electricity pricing policy. **Automating grid management and scheduling decisions, including preventing overdrawal from the grid if operating ranges are violated and eliminating the possibility of directing available power toward particular areas could harden the budget constraint on power availability and motivate states to pay more attention to creating an investment climate or grid policies to bring more generation capacity online.** PGCIL estimates that it would take three months to undertake a study

on a fibre optic network to automatically disconnect electricity supplies to overdrawing states and another two years to implement the system.[44]

Fuel Risk & Pricing Regime for Coal and Gas

Power producers around the world must contend with fuel price risk, and there are a variety of options available: fuel supply contracts, financial hedges, power purchase agreements with provision for some pass-through of energy price fluctuations, among others. Indian power producers must contend with two additional risks - the possibility the fuel supply contracts may not be fulfilled or that a political decision may be taken to reallocate or alter the price of domestic gas supplies – without the comfort of flexible or easily amendable power purchase agreements. Imported coal and gas are backup options for coastal plants, but fuel costs are much higher than domestic supplies.

Revising PPA templates and norms for tariff-based bidding to allow pass-through in some circumstances is an obvious possibility for mitigating power producers' fuel supply risk. This option is being discussed for the Twelfth Plan and the Power Ministry has taken an "in-principle" decision to allow it.[45] Passing higher fuel prices through to consumers, however, may exacerbate the demand-side risk given the poor finances of SEBs. V. Raghuram, former Principal Advisor to CII, notes that states tend to prefer load-shedding to buying from power exchanges above a certain price point.[46]

This does not solve the challenges of ensuring that existing plants have incentives to continue to run at capacity. As of July 2012, 87% of power generated in India was sold under long-term contracts.[47] (We were unable to obtain the more relevant figure of how much existing generation capacity and capacity under

[44] Reported in Utpal Bhaskar (2012), "Overdrawing states plead political pressure," *Livemint.com* August 15, 2012. http://m.livemint.com/Industry/TyvRt9GWAinQ5R9y6mxu6K/Overdrawing-states-plead-political-pressure.html
[45] "Fuel pass-through imperatives," *Hindu Businessline* May 20, 2012.
[46] Raghuram, V. "India Power Sector," in *India Energy Yearbook* 2012.
[47] GoI, CERC. Monthly Report on Short-Term Power Transaction in India.

construction was committed in PPAs without fuel-price pass through). Renegotiating these will be challenging, although the regulatory attitude is evolving. The Appellate Tribunal for Electricity had forbidden Adani Power to cancel a PPA with Gujarat's distribution utility in 2010 after it could not get domestic coal for a project[48], but the company was optimistic enough to approach the CERC with a similar request in July 2012. The Attorney General has also argued that the CERC has the power to alter PPAs, which could aid renegotiation of contracts with multiple states that would otherwise have to allow changes one by one.[49]

Coal

India's current and prospective coal power plants must contend with unreliable supplies of domestic coal, and significantly higher price for the backup option of imported coal (if importing coal and transporting it to the plant is even possible). Coal India Limited has been unable to meet demand for several decades and coal imports have risen since the late 1980s. (Figure 5) Indonesia and Australia's recent change in mining laws and taxation of coal have reminded developers that international coal prices are not only high, but subject to sudden change.[50]

The Government's first effort to increase coal production through private participation failed. Faced with the increasing shortfall between Coal India Limited's production and domestic demand for coal, the government began to allocate coal blocks to private companies in 1993 for exploitation and use in captive and other power plants. The results of that practice are now well known: "Coalgate" has not only criticized the allocation practice but also highlighted the fact that many of these coal blocks remain unexploited. Some companies attempted to obtain the necessary clearances, others did not invest at all. Figure 6 shows the discrepancy between

[48] The Gujarat ERC later allowed the company to delay power supply and the Supreme Court admitted Adani's appeal to Aptel in August 2012, ordering Adani to continue supply power as per the original agreement in the meantime.
[49] "AG Says CERC Can Alter Tariff. Will it?" *DNA India* August 30, 2012. http://www.dnaindia.com/money/report_ag-says-cerc-can-alter-tariff-will-it_1734391
[50] Indonesia's September 2010 law increased the price of coal imported from that country by 140%.

expected and actual production. Some unexploited coal blocks are being de-allocated and it is not clear how they will be re-allocated or how the underlying reasons affecting incentives to invest in mining the coal will be addressed.

Fuel Supply Agreements with Coal India Ltd should be designed to motivate faster exploitation of coal, while avoiding the pitfalls of high-powered incentives that will inevitably have to be renegotiated after widespread failure. The 2011 Approach Paper to the Plan noted that CIL was only entering into Fuel Supply Agreements for half of thermal plants requirements, and only for five years. By 2012, banks, CIL, and the Ministry of Power were in negotiation about the terms of new FSAs, including amount to be committed, term, penalty clauses, and provisions for importing coal.[51] One can't bleed a stone – coal exploitation and transport is challenging – but the tighter incentives may motivate CIL to become a more active advocate for policy changes that would allow it improve its performance.

In order to keep the aggregate commitments with reach of CIL's capacity, we recommend developing FSAs based on a pooled price for domestic and imported coal, with penalties levied on CIL if it does not supply the coal it commits to the pool. The Approach Paper also proposes pooling domestic and imported coal for producers so that all share a mid-range price. This could work in general if there were accurate projections of domestic coal production so that fluctuation in the index were based more on price changes for imported coal than surprises in the proportion of domestic and imported coal. Like FSAs, the arrangement could create performance incentives for CIL if CIL were penalized for not supplying its committed proportion of coal into the market. The FSAs under consideration include an arrangement where it CIL could import coal on a cost-plus basis (to be charged to the produce if they accept the coal) in case it could not meet the fuel supply contract through domestic resources.

[51] KPMG (2012) "Coal India's fuel supply agreements - a solution to India's power crisis?" summarizes developments. (July 2012).

Transport linkages will also have to be developed between the eastern coal reserves and power plants throughout India. Raghuram (2012) reports that rail bottlenecks have left at least 70 million tones of coal at pitheads.

Gas

India's efforts to ensure adequate gas supplies for development priorities such as power and fertilizer production seem to have backfired by reducing incentives for exploration and exploitation of domestic gas reserves. The potential for growth in use of gas is significant. IEA (2010) projects as much as 5.45% annual growth in demand over the next two decades, although it acknowledges that both fertilizer and power sector are price-sensitive. Domestic gas production is increasing gradually, and slightly lower than targets. (Figure 7) Efforts to attract international investment and expertise have not been successful. Seventy-four bids were received for 33 blocks offered in the NELP-IX round, but 10 of the 15 offshore blocks only received single bids. None of the largest global energy majors (Exxon, Shell, Chevron, Statoil, Conoco Philips) participated.[52] Some observers argue that the government's efforts to keep prices low in the face of growing market is financing a boom in gas exploration outside of India.[53]

Gas pricing policy has inched toward some kind of market influence over the past two years. The Administered Price Mechanism, under which the price and sectoral allocation of petroleum products has been gradually withdrawn since 2002, but gas pricing has remained a matter of policy rather than markets. Up to 2010, the government allocated and sold gas produced by public sector companies to priority sectors (such as power and fertilizer production) at low prices, while privately produced gas could be sold at closer to market prices. This was loosened in 2010 to allow state owned ONGC and OIL to market gas from new fields at market prices. However, the government's statements in the legal dispute between Reliance Industries Ltd. and

[52] Ranjan Ghosh, former Executive Director of GAIL Ltd. Writing in India Energy Yearbook (2012).
[53] Iann Conn, Group MD, BP, quoted in "Price controls hit India's gas story: BP," *Times of India* June 15, 2012.

Reliance Natural Resources Ltd over a gas contract reinforced the extent of its continued influence on both price and allocation. "How could RIL allocate gas to RNRL when the government had not yet given any allocations to its own entity in NTPC?," the Solicitor General asked at one point.[54] The verdict affirmed that the government production sharing contract overrides all other contractual obligations.

The Minister of State for Petroleum emphasized the need to continue to control the allocation and price of power for power and fertilizer in his August 2012 announcement of "Action Initiated to Formulate Open Acreage Licensing Policy (OALP)," stating that

> "the Ministry of Petroleum and Natural Gas is in agreement with the development of natural gas trading platform to effect market discovery of gas prices except for fertilizers. This would require differential pricing of gas. In a condition of scarcity, Exchange traded domestic gas prices would tend towards LNG prices. This may make the gas unaffordable for some of the sectors like power. The present market is an emerging market with few players and oversight by downstream regulator may not be appropriate at this stage."

He also noted that "any trading platform or exchange will be relevant only when needs of fertilizer and power sector are fulfilled."[55]

While the recent increases in diesel and gas prices are consistent with the incremental approach recommended in the 12th Plan Approach paper, the continued clinging to discretion over prices is not. The Approach paper states,

> "A transition to more rational energy pricing requires upward adjustment in all these prices. … The adjustment needed cannot be achieved in one go, but the process must begin so that a full adjustment occurs over two or three years. Increasing prices is never easy, but it is also true that our ability to grow rapidly in a world of high energy prices depends crucially on our ability to adjust these

[54] Quoted in "SC reserves verdict on RIL-RNRL gas dispute," *Times of India* December 19, 2009.
[55] Press Information Bureau, August 29, 2012. RCJ/RKS
(Release ID :86931)

prices. Suppressing energy prices will not help. There is a case for insulating the poor from these price increases by a targeted subsidy, but what we have at present is a much more general subsidy." (3.18)

It is time to take decisive steps toward market-linked pricing for gas extracted from domestic fields and subsidizing domestic consumption more transparently. The resulting gas price may be too high to justify its use for base-load power, but at least expectations will be clear and investors will either adapt and perhaps use it for peaking power or choose other fuel sources. The debate about pricing of domestic gas is moot in any case if most of it remains un-extracted.

3.4 Transport Sector[56]

Transport is the circulatory system of a nation: an infrastructure that affects prospects for economic inclusion, overall national growth and balanced regional growth, the common national market, and the energy efficiency of growth. India's system of roads, rail, ports, and air connections is currently a bottleneck for manufacturing and agricultural supply chains as well as movement of commodities. This handicap will only get worse as India seeks to return to higher growth over the coming decades.

The Twelfth Plan Approach paper's a view on transport infrastructure combines a straightforward statement of need and intent:

"Rapid growth needs to be supported by an efficient, reliable and safe transport system. This is especially important for an economy concerned about competitiveness. On the basis of past experience in India, and the experience in other large economies, requirements of transport services are likely to grow significantly faster than overall GDP growth. Railway freight traffic elasticity is

[56] We have written more extensively on transport sector reform in Seddon and Singh (2012). "Moving India: The Political Economy of Transport Sector Reform," in Hope, Kochar, Noll, and Srinivasan (eds). *Economic Reform In India*. Forthcoming. This section draws significantly on research Jessica Seddon is doing for the National Transport Development Policy Committee. However, it reflects the author's assessment of transport policy priorities.

> computed to be around 1.3. Civil aviation has grown by nearly 20 per cent per annum in the Eleventh Plan. Road traffic volumes, as measured by the consumption of automotive fuel, have grown by about the same rate as overall GDP. The expansion of urban centres has triggered an enormous demand for dependable urban mass transit ... International trade volumes have been growing faster than GDP and will continue to do so indicating the need to build adequate capacity in the ports. … To meet these expanding demands large investments will be needed in roads, railways, ports and civil aviation sectors for augmentation of capacities and modernization. Further, appropriate linkages between ports, railway and road network need to be completed." (4.1 – 4.2)

It goes on to discuss the financing requirements and the need to accelerate private investment in transport along with other infrastructure sectors.

The last sentence of the excerpt, however, highlights real challenge: integration. India's transport system is less than the sum of its parts. Airports, even recently modernized ones, are not always linked to urban passenger transport systems. Ports do not always have evacuation routes, highways and major district roads or other feeders do not intersect. Congested inland container depots and rail stations complicate freight transfer from ports to rail and rail to roads for the last mile. Newly built urban metros may or may not be served by feeder buses, and suburban rail may or may not link to core city networks. Decisions about the national transport network are spread across one or more Ministries per mode (in contrast to most larger economies and all BRIC countries' model of a Ministry of Transport and perhaps an additional Rail Authority). State transport policy, much of which is concerned with roads, may or may not coordinate with national plans for highways or nationally funded rural road networks. Urban transport can involve as many as ten agencies across three levels of government.

This fragmented policy environment not only affects India's ability to extract the maximum benefit from its current infrastructure, but it also handicaps its ability to prioritize the next set of investments to achieve the highest possible development returns for investment. Transport planning must improve to realize synergies between

investments in different modes of transport and between physical infrastructure and policies governing its use. Financial resources for investing in additional capacity are increasingly scarce; India must become more discerning and efficient in using them.

It must also evolve to recognize and internalize the impact of transport on energy use given the national security implications of energy dependence and the broader environmental implications of India's emissions. TERI (2006) projects that transport will account for 30% of India's energy use by 2031 under business as usual, up from its 18% share in 2001. Their models show that reasonably small shifts in the use of public transport, from road to rail freight shipping, fuel efficiency, and use of biodiesel could reduce the projected energy use (461 Mtoe in "business as usual") by as much as a third.[57]

What are priorities for setting transport planning on this path in the next five years? First, the general infrastructure reforms that we mentioned in Section 3.1 are especially relevant for the transport sector and probably the most important factors in being able to attract private investment in transport infrastructure and services. **Land acquisition** for construction and expansion of roads, airports, ports, and inland container depots is particularly difficult because the investment in transport infrastructure often significantly increases land value. A power plant as a neighbor decreases value; a highway or an airport multiplies it. The debates over the Delhi Airport concession, for example, are fueled at least in part by the staggering value of the land development rights given to GMR even if the general practice of shifting land is not unusual. Some of the current challenges in expanding the system capacity could have been avoided by over-buying (and, equally importantly, securing) land when four lane highways or smaller ports/airports/inland container depots were constructed, but this is politically difficult to do and land-based financing creates incentives not to bank land. **Moving away from the Plan/non-Plan division of public expenditure** is essential for roads in particular given the maintenance backlog.

[57] TERI (2006) "National Energy Map for India: Technology Vision 2030"

Credible competition regulation is also an important component of transport sector reform, particularly (as we discuss above) to attract investment in civil aviation and rail infrastructure and services. The Approach Paper to the 12th Plan emphasizes this point: "Private container train operators have already commenced operations and are competing with Concor. It is important to ensure that they are given a level playing field with Concor so that private investment in this area increases." (4.16) Germany, for example, concessions suburban and regional rail through open tenders and this has been found more cost effective than leaving these to uncontested national operators.[58] Credible opening of logistics and inland container depots to private participation, could also make Railways more responsive to changes in regional and metropolitan transport networks.

This section focuses on sector-specific reform priorities. Overall, it is essential to move transport policy from its current focus on infrastructure projects and sector-specific oversight toward a more strategic integrated programme to develop India's transport system. This is particularly important for two parts of the transport grid: the national backbone and urban or metropolitan transport. The first subsection describes the context and priorities for integration and national and metropolitan levels.

The next subsection discusses reform priorities for Railways over the 12th Plan period. Rationalizing freight and passenger prices – in other words, increasing passenger prices and reducing freight – is essential not only for Railways' survival, but also for starting to shift freight movement toward more energy efficient rail shipping and reduce the wear and tear on roads. We also recommend a complete overhaul of Railways' accounting system to implement a more standard and externally intelligible accounting system based on cost centres for various activities. This one change would start to highlight the costs and benefits of Railways' extensive vertical integration as well as the nature of subsidies across routes and paths. The information is necessary for any

[58] DB Annual Competition Report, 2011. Cited in Amos (2012) – Review Paper on Railways

evidence-based restructuring or privatization and it would likely start to create more pressure to move toward professional management.

The third subsection discusses road policy. Streamlining land acquisition and eliminating the Plan/non-Plan distinction, discussed elsewhere are probably the most important reforms that could be made for accelerating road development. However, given that these would be large, cross-cutting policy changes and may happen slowly, we discuss some shorter-term "triage" possibilities for encouraging faster development of roads. We also highlight the importance of developing an institutional mechanism for coordinating linkages between various tiers of the road system (National Highways, State Highways, Rural and Urban Roads) also needs to be developed in order to maximize returns on investment. This may not require a specific organization, but at least there should be information sharing between all agencies involved so that siting of first/second/third tier roads can respond to the network development as well as local pressures. The penultimate and last subsections discuss civil aviation and ports respectively. Other than regulatory reforms focused on enforcing a competitive playing field, civil aviation policy in the Twelfth Plan should focus on rationalizing the fiscal regime to lower airlines' costs and limit distortions in route planning. Without these changes the stated intent to develop smaller regional airports in the 12th Plan will not make sense – carriers will be unable to serve these new facilities.

Integration

India's transport infrastructure institutions are not equipped to consider tradeoffs between investments in different modes or collaborate in developing linkages between different types of infrastructure in the network. There are limited mechanisms for cooperation or even timely information sharing across transport providers. This is particularly apparent in areas with denser populations and transport infrastructure – urban regions. Public and private service providers ferrying goods and people over parts of the network do not fill the gap. Service providers are in principle a strong force for

inter-modal coordination when formal institutional arrangements do not exist – businesses built on getting from point A to point B at lowest cost have an incentive to monitor transport investments across modes and lobby investors to deliver infrastructure that ultimately makes it possible to link across modes. However, the policy environment and poor state of points of interchange between modes of transport has discouraged multi-modal logistics.

India is one of the few countries, and the only major emerging or developed economy that still has separate Ministries for each mode of transport. The Planning Commission's Transport Group is the only standing arrangement for integrating investment plans across modes of transport. Its official mandate implies long-range intermodal planning, including "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" and "Addressing inter-modal issues for improving coordination among different transport sectors and ensuring that each sector works according to its comparative advantage and efficiency." Most of its activities however, are rooted in the Plan process's five-year time frame and focus on aggregating projects proposed by Ministries and States.

One can see the effects of ad hoc multi-agency coordination at various scales. Facility performance is affected by obstacles to linking it to the network. Traffic through the Chennai port is growing quickly, for example, but infrastructure projects to connect the port to road and rail networks have been stalled. Many issues converge.[59] First, environmental: some of the cargo, coal, is dusty and the Madras High Court banned handling of these cargoes. The Supreme Court appointed a committee with representatives from state and national environmental regulators, academics, and the relevant state and national top bureaucrats to resolve the issue. Second, the State Public Works Department is behind schedule in linking the port to roads by widening

[59] As reported in Anand (2012).

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 stake-holders for the revival of connectivity projects … And often, such hope fades away soon after the visit."[60]

At the 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. Representatives from eight agencies met almost once a fortnight for six months under the guidance of an Additional Chief Secretary to ensure there was better connectivity to the new international airport from city centre. Interagency agreements have also functioned well. The Bangalore Metrorail Corporation and the Bangalore Metropolitan Transport Corporation signed a MoU for Common Day Metro-Bus transit passes in February 2011, and 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, particularly coordination problems that extend across state and national governments. The BMRCL 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.[61] There have been extended delays over transfer of land to Metro by KSRTC and vice-versa for construction of Central Station at Majestic by Metro and Intermodal Bus Terminal at Peenya by KSRTC respectively. The matter had appeared in at least two meetings of the BMLTA and has been finally resolved. In the

[60] N. Anand (2012). "Hopes of reviving port connectivity projects up," *The Hindu.* May 4, 2012.
[61] http://articles.timesofindia.indiatimes.com/2012-04-18/Bengaluru/31361004_1_railway-land-swr-metro-workers. Accessed May 2, 2012

current state of affairs, the State Government has resorted to SPVs to ensure various projects proposed under the comprehensive traffic management plan.[62]

The necessity of ad-hoc coordination also affects the returns on much larger investments. The Roads Working Group for the NTPDC reports that the Delhi-Mumbai Industrial Corridor Project (DMIC) has been "persistently making requests to the M/o Road Transport & Highways to give special emphasis for development of road corridors necessary for … efficient hinterland dispersal traffic generated on account of the DFC and anticipated future demands on account of proposed development of [Investment Regions] and [Investment Areas]" approved by the Government. (Para 2.5.4) It also reports that the State Support Agreements that Ministry of Road Transport and Highways signs with states collaborate in PPPs for NHDP "in itself does not ensure complete co-operation from the concerned state machinery. Steps should be explored to incentivise the states to fulfil their commitments in a time bound manner." (2.9.5).

It will be difficult and impractical to formally merge these Ministries any time in the near future. In any case, relabeling institutions is just the start. According to Perkins (2012):

> "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 - if some areas of policy are not to be captured by vested interests." (6)

[62] The Bengaluru Airport Rail Link Limited, another SPV under the Infrastructure Development Department was set to study the feasibility for high speed rail to airport, monorail / light rail as proposed in CTTP and then take on its construction similar to the relationship between BMRCL and the Metro. In a more recent move, the State Government has established Hubli-Dharwad BRTS Company Limited (registered during first week of May 2012) for taking up the BRTS between Hubli-Dharwad in northern Karnataka.

Creating a higher-level strategy office with convening and approval power as well as the infrastructure for information flow between departments could accomplish a de facto merger.

We recommend **creation of an integrated Office of Transport Strategy (OTS) as an independent standing body linked to the Planning Commission but reporting to the PMO or Cabinet Committee of Secretaries**. The important part is to create a high-status OTS with convening power. We recommend linking it to the Planning Commission to avoid rivalry the current Transport Planning Group (whose nominal mandate is consistent with transport strategy). If linked to the Planning Commission, the OTS would have to have institutional safeguards to preserve its autonomy, including an independently appointed Director, its own budget, a mandate well beyond participation in Plan preparation, and the ability to build a cadre of experts on competitive terms.

Developing a new agency will take time. In the meantime, larger transport projects could be required to complete a **"**System Impact Requirement" to project the impact of a new highway, port, rail line, airport on traffic in other parts of the network and invest in these areas accordingly. This kind of provision could be incorporated into the decision-making of the proposed National Investment Board, for example. It would require creating an integrated transport planning database that would collate and enable traffic modeling. Both the investment criterion and the database would create stronger incentives and build institutional capacity to move from viewing transport as a collection of projects overseen by a number of sectoral Ministries to a more holistic view of transport as a circulatory system for the country.

The prospects for integrating metropolitan transport planning are murkier. International experience offers three lessons: first, integrating urban transport across modes of public transport, road development and traffic management, and support for non-motorized transport, not to mention taking land use plans into account, is difficult and can take decades. Second, the convening power necessary for effective integration across transport developers and service providers requires funding. Third, locating integrated urban transport agencies at the city level is not only "best practice"

recommended as a way to ensure that the transport strategy responds to local and regional needs, but is also increasingly the actual practice.

India's metropolitan governance, however, is nascent. The 1992 74th Constitutional amendment strengthened municipal governments in principle; states have been slow to devolve the personnel, resources, and powers for urban planning, urban finance, infrastructure development, and other city administration to cities. There is no metropolitan level of government with the capacity to convene as well as strategically plan urban transport investment and policy.

Rather than try to impose a single solution into a center-local government context that varies across states, **we recommend setting up a demand-driven challenge fund that can be accessed by city or national governments seeking funds to develop transport strategy, build capacity, or invest in integrative projects.** Such an approach would build upon the modest successes of two recent central government-led efforts to motivate integrated urban transport planning, the National Urban Renewal Mission's requirement that cities produce Comprehensive Mobility Plans and the National Urban Transport Policy (2006)'s mandate that cities of more than a million residents form Urban Metropolitan Transport Authorities. At least six of the 53 "million +" cities have a UMTA or UMTA-like entity. Hidalgo et al (2011)'s 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" found that some cities had gained new insight into transport planning, although the strategies were still basic.

Railways

The Twelfth Plan Approach Paper describes Railways reform requirements succinctly:

> "The entire system is in urgent need of modernisation and this should have top priority in the Twelfth Plan." (4.11)

> "The current revenue model of Railways is clearly unsustainable. It leaves a very small surplus for investment and modernisation. There is an urgent need to revisit the fare structure … The Planning Commission has on several occasions recommended the establishment of an independent Tariff Regulation Commission for the Railways to fix tariffs in order to depoliticise the Tariff setting process. This is essential if the Railway system is to be put on a financially viable basis."

There is little more to be said. **India must set up an independent Rail Tariff Regulatory Commission.** The current political context for railways pricing handicaps Indian Railways' ability to compete with roads for any kind of freight handling, leading to a rail share in freight traffic of 36% compared to 50% in the U.S. or China[63] and a history of 86.2% of freight in 1950 and 70% of freight in 1970.[64] This in turn leads to skewed demand for additional investment in roads and expenditure on operations and maintenance. It also leads to artificially high demand for energy-inefficient road transport, in a time when energy security and national accounts balance demand reduced energy imports. Rail consumes 75-90% less energy than road transport for carrying freight traffic and 5-21% less energy for passenger traffic.[65]

Indian Railways' finances are deteriorating quickly after a brief turnaround in the mid 1990s. This will not only create a significant fiscal drain, but pressures to cut costs also will affect rail safety and efficacy. Although train travel is a popular benefit, it is not a well-targeted subsidy.

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[63] Report of the NTDPC Working Group on Railways, March 2012, citing Total Transport System Study by RITES and McKinsey's study on Building India: Transforming the nation's Logistics Infrastructure, 2010.

[64] NHAI website. (www.nhai.org). The lower current figure for road traffic (62%) was according to data provided by the Ministry of Shipping, Road Transport, and Highways. More recent market research reports (Research and Markets, (2007). "Surface Transport in India," Report 845404 cite projections of 65% into 2010-2011. Source: Table 1.10, Road Transport Year Book 2006-07.

[65] Report of the NTDPC Working Group on Railways, March 2012, citing Asian Institute of Transport Development (2000) 'Environmental and Social Sustainability of Transport- Comparative Study of Rail and Road.'

The fate of the one Railways Minister in recent times to announce a price increase illustrates the prospects for a political decision on fare pricing. Trivedi was forced to step down from his post as Minister when he proposed a nominal fare increase and the Government rolled back the fare under pressure from a regional ally (who has since left the government).

Over the long run, India may wish to privatize all or part of Indian Railways, although history and comparative international example (e.g. Japan) demonstrate that this will be a long process. There is no particular need for privatization if corporatization can be achieved. Many countries still retain a significant proportion of state ownership of the railway network - Australia, Brazil, China, Germany and Russia, for example. Canadian, Japanese, and American railway networks are mainly privately-owned, with the Japanese privatization as the most recent and, many would argue, incomplete experience. **In the short run, this Plan period, replacing Indian Railways' existing system of accounting with a more standard corporate format including profit-center accounting and line of business structures** would help to build an evidence base for a "corporatization" plan. It could also help clarify criteria for project authority, and support rationalization of project selection to focus on relieving current capacity constraints rather than continuing legacy projects for their own sake. Clarifying accounting would also help policymakers and researchers evaluate the various contributions of railways sub-entities and create a more accessible evidence base for possible unbundling or rezoning of railways. Indian Railways is unique among even publicly owned national railways in the level of vertical integration of services. Most zones formed in 1950s/66s but then a spate of new zones were created in 2002-3. The criteria are not clear.

The budget and presentation of accounts should also be moved within the general budget process. The current separation of Railways' budget from the General Budget has opened it to strong political compulsions, as its backlog of proposed projects demonstrates. Railway Ministers have tended to find themselves pressured to announce Railway schemes as a prelude to the main Budget.

Roads

The Approach Paper to the Twelfth Plan also identifies some of the key challenges in road.

- Integrating state and national investment plans to ensure that National Highways, State Highways, and District Roads link to each other and are developed in keeping with a long-term strategic framework. It recommends that the 12th Plan investments be situated within a 20 year plan.
- Addressing the maintenance backlog more comprehensively, even though technically the Plan focuses on new capital investment. Bundling of maintenance contracts with construction contracts for toll roads and PMGSY has helped some, but longer-term provisions are needed. The Working Group on Roads reports a 40-50% shortfall in allocation of maintenance for State Highways and Major District Roads, for example.
- Building public and especially private sector capacity to successfully execute roads projects, especially in areas that have been affected by "law and order problems."

What can be done within this Plan period? **General reforms such as removing the Plan/non-Plan distinction in public finance, creating a credible process to acquire land and share the value of development**, **or building capacity in state highway and PWD departments as well as regional private companies** could be initiated.

The existing highways infrastructure could also be leveraged more effectively with the **constitution of a Highway Patrolling Authority that transcends the limits of Centre-State jurisdiction for preventing encroachments, dealing with crimes and consequences of accidents**. This is one of the bills stuck in Parliament.

Civil Aviation

Civil aviation requires three changes. **First, India needs to finish what it started in 2008 and finally empower the Airports Economic Regulatory Authority to resolve disputes with private partners in airport development as well as govern infrastructure resources such as landing slots.** The Airports Economic Regulatory Authority Act of 2008 gives the regulator authority to set tariffs and standards for aeronautical services and development fees for major airports, but in practice its authority is contested. The Act directs regulators to keep in mind investments made, economic viability, and concession agreements, but the balance between these factors is ambiguous. The Airports Economic Regulatory Appellate Tribunal, set up to resolve disputes over regulatory rulings, has stayed AERA orders as well as ordered AERA to respond to industry requests. AERA also does not have the power to regulate competition, pricing, consumer protection, and other aspects of civil aviation commonly subjected to regulatory oversight.

Given the contention over the Delhi Airport concession in the wake of the CAG report, the AERA needs to not only have unimpeachable technical capacity, but also be capable of developing more transparent bid documents for airports and anticipating issues that have led to post-bid renegotiation. Given the value at stake in new airport development, the level of capital investment, and the uncertainty about the market for airport services (which in turn creates risk of losses that reasonable to reallocate on technical grounds) it is essential for new airport development to be apolitical and technically unimpeachable. There is a valid business question at stake in airports development. Non-aeronautical revenues are an important part of airport concessions in many markets outside India, and are important for offsetting the costs of airport infrastructure. If "city-side development" is going to be viewed with suspicion as an effort to grab land around the airport, some other way of filling in the revenue gap does need to be developed. Rebuilding of public trust in PPPs and private finance as a means of upgrading existing airports, including safety, cargo-handling services, that are important for enabling a supply response to air travel and air freight demand.

Airport concessions are perhaps the highest profile issue for the AERA, but they are not the only challenge. Clear and expert regulation would reduce ad hoc decision-making about airport services as well as access to facilities. The Ministry restricted the number of ground handling companies for the 6 metro airports, ostensibly in order to promote efficiency and consolidation. Airlines have protested and the matter went to the Supreme Court. Landing rights should also be revisited. They are currently allocated by AAI and DGCA and the Bureau of Civil Aviation Security in accordance with IATA norms, a practice that tends to reward incumbent carriers. There is also regulatory overlap, some inconsistencies in slot allocation processes across airports, and no provision to trade slots. The NTDPC-WGCA appears to consider these akin to a "natural resource" (explicitly comparing them to allotment of spectrum in telecommunications in para 7.1.7.7), which suggests a push to have them auctioned. Finally, route allocation has been a perennial problem with accusations of arbitrary awards of profitable foreign routes to favored carriers.

Second, India needs to rationalize the operating environment, including fiscal aspects such as taxes on ATF, import duties on maintenance equipment, and other taxation of the operating environment as well as the implicit costs such as the public service requirements embedded in current route allocation criteria. The high price of ATF adds insult to injury of other factors such as rupee depreciation in an industry where many contracts and capital investment requirements are denominated in dollars. Prices are 60% higher than those in regional air hubs such as Dubai, Singapore, and Kuala Lumpur due to the combination of service charges, customs duty, oil companies' marketing margin, and national customs, excise, and service and state VAT as well as octroi or entry taxes.[66] The Report of the Working Group on Civil Aviation reports that

[66] Report of Working Group on Civil Aviation for 12th Five year Plan (NTDPC WGCA) "Following dismantling of 'Administered Price Mechanism' (APM), prices of ATF in India are said to be based on the "International Import Parity Prices", and are directly linked to the benchmark of Platt's publication of ATF prices ; That means it is not related to the actual cost of refining ATF in India which is a middle distilled crude derivative. ATF prices for domestic operations thus also include Ocean Freight charges, insurance, notional Customs Duty and other charges; On top of this, Oil Companies' marketing margin; and throughput and other services charges paid to the Airport

ATF accounts for 40-50% of airlines' operating costs. (7.1.1.5) The VAT on ATF ranges from 20-30% in most states. The excise tax paid is also not considered as an offset to the service tax on airline travel as is usually done for taxation of input and service taxation of output. (NTDPC-WGCA, 7.1.3.3) Not only is the price high, it is also unpredictable. The Working Group reports that Indian Oil Marketing Companies increased aviation fuel prices 12 times between October 2010 and March 2011, and prices of ATF often moved in the opposite direction of other derivatives such as petrol. (7.1.2.3)

India's fiscal regime also discourages development of domestic maintenance options, which in turn affects route decisions. According to the NTDPC working group on Civil Aviation (NTDPC-WGCA), Indian MRO players have to suffer an additional tax burden of nearly 40% over foreign MROs due to import duties on equipment and spare parts, VAT, and service tax. This then forces Indian carriers to take their aircraft to Dubai, Singapore, Malaysia, and other MRO centres, disrupting flight planning. Domestic MROs also find it difficult to bring experts into India for urgent repairs due to security and visa restrictions. Service aircraft is 40-50% more expensive in India than in neighboring countries. Spare parts are also not always kept in stock because customs, VAT, and octroi are high for third-party MROs.

Airlines are currently mandated to serve particular combinations of traditionally loss-making, traditionally surplus-generating, and other routes. However, there appear to be significant variation in the profitability of routes within these MoCA-defined categories, so that airlines pick and choose among these routes. The routes are categorized based on the history of ASK over the last decade, with some adjustments to promote tourism or additional connectivity (such as declaration of Cochin-Agatti-Cochin to be Category IIA (within Northeast or Islands) in 2006 by MoCA). Naresh Chandra Report, Rohit Nandan Committee, and NTDPC Working Group: recommend moving toward a direct essential air services fund allocated by minimum subsidy bidding for particular routes. We concur.

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operators and service providers related to the fuel complex in the airport premises." (7.1.2.3)

Third, India needs to build infrastructure and capacity for air traffic control. The NTDPC Working Group on Civil Aviation writes: "Industry sources suggest that the investment required for ANS alone would be not less than US $ 7 billion for the next 5 – 6 years. Presently, there is a shortage of Air Traffic Controllers. Unless concerted efforts are taken to develop and retain adequate number of skilled manpower, sustaining the air traffic growth without having safety implications will be daunting task. Corporatization of air navigation services is expected to pave the way for raising resources towards funding the ANS infrastructure. (NTDPC-WGCA 6.5.3) Strengthening AERA and CCI will be important for attracting investment in the ANS infrastructure.

Ports

India's major ports have resisted efforts to improve performance. All but one (Ennore) are still run by Port Trusts in spite of various initiatives to corporatize them since 1996. Trustees, appointed by the government of India, have limited discretion and are bound by directions and policy orders from the Government. Efforts to improve performance on the margin by moving to a landlord port model (essentially replacing public with private management incrementally) have not delivered results. Indian ports' average turnaround time is more than four days compared with 10 hours in Hong Kong and performance does not seem to be improving. The average turnaround time increased from 2.04 days in 2003–04 to 4.38 in 2009-10.[67] Some of the slowdown has been attributed to poor road and rail container evacuation facilities, but other aspects of performance are likely to result from labor and management practices.

"Minor" state ports have started to attract an increasing share of freight traffic as well as investment. (Figure 8). State ports have also attracted investment in the port infrastructure itself (not just the terminals) although the largest investments are for

[67] Economic Survey 2010-11, GoI, Ministry of Shipping.

captive or single-cargo ports linked to large local industrial projects rather than general-use ports.

Given this competitive landscape, India has three options: redouble efforts to improve major ports' performance, including corporatization and/or privatization as well as concerted effort to built road and rail links to remove this excuse for slow turn-around times; abandon major ports and focus on states' efforts to develop minor ports by linking these to national highways or rail projects among other support; or try to bring the two sets of ports on a level and actually competitive playing field by creating a common ports regulator. All of these approaches have important risks. The first could fail (again). Relying on these state-level ports to carry the entire sector forward, could lead to environmental challenges and unproductive interstate policy competition as well as underutilize some of India's best national port sites. The last could stifle the most vibrant area of ports development if the common regulator/regulation were captured by Major Ports.

The best course in the Twelfth Plan may be to wait and watch and focus on integrating all larger ports (Major or Minor) with inland infrastructure in the meantime.

4. CONCLUSION

We began this project intending pare the long list of "important reforms" in three infrastructure sectors down to a shorter set of priorities that could be initiated during the 12th Plan Period, but have ended up retaining quite an ambitious agenda for national policy action. The Agenda (in order of appearance in the Paper) includes:

1. Land acquisition: continue to move forward on the national land acquisition, rehabilitation and resettlement law (LARR), but create room for alternate efforts to develop land acquisition norms for particular purposes or geographies to be upheld as the national regime evolves.

2. Strengthen the political autonomy and technical expertise of the Competition Commission of India and clarify its jurisdiction as the regulator in charge of competition issues in infrastructure as well as other sectors.
3. Opening more senior infrastructure management positions to non-IAS appointments, with competitive pay scales and lateral recruiting for specific and verifiable skills.
4. Abolish the distinction between Plan and non-Plan public expenditure.
5. Develop and follow a transparent process for government, regulator, and industry dialogue on spectrum pricing.
6. Rework the terms of access to the Universal Service Obligation Fund to create more incentives for multiple public and private telecoms providers to participate in converting the funds to rural broadband infrastructure.
7. Reaffirm TRAI's status as the regulatory counterpart to the Department of Telecommunications as well as its authority over BSNL as a telecommunications service provider.
8. Undertake comprehensive study of factors behind state variation in electricity tariffs in order to identify the factors behind state reforms and leverage these dynamics for further distribution sector reform.
9. Explore options for a joint state-centre electricity regulatory commission as a means to achieve greater regulatory autonomy for the sector.
10. Proactively monitor transmission investments' progress to identify challenges before they become bottlenecks for scale.
11. Automate systems for preventing states from drawing from the interstate grid outside of specified operating parameters.
12. Revise PPP templates and tariff-based bidding norms to allow some pass-through of fuel price risk.
13. Develop fuel supply agreements for CIL that are feasible, but a stretch for the organization – force it to commit to better performance, but avoid high-powered

incentives that become uncredible because they will inevitably have to be renegotiated after widespread failure.

14. Move to market-linked gas pricing with transparent subsidy for particular uses as required for policy goals.
15. Integrate national transport investment under a high-profile Office of Transport Strategy and the power to convene senior officials from relevant Ministries.
16. Create a challenge fund to support state and city proposals for developing metropolitan transport strategy offices.
17. Establish an independent regulator for setting rail tariffs.
18. Replace Indian Railways' accounting with more standard corporate format including profit-center accounting and line of business structures.
19. Create a highway patrol authority to create and enforce controls on access to highways.
20. Strengthen and clarify the jurisdiction of the Airports Economic Regulatory Authority.
21. Review and generally reduce taxes on fuel, maintenance services, and other aspects of the airline operating environment.
22. Invest in equipment and human resources for air traffic control.
23. Allow the contest between state and national ports to continue to play out rather than imposing a common tariff regime without further research on its consequences. Focus instead on connecting all ports to national infrastructure networks.

Our recommendations for national policies to unblock India's infrastructure impasse fall into four broad categories: tie your hands, learn from states, focus accountability, and be realistic even if it means incremental change.

The Indian government, like many of its counterparts around the world, uses pricing policy and discretion in resource allocation to achieve distributional goals. There is nothing wrong with having or pursuing distributional goals – these are "policies" as

well as "politics" – but pursuing them indirectly damages public and private providers' ability to produce the goods or services in question.

Many of the changes we discuss involve creating, strengthening or clarifying regulators' jurisdiction. In some cases (railways and power), the primary goal is to enable apolitical pricing for public services, in others (competition, civil aviation, and telecoms) the motivation is to create a clear locus of responsibility for resolving disputes between service providers and setting the terms of the market. The recommendations to automate some parts of inter-state grid management is also a form of "tying hands" to eliminate the temptation to support states who are not managing their own intrastate grids. Moving gas pricing to a market-linked regime, perhaps some kind of formula, would also be a form of committing to refrain from political interference.

"Learning from states" is also important as a new approach to federal management. India's constitution gives the central government substantial fiscal power and some extreme political powers, but states are increasingly politically powerful and less likely to conform to national governments requests or laws simply because the rules have been stated. The central government has used a variety of financial incentives, intergovernmental diplomacy, and other tactics to motivate state reforms. Some of these have worked, many have not. It is time to try a different tactic and focus on how the national government can reinforce states own constituency-, competition-, or leadership-led efforts to reform. Our recommendations for urban transport as well as electricity sector reflect this new "enabling" approach.

While many of the points are focused on creating a clearer and more stable environment for private investment, we also acknowledge the importance of building public sector capacity to deliver infrastructure. Rebuilding the public sector's capacity to plan, initiate, and manage projects in keeping with policy goals will be a long road, but one way to start is to start to make particular entities' performance more visible. Our recommendation to move Indian Railways to more standard corporate accounting is one example of this approach, as is the recommendation to focus on strengthening transport links to ports so that ports' service quality can be separated from the effects

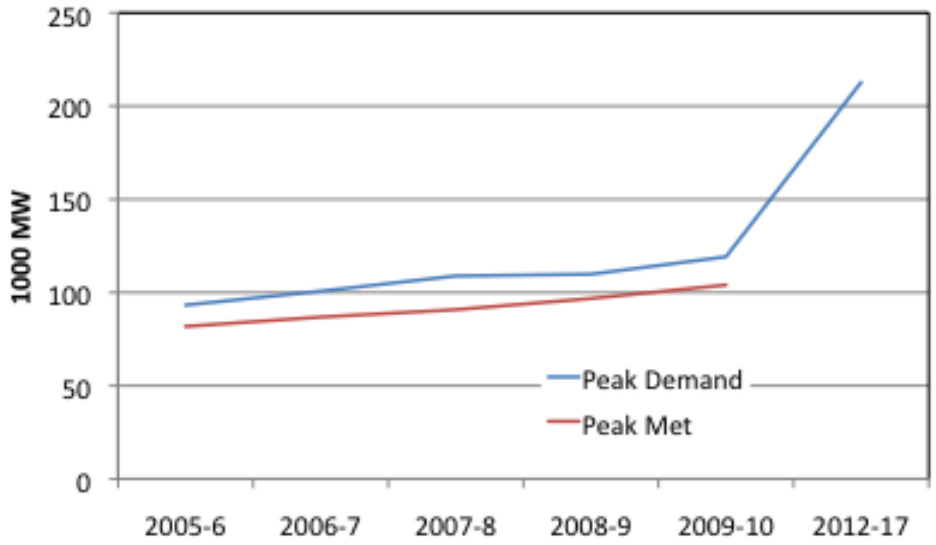
of congestion. The CIL Fuel Supply Agreements also focus accountability for performance. However, there is a limit to how much "incentivizing" can do. Pushing agencies to achieve goals that would be nice but are nearly impossible may be good for symbolic politics and shifting of blame, but it does little for effort. If the organization knows it is going to fail in any case – that success is beyond its control - why try?

The entire paper is an attempt to be strategic and realistic about what's possible to achieve in 5 or 10 year time frame. Policy reform agendas and official policies have a tendency to be long lists and sweeping statements of goals (e.g. Power for all by 2012, broadband for most by 2015). Then years go by. It is time to focus on more specific actions that could lead to these kinds of achievements.

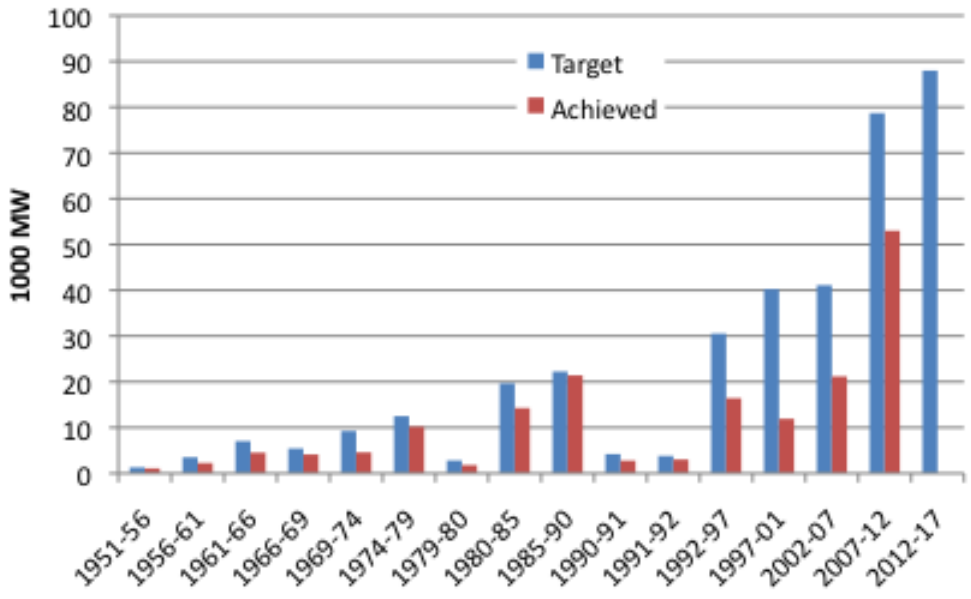
Finally, and most importantly, policymakers must also pay close attention to repairing the political culture, particularly levels of trust between the State and civil society, in order to create a context that allows for continued experiments in public-private collaboration for development. Recent weeks have seen some halting steps in the right direction, from the Prime Minister's televised address and explanation of the need for reforms to Members of Parliament sitting down with their constituents and party workers to explain the rationale for unpopular price hikes.[68] These kind of incidents need to become more of a habit, and these kinds of habits need to have more of a place in institutionalized policymaking.

[68] One MP tweeted: "Interesting experience at public meeting in Thiruvanthapuram … my own party's local leader criticized govt's diesel&gas decisions... but when I explained the reasons4the decisions to the public, they listened patiently &applauded. Treat voters w/respect, not pandering"

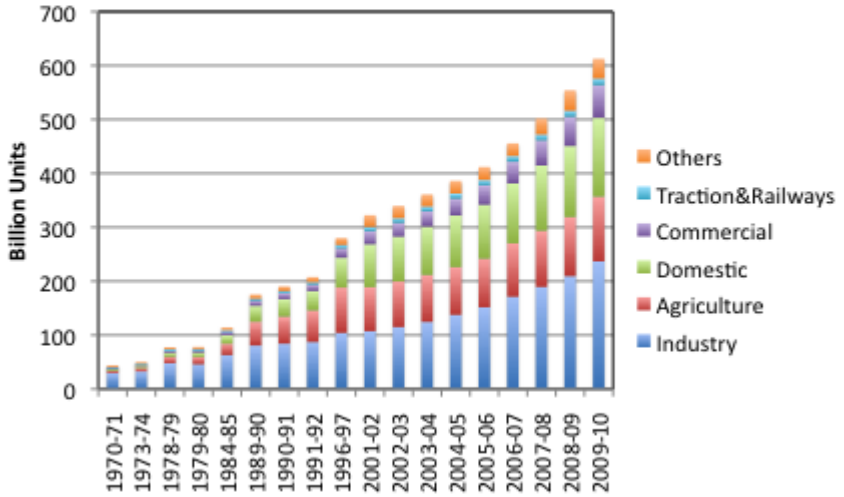
1: Power Shortfall



2: Generation Capacity Addition

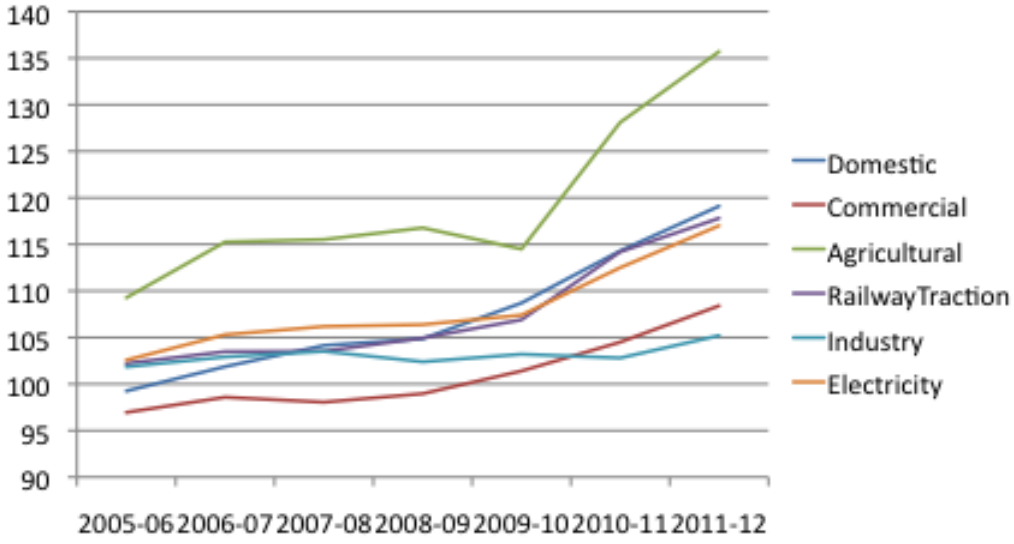


3: Electricity Consumption, By Sector



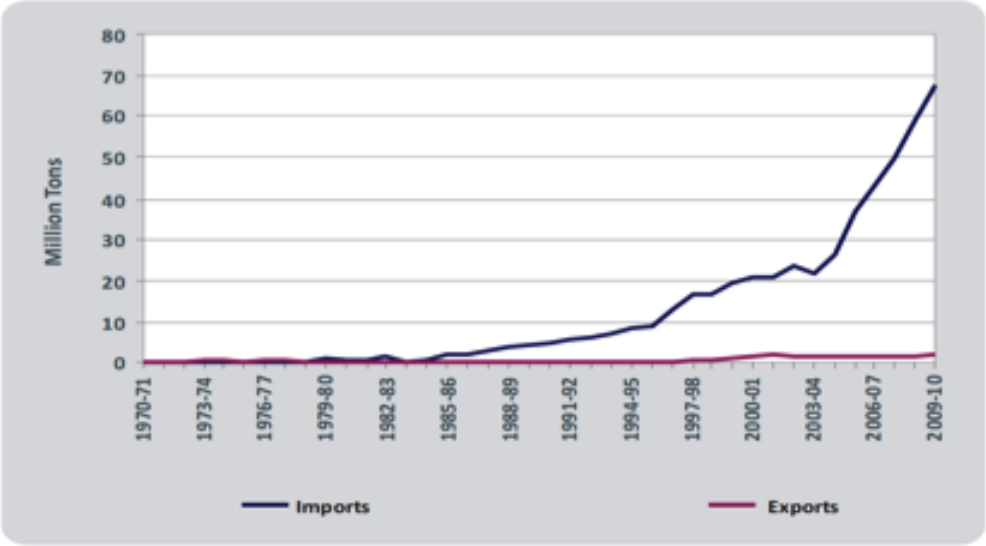
GoI, Ministry of Power, compiled in *India Energy Yearbook (2012)*

4. Wholesale Price Index of Electricity (2004-5 =100)



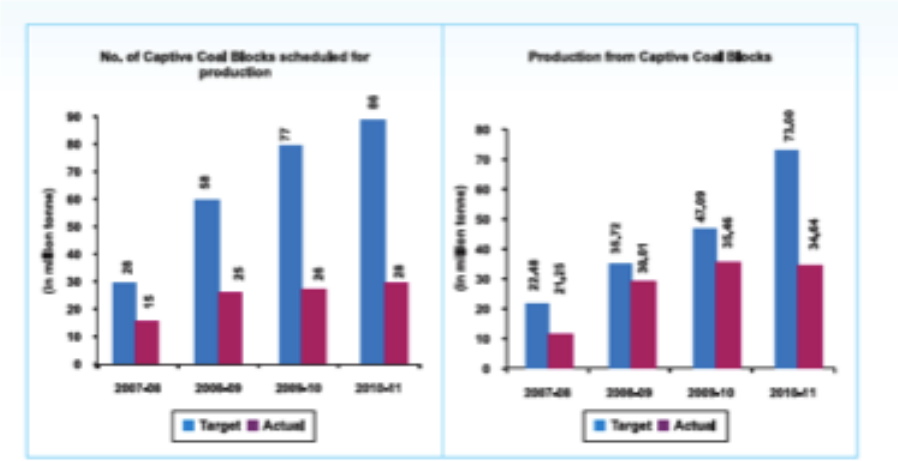
Source: Data Compiled by India Energy Yearbook (2012) and CERC (2011-12)

5: India Coal Imports



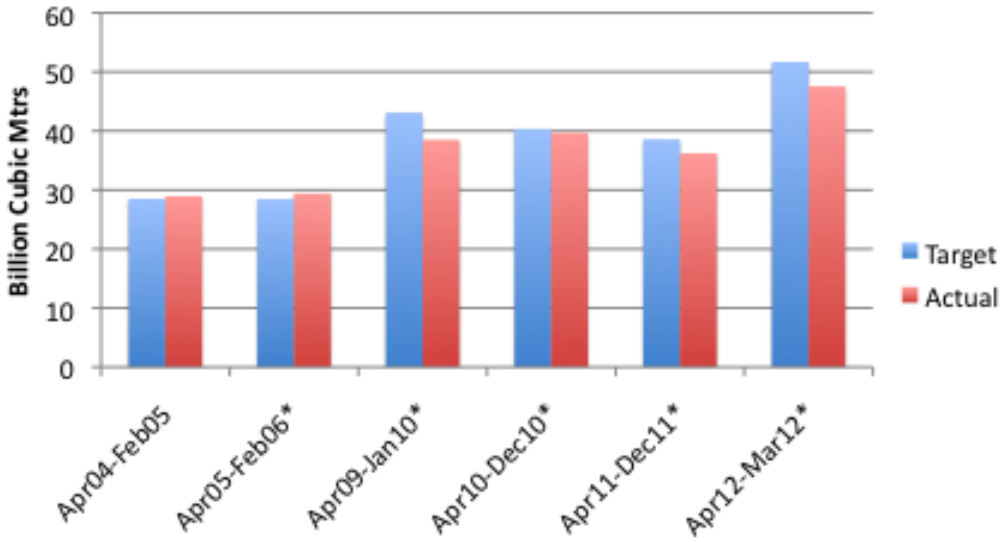
Source: India Energy Yearbook (2012)

6: Coal Production in Blocks Allocated for Captive Use



Source: CAG (2012)

7: Gas Production



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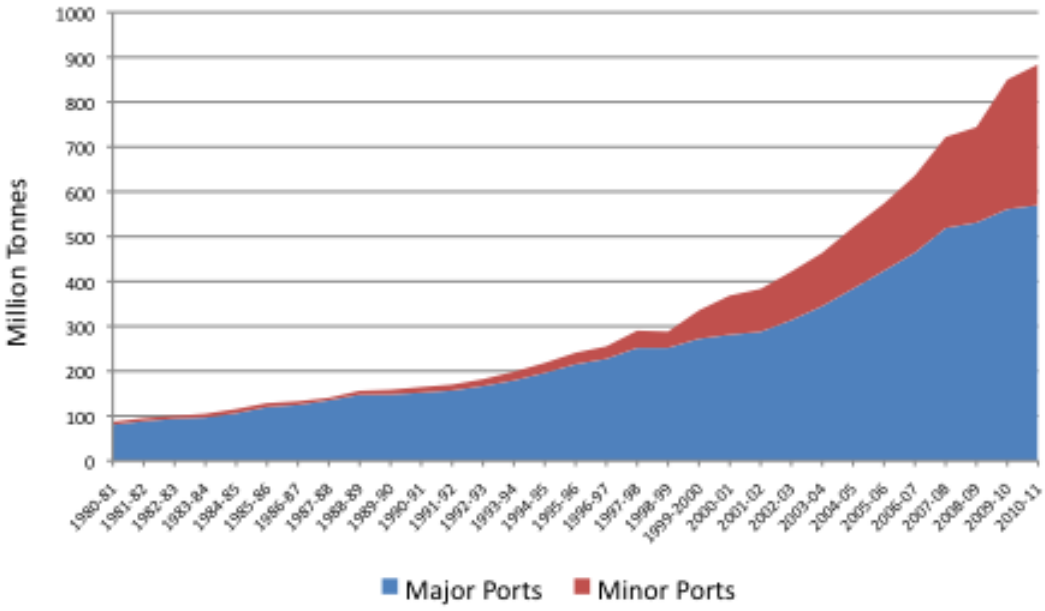
8: Port Traffic



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