

1 | THE INFRASTRUCTURE SECTOR IN INDIA, 2007

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INTRODUCTION

An average economic growth of 8.6 per cent over the past three years has India bursting at the seams, so to speak, with its infrastructure sector stretched way beyond capacity. Spiralling demand for air travel, reliable power supply, and efficient ports, roads, and railways has not been matched by a proportionate increase in supply. It is widely acknowledged that severe supply-side bottlenecks can retard the economy's potential rate of growth.

There is a palpable urgency and competition among states to provide better infrastructure to users but most infrastructure projects are facing serious land constraints as well as the ire of those displaced by expansion of infrastructure facilities. Rural as well as urban land holders are now increasingly aware of their rights, demanding sufficient compensation to form a source of livelihood over a long period of time.¹

RECENT POLICY INITIATIVES AND BENCHMARKING

To improve India's poor roads, narrow bridges, and dilapidated airports which choke the flow of goods and people, a large injection of capital into the system is required. The infrastructure sector is being paid maximum

policy attention to ensure that supply shortages do not trigger runaway inflation. At present, it offers significant opportunities to private investors, both domestic and foreign.

The government has been dismantling longstanding barriers and actively encouraging private investment in big public-works projects. Private-sector companies have been invited to manage airports, which used to be exclusively government-run. The government is helping private sector developers by lowering their risk in road projects. Telecom and aviation sectors have demonstrated that introduction of private capital introduces discipline of time management and leads to remarkable results even within the very short term. To harness private sector efficiencies in design and construction of infrastructure projects the Planning Commission envisages that at least 75 per cent of new investment into infrastructure will come from the private sector—some in the form of fully private ventures, others as public-private partnerships (PPPs). The aim is to make sure infrastructure does not become a capacity constraint on 9 per cent growth rate of the economy.² This is feasible when investment in infrastructure grows to about 9 per cent of GDP compared to the current 5 per cent. It is estimated that over the next five

* All views expressed in this chapter are the author's views and should not be attributed to the organization he works for.

¹ Land acquisition for highways, power projects, pipelines and so on has always been an elaborate process. Singur, about 50 kilometres north-west of Kolkata, was identified for acquisition for Tata Industries to set up their small car project. The slew of protests and political upheaval that Singur brought in its wake has brought the land acquisition issues into recent limelight. Incidentally, Bengal government had agreed to pay compensation to farmers at a generous rate—almost 150 per cent more than the prevailing market price. National Policy on Resettlement and Rehabilitation Policy is being piloted by the Ministry of Rural Development under Article 73 of the Constitution which will give it the status of an Act till the whole policy is enacted. The resettlement and rehabilitation of people affected by projects will have three components—the policy, the National Rehabilitation and Resettlement Bill and the amendments to the Land Acquisition Act (*Business Standard*, 14 September 2007).

² The target during the span of the 11th Five Year Plan (2007–12) (FYP) is to have economic growth of 9 per cent in the beginning and increase it to 10 per cent by 2012. Statistics and projections used in this chapter for the 11th FYP are from the Approach Paper of the 11th FYP and working group reports prepared by respective sectoral ministries for the Plan (Planning Commission, 2006).

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years India will need US\$ 475 billion of investment in infrastructure to this end (Box 1.1). The government is keen to raise funds from various sources using different financial instruments.

The committee for the launch of dedicated infrastructure funds (DIFs) has proposed listing options for DIFs to provide liquidity to such funds. The committee has also recommended that the proposed DIFs should operate as a closed-ended scheme with a maturity period of seven years. Considering the long-term and closed-ended nature of

DIFs, the committee suggested that retail investors be given tax incentives. DIFs should be given the option to invest the entire corpus in unlisted securities including equity and debt instruments (SEBI, 2007).

On their part the Reserve Bank of India is following time tested step-by-step approach. It has released long-awaited draft guidelines for banks and dealers to begin trading in credit default swaps that allow banks to hedge against the risk of default. The move will enable banks in India to step up lending to the corporate sector by

Box 1.1

The Parekh Committee Report

According to the GOI the country needs US\$ 320 billion (at 2005–6 prices) in infrastructure spending over the next five years and close to half of that will need to come from the private sector to maintain the current growth rate and to bring millions of Indians out of poverty (Table B1.1).

TABLE B1.1
Investment Required for Indian Infrastructure from 2007–12

Power ³	130
Railways	66
Highways	49
Ports	11
Civil Aviation	9
Other	55
Total	320

Note: Calculated at Rs 45.30 = US\$ 1.

Source: GOI (2007a).

A large portion of this investment may come from foreign institutional investors. In order to facilitate such a large flow of funds, the Finance Minister P. Chidambaram on 26 December 2006 established a committee under the Chairmanship of Deepak Parekh to suggest ways to facilitate financing of India's infrastructure needs by improving access to long-term risk capital, primarily from foreign sources, given the inability of domestic banks to lend in the long term.

The seven-member Deepak Parekh Committee on infrastructure financing has suggested that India should allow holding companies to raise foreign direct investment (FDI) through the automatic route, refinance rupee loans and relax cost ceilings for external debt. The Committee has also raised infrastructure spending targets for the next five years from the original US\$ 320 billion to US\$ 475 billion at current prices over the period 2007–12.

The key recommendations of the Committee include no withholding of tax on foreign borrowings by infrastructure firms, permission to refinance rupee loans through external commercial borrowing, extension of tax rebate to individual investments in ultra mega power projects, and relaxation of cost ceilings for subordinated debt and mezzanine debt (debt that incorporates equity-based options). It further recommends that infrastructure holding firms should not be subjected to the same norms as non-banking finance companies, investments in unlisted shares should be taxed at the same rate as listed shares, and dividend distribution tax should be rationalized to reduce tax burden.

The suggestion to refinance rupee loans through external commercial borrowings is also considered a major step forward. The Committee has suggested that the existing investment subsidiary—India Infrastructure Company Limited—should be allowed to borrow up to 10 per cent of the annual net accretion to the country's foreign exchange reserves. It also recommended that the loans to this subsidiary be benchmarked to 30-year US government bonds.

Source: <http://www.pppinindia.com/policy.asp>

³ This estimate is much smaller than the estimates given in the Rajya Sabha for the power sector. The Rajya Sabha was informed that the power sector will require Rs 10,31,600 crore (~US\$ 227 billion @ Rs 45.3 = US\$ 1) investment during 2007–12 to add generation capacity, besides creating and upgrading transmission and distribution networks (*Financial Express*, 14 August 2007).

allowing them to offload some of the risk to third-party investors.⁴

With various financial instruments being used by private infrastructure project developers and financial institutions, there is a need to have a benchmark to assess relative performance of mutual funds and institutional funds. In order to benchmark investment in the infrastructure sector, IDFC, jointly with FTSE Group, has inaugurated two stock market indices, namely, FTSE-IDFC India Infrastructure Index and FTSE-IDFC India Infrastructure 30 Index (Box 1.2).

awaited policy on spectrum or radio frequency is taking much longer than expected to finalize. The rollout of third generation or 3G⁶ services in India would be vastly more significant than elsewhere because villages that have no telecom facilities can then be provided such facilities at competitive prices.

With the mobile subscriber base growing at an exponential rate, the level of congestion on operators' network is increasing. According to a report released by the Telecom Regulatory Authority of India (TRAI), performance of mobile operators (in terms of congestion) at points of

Box 1.2

FTSE-IDFC Infrastructure Indices

The FTSE-IDFC India Infrastructure Indices will represent the performance of Indian companies generating the majority of their revenue from infrastructure, listed on the National or Bombay Stock Exchanges in India. The indices are designed to underpin the creation of index tracking funds and structured products.

FTSE-IDFC India Infrastructure Index is a benchmark index covering the entire eligible universe after size and liquidity screening. FTSE-IDFC India Infrastructure 30 Index is a tradable index representing the top 30 constituents of the eligible universe, by full market capitalization.

To be eligible for inclusion in the index, a company must have a full listing on either the National Stock Exchange or the Bombay Stock Exchange, must generate a majority of their revenue from infrastructure and must conform with FTSE's free float, liquidity rules, and size criteria. The Index Series will be reviewed on a semi-annual basis in March and September each year. The indices will be managed according to a transparent and public set of index rules.

The indices will be used as the basis for trading and benchmarking of financial products, such as institutional and retail funds, exchange traded funds, and derivatives contracts. These indices will allow investors to measure and invest in infrastructure-related sub-sectors of the Indian market for the first time.

Source: www.ftse.com/india

TELECOM

India, the world's fastest-growing mobile-phone services market, is now the third-largest wireless market by users in the world, behind China and the US. Teledensity crossed 25 per cent in February 2008 with a total user base of 290 million. The total wireless subscriber base is 251 million now. The wire line segment subscriber base stood at 39.18 million with a decline of 0.04 million in February 2008. Total broadband connections in the country have reached 3.47 million by February-end (TRAI, 2007a). Given the pace of growth, and reaching the target of 250 million telecom users by the end of 2007, the government has set the target of 500 million subscribers by 2010. Recent findings suggest that Indian telecom is the fastest growing telecom sector in the world, ahead of even China.⁵

But the nine million broadband lines targeted by December 2007 have not been achieved as the much-

interconnection deteriorated in March 2007 as compared to December 2006 (TRAI, 2007b). A point of interconnection is the physical place where two operators connect their respective networks with each other. The number of points of interconnection increased from 389 in December 2006 to 499 in March 2007. Due to a surge in mobile call traffic, operators are not being able to provide enough capacity to each other. As per TRAI direction in 2005, all service providers are required to provide interconnection on the request of the interconnection seeker within 90 days of the applicable payments.

The government has decided to constitute a committee to design a unified and single levy for the telecom sector, which is currently saddled with multifarious taxes, charges, and fees (GOI, 2007b). The committee will study the present structure of levies to make the recommendations so that different taxes, charges, and fees applicable to the industry may be unified and single

⁴ See Chapter 2.3 in this report.

⁵ 'Developments Across the Asia-Pacific Telecom Sector', April 2006, Fitch Ratings.

⁶ 3G, or third-generation wireless, refers to near future developments in personal and business wireless technology, especially relating to mobile communications.

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levy on revenue collected. Telecom operators have been urging the Department of Telecom (DoT) to bring down all levies imposed by the central government on the operators to 6 per cent of their annual revenues. Currently, telecom operators pay between 6 and 10 per cent of their annual revenues as licence fees. Besides this, they also pay spectrum charges, service tax, and other local taxes such as octroi and stamp duties to various state governments. While the levies charged by the state government may not be tampered with, the operators want that all levies and duties being charged by the Central Government should be replaced by a single levy that is not more than 6 per cent of their annual revenues. They reckon that even if the charges were brought down to 6 per cent, the government would not lose any revenue due to growth in the operator's revenues.⁷

3G AND SPECTRUM

Almost all telecom majors such as Bharati Airtel, BSNL, Vodafone-Essar, Reliance Communications, and Tata Teleservices have carried out trial runs of 3G applications and services. The pilots included testing of all high-speed internet applications, next generation gaming, video, and wireless streaming. They also have processes in place for seamless migration of all value-added services to the 3G space from the current 2G networks. But, they are all awaiting the allotment of radio frequency (also called spectrum) from the government to launch 3G services in India. 3G technology services will allow simultaneous transfer of both voice data (a telephone call) and non-voice data (such as downloading information).

Rollout of 3G services is a contentious issue owing to the scarcity of spectrum availability amidst many users who need the spectrum. An additional controversy had centred on whether global companies should be allowed to bid or not. The allocation of spectrum has to face the rigours of a long political process because 3G carries several trade policy and international bilateral implications.⁸

TRAI has called the industry's bluff of shortage of spectrum. Acknowledging that existing operators use spectrum inefficiently, TRAI implies that efficiency of spectrum usage can be increased four to five times the original estimates with the use of new technologies. TRAI's new criteria indicate that even with the initial allocation of 6.2 MHz in GSM and 3.75 MHz in CDMA, the addressable subscriber base can be doubled across all service areas (TRAI, 2007c). GSM players' argument that scarcity of spectrum cannot sustain open entry has been challenged. At the heart of this controversy is application of new technology which will adversely affect existing investments. Not surprisingly, incumbent service providers would like to delay it as long as possible.

Notwithstanding TRAI's analysis, sharp differences have arisen across ministries over vacation of radio spectrum for mobile services. As per the proposal worked out by the Wireless Planning and Co-ordination (WPC), defence forces are expected to release 42.5 MHz once the first phase of the optical fibre cable project is completed. The Group of Ministers, which was set up for vacation of spectrum from the defence services for the need of mobile operators, opined that at present the 'spectrum for the growth of existing 2G services is more important than planned 3G services'. The defence services and DoT have been looking at vacation of around 25 MHz of 2G spectrum as well as around 15 MHz of 3G spectrum for telecom services. In a move that would spell relief to mobile operators, the Department of Telecom and the Defence Ministry are working out a compromise formula that would make available additional spectrum of up to 55 MHz in three phases by April 2008. As part of the deal being worked out by the two sides, the DoT will agree to lay an optical fibre cable for the army and navy also at its own cost. Earlier, the DoT had made plans to set up a cable system only for the Air Force. Phase 1 covering 54 sites was expected to be completed by the end of December 2007. The remaining 69 sites will be connected in 2008. DoT will contribute Rs 1040 crore just for completing the first two phases. The cable system for the Army and Navy will be taken up by DoT in the second

⁷ The rapid growth in wireless services has resulted in buoyant revenues for the government with the exchequer realizing about Rs 9500 crore in the form of licence fee and spectrum charges in 2006–7. According to an analysis by telecom regulator TRAI, about Rs 2090 crore was collected as spectrum charges from the operators, while licence fee payment was Rs 6360 crore. Realization from spectrum charges is steadily going up. The analysis shows it was Rs 1028 crore in 2004–5 and Rs 1367 crore in 2005–6. Though telecom tariffs are probably the lowest in the world, operators often complain that they are among the most taxed companies in the world. They have estimated that all levies added up to 30 per cent or more while in most Asian countries, telecom companies were paying 3–5 per cent of their revenue as taxes and other charges.

⁸ In the US, Federal Communications Commission has voted to adopt rules that will partially open spectrum that will be auctioned in 2008. The new rules fall short of open-access rules. From 2008 onwards after the auction, the wireless companies that buy the spectrum will have to let customers use any device on the network, and access any application, provided they meet certain security and stability requirements. Allowing an open network would have loosened the grip held by telecom operators on the wireless and broadband markets (*Financial Times*, 31 July 2007).

phase.⁹ The move might further delay the launch of 3G services in the country which was earlier expected to roll out in July 2007. WPC is also negotiating with the Department of Space for vacating radio frequency for broadband services.

State-owned telecom firms, Bharat Sanchar Nigam Ltd. (BSNL) and Mahanagar Telephone Nigam Ltd. (MTNL) will get 3G spectrum quota in step with the recommendations of an internal committee of DoT.

It seems that DoT is unlikely to invite overseas companies to bid for 3G licence just yet. There are chances that DoT may not call foreign players to bid at all for 3G services in line with the TRAI's recommendations. One of the reasons could be that the foreign players have deep pockets and they can bid very high for the 3G spectrum.

NATIONAL 'DO NOT CALL' REGISTRY

The National 'Do Not Call' (NDNC) Registry has now become a reality and Telecom regulator, TRAI can impose a fine of Rs 500 on telemarketers for every unsolicited commercial call or short message to subscribers who have got their telephone number listed on the register.

TRAI has announced a 3-step process to implement NDNC Registry, which would check unsolicited calls after forty-five days of registration with the telecom service provider. In the first phase of implementation the National Informatic Centre (NIC) has designed an online registration module for telemarketers.

In the second phase, the registration of subscribers for NDNC will commence. The registration is being done through their respective service providers, according to TRAI. In the third phase, NIC has prepared a scrubbing module. Once the module is functional, the authority would ask all telemarketers to get their calling list scrubbed through this module and telemarketers would be able to call only those numbers which are cleared by NDNC registry (TRAI, 2007d).

It took almost two years after the Supreme Court asked the government to take steps to protect mobile phone users from being flooded with sales calls from firms and telemarketers offering a range of services. Private telecom companies are ready to comply with TRAI's plan as penalties for non-compliance are tough.

⁹ The new spectrum allocation proposal by the Telecom Regulatory Authority of India (TRAI) will result in an additional capital expenditure of US\$ 600 million in the next four years. This would be due to spectrum squeeze to be felt by the service providers in urban areas, according to Lehman Brothers (*Business Standard*, 6 September 2007).

¹⁰ Voice, cable TV, and internet services on a single line is popularly called the Triple Play in India.

¹¹ WiMax is a promising technology and appears to be a good broadband solution, but its real benefit lies in offering fixed wireless rather than truly mobile applications. As equipment for the mobile variant of WiMax (802.16e) is not yet available, it is very difficult to compare WiMax with 3G which includes high speed packet access (HSPA). WiFi technology provides the best solution to a place with

IPTV

The long-predicted convergence of the internet and the broadcast world is accelerating. Unlike established television networks, which serve up to 30 minutes of programming, video-sharing web sites offer a world of short programmes as well as regular programmes. But the right hardware for this convergence is not available in abundance.

MTNL, jointly with Aksh Optifibre, announced the commercial launch of their next generation television broadcast system in July 2007. All MTNL broadband subscribers are able to register for India's first IPTV service in Delhi and Mumbai. The software, hardware, service setup, and content delivery for IPTV service is being managed by Aksh Optifibre Ltd. MTNL will function as the service provider taking charge of operations and revenue collection. The consumers will now be in a position to select the pay channels as per their preferences, view details of all programmes scheduled for the week by channels on the screen, avail instant video-on-demand facility, and curb their overall expenditure as the fixed rental for the services is pegged at Rs 90 per month only.

Telecom companies are now showing keen interest in IPTV or Triple Play¹⁰ as they feel that 85–90 per cent of new broadband connections will be able to avail the IPTV facility. State-run BSNL will offer voice, cable TV and internet services on a single line by the end of 2007. With new technologies such as IPTV being launched in the country, fixed line demand may see resurgence. Broadband connections touched 3.47 million by the end of February 2008 compared with 3.13 million in December 2007, registering an average growth of more than 5.5 per cent in 2008.

WIMAX AND WIFI

WiMax, short for worldwide interoperability for microwave access, is a standard that's capable of data speeds of 10 megabits per second at distances up to 2 km from a radio transmitter. The use of wireless services based on open standards such as WiMax may make buying a broadband connection hassle-free and simple.¹¹

But from what we do know, 3G/HSPA has several clear advantages over mobile WiMax in terms of backward compatibility, standardization, use of licensed spectrum and availability of infrastructure and terminals giving it an edge

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over WiMax in terms of large scale economies leading to better affordability, availability, scalability, and overall ruggedness of the 3G/HSPA standard.

WiMax technology is at present in a nascent stage. Mobile WiMax standards are still under evaluation. The capital expenditure for deploying WiMax is up to 5–10 times higher than HSPA because the size of mobile WiMax cells is one-sixteenth the size of the cells in an HSPA system, necessitating a larger number of base stations to cover the same geography.

In a move to help roll-out of WiMax services, the government has delicensed 50 MHz of spectrum in the 5.8 GHz band for commercial use. The move assumes importance as the global WiMax forum has identified three frequency bands—5.8 GHz, 2.5 GHz, and 3.5 GHz—to deploy systems using this technological platform. Of these three frequencies, the world over, only the 5.8 GHz is a licence-exempt band, and therefore DoT's move to delicense this frequency puts India in line with global standards.

The telecom industry has pinned high hopes on broadband in villages to spread education, entertainment, medical services, and e-governance. Broadband can also facilitate the digitization of government records such as land records and birth certificates, which are essential to access basic services in India. Three Indian telephony and internet firms are finalizing plans to offer wireless broadband services to retail customers in anticipation of a change in rules that will allow them to do so in a financially viable way.¹²

RailTel plans to install WiFi for providing wireless access at Bangalore and Jaipur to begin with and is preparing to install the WiFi System at 500 stations across the country over a period of time. Pune is adopting a meshed network of WiFi for retail, and WiMax for enterprise consumers. The city is expected to go completely

wireless by the end of 2008. The advantage of WiMax over WiFi is that the range of WiMax is almost 10 miles.

MOBILE VAS

The average Indian spends more time talking on her mobile than her counterparts anywhere else except the US, according to TRAI¹³ (*Economic Times*, 14 June 2007). With over 160 million mobile subscribers, India has the highest monthly 'minutes of usage' (MOU) per subscriber in the Asia-Pacific region.

The high growth in mobile value added services (VAS) is attributed to a rapidly increasing subscriber base and easy accessibility to the end-users in rural as well as urban India (Box 1.3). Various downloads such as ring tones, bill-related information, TV contest, cricket scores, exam results, and messages received from public services such as banks, railways, and airlines earn revenues for the industry. Such revenues will grow and multiply to add volumes to VAS. According to Frost & Sullivan, total mobile revenue (voice and data) for the Indian mobile VAS market is US\$ 11.22 billion (Rs 46,000 crore). VAS revenue accounts for 8.3 per cent of this, that is, US\$ 927.1 million (of which non-SMS revenue is US\$ 224.4 million) (*Business Standard*, 28 August 2007).

POWER

While the growth in investment in this sector has been phenomenal in the last three years, the country is still faced with acute power shortage—with energy and peak shortages of 9.5 per cent (55,000 million units) and 14.2 per cent (14,500 MW) in 2006–7. Power has been identified as one of the main constraints which may derail the growth trajectory envisaged in the 11th Five Year Plan. The capacity

existing broadband access whereas WiMax, a fourth generation technology, is the best solution for expanding coverage and backhaul facility. The technology, which promises citywide coverage with a few transmitters, promises enough wireless capacity to support internet telephony or voice over internet protocol. 3G is a data-friendly evolution of the existing cellular networks and promises data throughout of 2mbps, but is seen as being less efficient in use of frequencies than WiMax. Earlier, ITU approved only five technologies, including the generic versions of the most popular standards—WCDMA or wideband code division multiple access, a 3G version of GSM, and EVDO (short for 'evolution, technology')—in its list of data only, which is the next generation CDMA certified 3G technologies known as the International Mobile Telecommunications-2000 or IMT-2000.

The WiMax and WiFi standards, among others, were formulated by the IEEE. The International Telecommunications Union Radio-communications Assembly included WiMax as a third generation (3G) wireless technology in October 2007 i.e. WiMax will be part of the 3G family and spectrum allocation will have to be done accordingly.

¹² Reliance Communications Ltd (RCL), Videsh Sanchar Nigam Ltd (VSNL) and Sify Ltd have started planning and setting up wireless-data networks using the so-called WiMax technology in more than 200 cities. VSNL has announced plans to extend its WiMax network to about 120 cities across India for enterprise customers and in five cities for retail customers by the end of 2007. RCL has launched its wireless broadband technology based on WiMax in Pune and Bangalore. Bharti Airtel has already deployed fixed WiMax in eleven cities which include Ahmedabad, Mumbai, Pune, Hyderabad, Bangalore, Cochin, Trivandrum, Kolkata, Jalandhar, Chandigarh, and Kolhapur.

¹³ According to Merrill Lynch, in the fourth quarter of 2006, the US recorded 838 minutes a month, with India at the second position with 461 minutes a month.

Box 1.3**Multi-media Phones**

Over the past few years, cell phones have evolved from simple communication devices into multimedia powerhouses. First came cameras, then web surfing followed by music players. One of the most important trends in personal technology over the past few years has been the evolution of the humble cell phone into a true handheld computer, a device able to replicate many of the key functions of a laptop. But most of these 'smart phones' suffered from software with confused user interfaces and clumsy music, video, and photo playback. Their designers struggled to balance screen size, keyboard usability, and battery life.

The iPhone introduced by Apple Computer in July 2007 is a thin and sleek handheld device with the biggest screen ever seen on a mobile phone. It combines all the functions of a smart phone, internet appliance, and multimedia player seamlessly in one handsome device. Using a subset of Apple's OS X operating system means the iPhone's 16 built-in applications including phone, address book, calendar, alarm clock, organizer, camera, web browser, e-mail client, Wi-Fi terminal, video and audio iPod work together in a clear, simple, and intuitive way. A virtual QWERTY keyboard pops up on the screen when you need to write a text message or an e-mail. The software is smart enough to guess what you meant to type and will correct most mis-keyed letters. It can log onto a paid Wi-Fi network as well as a free Wi-Fi network to access internet.

The iPhone is a breakthrough in handheld computer. Its software, especially, sets a new bar for the smart-phone industry, and its clever finger-touch interface dispenses with a stylus and most buttons. At present, the iPhone is available in the US and Europe.

The iPhone heralds a new way to use mobile phones for voice telephony and access information freely available on internet. ATT which is a licensed service provider for the iPhone is in the process of acquiring telecom operator licence in India. Other mobile telephone handset manufacturers are releasing various models which have phone, internet, browser, search, and organizer capabilities (*Wall Street Journal*, 11 July 2007).

addition for the power sector in the 10th Five Year Plan period (2002–7) was revised downward again by 43 per cent to 23,250 MW, from the original target of 41,110 mw. One of the major reasons for not achieving the 10th Plan target was the inability of various private sector projects to meet their construction schedule. The expansion achieved in thermal energy was 12,114 MW against the envisaged 25,417 MW. In hydropower energy, the target achieved was 7886 MW against the targeted 14,393 MW, and nuclear energy expansion achieved was 1180 MW compared with the target of 1300 MW. Accordingly, the ambitious 'Power for All by 2012' project is in serious trouble. The Ministry of Power (MoP) has set a capacity-addition target of 78,577 MW for the 11th Five Year Plan (2007–12).

Out of the proposed capacity addition of 78,577 MW for the 11th Five Year Plan (FYP), 39,855 mw is expected to come from government-controlled power utilities, 27,962 MW from the states, and 10,760 MW from private power companies. Out of the 11th FYP target 9200 MW has been commissioned in 2007–8 as roll over from the 10th Five Year Plan target. The Central Electricity Authority (CEA) has raised the alarm that the 11th Plan period would once again miss the capacity addition target. Against the 78,577 MW target, the total capacity addition would be 51,040 MW (64.9 per cent as utilities have already placed necessary orders and started construction as of now. For projects of 25,732 MW capacity, the letters of award are yet to be placed. However, the CEA and the power ministry observed that addition of 12,000 MW could be

possible if the utilities hurried up and placed the orders before December 2007. It must be mentioned that against the original target of 41,110 MW, which was later revised to 32,000 MW, the capacity addition achieved was 21,180 MW in the 10th Plan. It seems that the country can have, at the most, additional capacity of approximately 63,000 MW after the completion of 11th Plan period (*Financial Express*, 29 August 2007). In order to install as much generation capacity as possible the Ministry of Power is making it mandatory for companies executing ultra mega power projects (UMPP) to commission a minimum of one unit (about 660 MW) in the 11th Plan (2007–12).¹⁴

The MoP has identified seven core issues that need to be tackled to improve the power situation in the country as a follow-up to the recommendations of the Chief Ministers' Conference on Power, held in May 2007 at New Delhi. Special emphasis will be placed on the rural electrification programme with clear timelines for states to submit their plans and budgets. Open access in transmission and distribution would be taken up with the industry and state electricity boards. It was also agreed in the meeting to reduce Aggregate Transmission and Commercial (AT&C) losses to less than 15 per cent by the end of the 11th Plan. The current AT&C losses are about the 35 per cent. The meeting also asked the power PSU chiefs to draw clear road-maps for energy conservation and demand-side management. The Chief Ministers also asked for revamping of the Accelerated Power Development and Reform Programme (APDRP).

¹⁴ In order to attract investors in the power sector, the Central Regulatory Commission (CERC) has proposed a number of investor friendly changes in terms and conditions of tariff for 1 April 2004 to 31 March 2009, under the provision of Section 61 of the Electricity Act 2003 (*Financial Express*, 14 December 2007).

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The key outcome of the conference was that at the national level, the Chief Ministers agreed to help in the formation of three crucial agencies to steer new power projects to fruition. The first is a Standing Group of Power Ministers to examine everything that concerns power (MoP would liaise with this Group directly). Second, a sub-group of this body would scrutinize financial aspects of all new or additional power projects. Finally, a National Power Project Management Board attached to the MoP would monitor projects under construction.

The original APDRP—under which Rs 6500 crore has already been released—achieved qualified success in cutting down losses.¹⁵ Experts blamed ‘too many pre-conditions’ for the failure of the programme, under which states were supposed to unbundle their utilities, set up state electricity regulatory commissions (SERCs) and ensure 100 per cent metering.

Under the revised APDRP, establishment of reliable and automated systems for sustained collection of accurate base-line data and adoption of information technology in the areas of energy accounting will be necessary pre-conditions for sanctioning projects for strengthening and upgradation of sub-transmission and distribution networks in urban areas. It is also proposed to extend the programme to rural areas and take up feeder separation and high voltage direct current projects in high-load density areas. Under the new incentives to improve distribution efficiency, the loan given to states will be converted into grants. The conversion would take place in five equal annual tranches on third-party verification that the AT&C losses continue to remain 15 per cent in each of the five years. Any slip-up will disqualify the utility from conversion of that year’s tranche into grant. If fulfilment of conditionalities and AT&C loss reduction to 15 per cent takes place within the timeframe laid down by the Steering Committee, the entire interest on the converted tranches will also be paid as grant.

The summer of 2007 witnessed unmet supply targets in Maharashtra, AP, Haryana, and UP. Many states saw capacity addition shortfalls. But there was some good news in store. New power plants and good monsoon in 2007 perked up the power sector’s performance. Deficit, which was at a decade-high level in March 2007, declined sharply in June. The improvement started in April–May 2007, as evident from the performance of the index of industrial

production (IIP). The cumulative growth in electricity production during April–May 2007 was 9 per cent compared to 5.3 per cent in the same period previous year.

CRISIL Research estimates an overall investment of Rs 3 trillion¹⁶ in the power sector during 2007–12. Central and state sector utilities are expected to play a key role in the capacity addition process. However, the poor financial health of state utilities remains an area of concern. Investments by the private sector would quadruple in the coming five years. But its share in overall investments is expected to remain marginal. PPP is expected to play an important role in transmission and distribution.

The state-owned Power Finance Corporation (PFC) plans to float a private equity fund shortly, which will invest in the equity of various power projects mainly from the private sector. The fund will be set up as a subsidiary of PFC with an initial corpus of Rs 250–300 crore but with a target of making it a billion dollar fund in the next one year. PFC’s fund will cater to the last mile equity requirements in a project and will only look at those projects which are viable and attractive.

States are also eager to set up new generation capacity by Independent Power Producers (IPPs) and state-owned generation companies and improve the power system in line with the Electricity Act 2003.

Gujarat is likely to see capacity addition of nearly 11,000 MW during the 11th Five Year Plan and the government hopes that the power situation in the state will stabilize after December 2007. The state has reduced T&D losses from 45 per cent about four years back to the present 20 per cent. The state also claims that plant load factor (PLF) of the generating stations have improved by 3.44 per cent to 72 per cent. The state has asked the centre to help out in strengthening the transmission grid as it is gearing up for the first ultra mega power project at Mundra.

Haryana is the only state which is providing for short-term open access now. Between April and September 2007, it met its summer shortage of 15 per cent or 1300 MW using the open access route as enshrined in the Electricity Act 2003. Consumers who used more than 1 MW power were able to gain from this decision of the Haryana government. Open access surcharge ranges from Rs 0.47 per unit to Rs 1.50 per unit in the country.

Uttar Pradesh faced an energy shortage of 16 per cent in 2006–7 and it has now embarked on a multi-pronged

¹⁵ About 160 towns have achieved AT&C losses of less than 15 per cent. These are in Andhra Pradesh, Maharashtra, Gujarat, and Tamil Nadu. During 2007–8, fifty more towns are expected to achieve AT&C losses of less than 20 per cent. In comparison, losses in states like Madhya Pradesh, Rajasthan, Jharkhand, Bihar, and Uttar Pradesh range between 25 per cent and 70 per cent. For Bihar and Jharkhand, the figure is over 50 per cent. Uttar Pradesh has been reporting losses of 43–44 per cent.

¹⁶ The conundrum of investment estimates in the power sector given by the the Parekh Committee (US\$ 130 billion), estimates given by the MoP in the Rajya Sabha (US\$ 227 billion) and CRISIL estimates (US\$ 66 billion) are quite varied. The reason being that the Parekh Committee estimates what ‘should’ be while CRISIL estimates what is ‘likely to be’ and the Ministry of Power estimates include investment required in the power sector as a whole including RGGVY for rural electrification.

strategy to add over 4500 MW of fresh power generation capacity through state-owned generation companies with private sector participation. The state has established two SPVs (Special Purpose Vehicle), namely, Prayagraj Power Corporation and Sangam Power Corporation to develop the Bara and Karchana projects, respectively. The state government will also assist in securing clearances and establishing coal and water linkages for the projects.

POWER GENERATION: THERMAL

Power generation is the first important component in providing power to consumers. Power generation is broadly classified into thermal, hydro, and non-conventional means of generation based on energy source which ultimately gets transformed into electricity. Thermal power plants can be of a very small capacity of a few kilowatts to Ultra Mega Power Plants (UMPPs) having generation capacity of a few thousand megawatts. A substantial part of thermal power in the country is installed by users for their own use in 'emergency'. This capacity is defined as captive capacity. Though about 15,000 MW of captive capacity is connected to the grid, only about 6 per cent of the energy generated actually flows to the grid due to various regulatory issues.

In a significant move to tide over the widening gap between power demand and supply, the centre has delicensed the supply of power produced by captive power producers (CPPs). This was made possible through an amendment to the Electricity Act, 2003 via the Electricity (Amendment) Act, 2007, which came into effect from 15 June 2007. No approval or licence was required to set up captive power plants by individuals, groups, and cooperatives. But with the amended Act, the supply of electricity generated from captive power plants to any distribution licensee has been delicensed.

CPPs can now play a supplementary role in meeting the country's power demand. According to the Ministry of Power's compilation, the average PLF of CPPs is 42.7 per cent. If the PLF of these plants were increased to a normative level of 80 per cent for steam and gas, and 70 per cent for diesel plants, the estimated surplus capacity from captive power plants would be around 6000 MW.¹⁷

The MoP had earlier blamed state-run equipment supplier Bharat Heavy Electricals Ltd (BHEL) for failure to achieve 10th Plan target for equipment supplies. It had also said the country will not achieve the 11th Plan target of putting up additional 78,577 MW of capacity even if BHEL doubles its capacity. To meet the power equipment shortages, Larsen & Toubro (L&T), India's largest engineering

company, is likely to set up two manufacturing facilities—for turbines and boilers—at Hazira in Gujarat. L&T has joined hands with Japan's Mitsubishi to float a joint venture (JV) that will build the Rs 350 crore boiler factory, while its other JV, with Toshiba for manufacturing turbines, will invest another Rs 350 crore. Reliance Energy Limited, a private power supply company, is also entering the equipment manufacturing space.

A growing country can seldom afford delays in project implementation. This is especially true for power sector, which is invariably plagued by slow-paced implementation and the resultant cost and time over-runs. The power ministry, in consultation with the industry, has submitted a proposal for a Power Project Monitoring Board to the government. It may get cabinet approval by December 2007. The proposed board will keep an eye on the progress of projects above 100 MW capacity that are under implementation with the help of IT-enabled systems and a dedicated network. But the government is still confused about the constitutional power, which can be given to the board to make it an effective body to hasten project implementation (*Economic Times*, 12 September 2007).

MEGA POWER PLANTS

Initially, six Ultra Mega Power Plants (UMPPs) were planned in Madhya Pradesh (Sasan), Gujarat (Mundra), Karnataka (Tadri), Andhra Pradesh (Krishnapatnam), Maharashtra (Girye), and Chhattisgarh (Akaltara). Later, the government decided to add three more UMPPs in Tamil Nadu (Cheyyur), Orissa (Sundergarh), and Jharkhand (Tilaiya). One more UMPP at Marakkanam in Tamil Nadu is under consideration. Tamil Nadu will be the only state to have two UMPPs of 4000-MW capacity each.

The CEA has also agreed on Dighe as the alternate site for the project originally slated to come up at Girye in Maharashtra and has started a feasibility study on the project. Karnataka is in the process of identifying a new site for the project initially proposed to be set up at Tadri. But, the Chhattisgarh project to be set up in Akaltara may be put on hold. The state government there has asked for 12 per cent of power generated from the project as the state's entitlement.

The government had planned for nine UMPPs for the 11th Plan earlier but reduced the number to seven later with state governments now showing interest in such projects. Initial work has begun for identifying projects for the 12th Plan.

Bowing to pressure from states, the MoP has decided not to press for fulfilment of conditions relating to

¹⁷ However, there are rules and regulations related to selling of CPPs' (captive) surplus power which discourage industries from selling surplus captive power. Further, state governments' high levies for cross-subsidies and wheeling make the surplus power generated commercially non-viable for a private power producer to add to the grid.

privatization of distribution before granting concessions to UMPPs under the Mega Power Project Policy introduced in 2006. This will now enable Andhra Pradesh, Tamil Nadu, Jharkhand, and Maharashtra to pursue the implementation of UMPPs in the respective states.

Out of the nine UMPPs identified for the 11th Plan, three at Sasan, Mundra, and Krishnapatnam have already been awarded, two are on track, while the remaining four are facing problems related to land acquisition and water availability. The second round of bidding for seven out of the nine UMPPs is likely to be delayed by over six months, with the amendments in the bidding rules.¹⁸

Under the present mega power policy, projects up to a particular capacity (1000 MW for coal and 500 MW for hydel) willing to make inter-state sale can avail of fiscal concessions that includes waiver from customs duty on equipment imports as well as a ten-year tax holiday (*Indian Express*, 14 September 2007).

At a time when the power ministry is seeking to lower the threshold limit for mega power projects to allow more projects to avail of sops under the UMPP scheme, the Finance Ministry has already sounded out that the mega power policy is 'flawed' and could lead to increasing costs of projects rather than bringing them down. According to the MoF the current policy does not allow players to participate on a level playing field. This policy in its current form also allows domestic manufacturers to quote higher prices while availing of several tax benefits, leading to an increase in the cost of the project. The law ministry has written a letter to the power ministry to look into the rules of the bidding process. The power ministry is now planning to bring about certain amendments in the bidding rules (*Economic Times*, 17 September 2007).

The Mundra UMPP was 'transferred' to Tata Power, following open bidding in April 2007. The project is based on imported coal and hence requires 12 million tonnes of imported coal, of which a significant portion is likely to be sourced from Indonesian coal producers, PT Kaltim Prima Coal and PT Arutmin, where Tata Power holds 30 per cent equity stake. While the off-take agreement from the Indonesian coal field entitles Tata Power to purchase about 10.5 million tonnes of coal per annum, the company is likely to allocate only a portion of the coal from those fields for Mundra, while the remaining coal is slated to come from similar deals that the firm is scouting for in Australia and South Africa to diversify the fuel risk (*Business Line*, 11 September 2007).

Tata Power had emerged as the lowest bidder for the coastal project in Gujarat by quoting an average 25-year leveled tariff of Rs 2.26 per unit, beating bids from

five other companies. The company acquired the project's special purpose vehicle—Coastal Gujarat Power Ltd—from Power Finance Corporation in April 2007. CGPL has signed power purchase agreements with seven distribution licencees for sale of power from the project upon commencement of generation. It also nominated Gujarat Distribution Company as the lead procurer on behalf of all procurers.

Tata Power Company Ltd is aiming to achieve financial closure for the 4000 MW Mundra Ultra Mega Project before the end of March 2008. The company would be funding the project through a debt-equity ratio of 80:20, with the option of overseas and domestic debt being considered for shoring up funds for the project, which would entail total investments of up to Rs 20,000 crore. Tata Power had earlier appointed SBI Capital Market as its advisor for raising the funds. While the terms of the bid stipulate commissioning of units starting from the first half of 2012–13, the company hopes to commission the first unit ahead of schedule. While construction work is likely to start in the beginning of 2008, the first 800 MW super-critical technology-based unit is expected to go on stream by the second half of 2011 (*Business Line*, 11 September 2007). Tata Power is sourcing boilers from Doosan Heavy Industries and Construction Company of Korea and supercritical steam turbines and power generators from Toshiba Corporation of Japan.

The second UMPP, namely, the Sasan project, ran into post-bidding controversy with the change in ownership of the winning bidder. Reliance Power, a subsidiary of Reliance Energy, has met the winning bid quote of Rs 1.196 per unit and the government which floated the special purpose vehicle (SPV) for the 4000 MW project, has transferred the Sasan UMPP to Reliance Power.

The bid for the 4000 MW, coal-fired Krishnapatnam Ultra Mega power project to be set up in the Nellore district of Andhra Pradesh was won by Reliance Power in November 2007. The electricity boards of Andhra Pradesh, Tamil Nadu, Karnataka, and Maharashtra have already agreed to buy power from Krishnapatnam UMPP. Power Grid is expected to lay a dedicated transmission line to evacuate power from the project (*Financial Express*, 14 September 2007).

POWER GENERATION: HYDRO

The government is targeting to add 16,553 MW of hydropower in the 11th Five Year Plan with an estimated investment of about Rs 78,100 crore. A new hydro electricity policy will be unveiled by December 2007.

¹⁸ The government plans to introduce tighter eligibility criteria for companies wishing to build multiple UMPPs to ensure their timely completion and to prevent existing power companies from bidding for new projects as a pre-emptive measure. Companies wishing to build more than one project will have to possess the incremental net worth or raise their net worth to do so.

Hydropowernet, a web-based system has been launched which will offer online monitoring of hydropower projects and a platform for data sharing between various hydro utilities, the Central Electricity Authority and Power Ministry (*Economic Times*, 11 August 2007).

New Hydropower Policy

In the new hydropower policy, the MoP has argued for exempting the hydropower sector from tariff-based bidding suggesting that a cost-plus approach would be more appropriate. Given that there are uncertainties and risks associated with the construction of hydro projects—like geological surprises, resettlement and rehabilitation problems, inaccessible sites, law and order issues—tariff-based bidding is difficult. Their argument is that unlike in a thermal plant where the developer, at a relatively low cost, does preliminary investigations to work out tariff and bid competitively, getting primary information is an expensive affair in hydro projects. Developers will bid competitively for tariff only when full details are available. Detailed project reports (DPR) for hydro projects require time and sizeable investment. A reliable DPR requires at least two to three years and an expenditure of Rs 20–50 crore according to hydrology experts.

The MoP has already circulated a draft proposal on the cost-plus approach to the ministries concerned and the states. The policy will be finalized only after a consensus emerges. However, cost-plus approach seems to have met stiff resistance from the Planning Commission which is making a last ditch attempt to make tariff-based competitive bidding work for hydropower projects. For the 11th Plan, the Commission has suggested setting up a hydro power viability fund that will allow developers to defer a portion of the tariff to be recovered from consumers after the first ten years of the project.

The central government is keen on ensuring that the hydroelectric potential is harnessed as it would provide for a clean and renewable source of power. The proposed hydropower policy will give states incentives beyond 12 per cent free power. Provisions are being considered for offering a percentage of accrued funds for the development of the area in which the hydro project is located. Already, the central government has announced allocation of Rs 0.01 per unit as state incentive, which will be used for local area development. The government is also working on other incentives for the state. The move, the MoP hopes, will put brakes on the practice adopted by the states to virtually auction off hydro project sites and attract the serious developer.

With an eye on expediting clearances, an increasing number of hydroelectric power developers are roping in host state governments as equity players in their projects and handing out minority equity of up to 49 per cent,

over and above the 12 per cent free power entitlement for the host state. Both private and public sector players, in negotiated projects as well as those offered through competitive bidding, see this as a means to speed up clearances as delays generally hamper the progress of most hydel projects.

NHPC is in talks to offer up to 26 per cent of its project capacity to the Arunachal Pradesh government for its 3000 MW Dibang project, besides the 12 per cent free power entitlement for the host state. In the case of the Rs 2047 crore Rampur Hydroelectric project—being executed by the Satluj Jal Vidyut Nigam Ltd—the Himachal Pradesh government has been offered 30 per cent equity participation. The state is also scheduled to get 12 per cent free power as royalty.

PFC has developed special schemes for funding hydro projects with tenures of up to 25 years to address various concerns raised by lending institutions. These schemes would help states in limiting project cost as cost and time over runs are minimized. According to the Ministry of Power, some of the projects to be developed during the 11th Plan period include Parbati II (800 MW), Koldam (800 MW), Karcham Wangtoo (1000 MW), Baglihar I (450 MW), Loharinag Pala (600 MW), Tapovan Vishnugarh (520 MW), Tehri (1000 MW), Kameng (600 MW), Koteshwar (400 MW), Maheshwar (400 MW) and Teesta III (600 MW).

Among hydro projects under construction, National Thermal Power Corporation (NTPC) is executing the 800 MW Koldam hydroelectric project in Himachal Pradesh, and the 600 MW Loharinag Pala and 520 MW the Tapovan Vishnughad projects in Uttaranchal.

Financing Hydropower Projects

National Hydroelectric Power Corporation (NHPC), the country's largest hydroelectric power generation company, plans to raise Rs 28,000 crore in equity and debt over the next five years to help fund an increase in its power generation capacity to 10,000 MW by 2012, to keep up with the needs of the economy.

The Arunachal Pradesh government is planning to build thirteen hydroelectric power plants in the state on build own operate transfer (BOOT) basis. The proposed projects are at Amulin, Emini, Angoline, Mithudon, Etabu, Malinye, Emra-I, Emra-II, and Elango in Dibang Valley and at Sissiri in the lower Dibang Valley, at Hutong-I in Anjaw, Demwe in Lohit, and Kalai-II in Anjaw.

Arunachal Pradesh has awarded a Rs 900 crore 160 mw project to GMR Energy through competitive bidding which is offering 12 per cent equity to the state in the project, besides the offer of 14 per cent free power and two paise per unit as additional benefit to the state. GMR Energy would be implementing the Talong Hydro Power

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Project, scheduled to be commissioned by end 2011, on BOOT basis.

Madhya Pradesh has embarked on its maiden initiative of inviting private sector enterprise into small hydro-power projects in the state. The development follows a new incentive policy that the Madhya Pradesh government finalized in August 2006. According to this policy, the private sector developer for a project will be chosen based on the proportion of free power offered to the state government. However, technical and financial competence of incumbent developers will be assessed first. Securing of all approvals and attainment of financial closure is expected within twelve months of handing over the project to the private developer. Land acquisition will be the Water Resources Department's (WRD's) responsibility. However, since most of the projects offered are canal-based, land acquisition will not be a major concern in this case.

POWER TRANSMISSION

The Union government is proposing a massive investment of Rs 46,000 crore to set up new power transmission capacity which, by 2012, could move 46,000 MW of power from the North-East region and Bhutan. The investment, to be undertaken jointly with private companies, will entail setting up of 12 high-capacity transmission corridors through the region, which resembles a chicken neck and connects the North-East to the rest of India. The government plans to start work on the project during the current 11th Plan period (2007–12), using a public-private partnership model (*Mint*, 17 September 2007).

The central transmission utility, Powergrid Corporation of India Ltd (PGCIL), plans to invest Rs 55,000 crore in the next five years to expand the national grid capacity to transmit 37,000 MW of electricity by 2012. To part finance these projects, PGCIL raised Rs 3000 crore from its Initial Public Offer in September 2007.

With the Central Government thinking seriously about bifurcating regulatory and operational roles of PGCIL the chances of the private sector in transmission look brighter. The Ministry of Power has initiated processes to split the dual regulatory-cum-operations functions of the transmission utility PGCIL which is the central government monopoly company for interstate transmission. For private players to feel confident enough to compete for projects with PGCIL, it must be relieved of its regulatory powers. Else the privatization endeavour cannot expect to succeed.

Powergrid cannot be stripped of its regulatory functions immediately. Rather, what may be envisaged is that a distinct regulatory body may first be constituted as a subsidiary to PGCIL. Over time this body may be delinked

from PGCIL and allowed to evolve into an independent entity once it has gained enough experience to discharge all regulatory functions of PGCIL successfully. Until now, PGCIL was only willing to allow private participation in joint sector ventures over which it would have control. State governments through SEBs monopolise intrastate transmission and there are hardly instances of private transmission investment in the country.

The Tala Transmission System is the first high capacity link to be built by Powerlinks Transmission Ltd (a JV between Tata Power Company and PGCIL) at a cost of Rs 2800 crore through PPP. Powerlinks has constructed power transmission lines from Siliguri in West Bengal to Mandaula near Delhi. These comprise 1133 km of 400 kilovolts (kV) lines and 20 km of 220 kV lines. The project was completed and commissioned in 2007. The transmission lines will convey power from the Tala Hydro Electric Power Project in neighbouring Bhutan as well as surplus power from India's eastern to northern region where industries and households suffer from chronic power shortages. PGCIL has a JV with Jai Prakash Hydro-Jaipur Powergrid and another JV with Reliance Energy.¹⁹

In power-deficit India, there is no dearth of effective demand, but the state-owned network refuses to wheel the power to the intended consumer, often citing specious 'technical' grounds. The Centre's present move is intended to address this problem.

POWER DISTRIBUTION

Reforms in the power distribution have been seen as the drivers of the reform process in the power sector in general. As of now, except Delhi and Orissa, no other state has entirely privatized its distribution system. While the list of recalcitrant states includes big ones like Bihar, Kerala, Punjab, and Tamil Nadu, other equally big states such as Andhra Pradesh, Karnataka, Uttar Pradesh, Rajasthan, Gujarat, and Madhya Pradesh have fully unbundled their state utilities. West Bengal is served by two distribution companies (discoms), one being the State Electricity Distribution Company and the other being the private player, Calcutta Electricity Supply Company. Thus, a large number of states have introduced distribution reforms in one way or the other. Results in terms of AT&C losses, duration of power supply, number of interruptions, voltage and frequency fluctuations, as well as handling of consumer queries and redressal of consumer grievances have been positive for most private discoms.

The Indian Institute of Public Administration (IIPA) was commissioned by the MoP to study the impact of unbundling of SEBs in twelve states, including Orissa, Haryana, Gujarat, Maharashtra, Andhra Pradesh, and

¹⁹ The Central Government is in the process of finalizing a Tariff Based Competitive Bidding Guidelines for Transmission Services, in consultation with the Power Finance Corporation on the pattern of ultra mega power projects.

Karnataka. The study was to evaluate the extent of reforms, performance of utilities, and extent of private participation in state utilities that posted a staggering loss of Rs 26,150 crore in 2006–7. The survey revealed that consumers are willing to pay higher rates for higher quality electricity, if quality is assured (82.2 per cent in Andhra and 86.6 per cent in Kerala). The myth that non-agricultural consumers will willingly pay higher rates for higher quality but not the agricultural consumers is refuted by the survey results. The survey showed that the agricultural consumers prefer quality supply (even at a premium) over cheap supply. This is despite the fact that presently they are subsidized (MoP 2006). It is now evident that whereas elite Indians feel that farmers need cheap electricity, farmers themselves say that they need quality electricity. This revelation has serious implications from the policy formulation perspective.

Delhi

The Chief Minister of Delhi, Mrs Sheila Dikshit, has termed the power reforms in the capital a ‘success story’. She singled out quality of power supply—uninterrupted and without fluctuations—as an important indicator of improvement. The situation in the state which is served by three private discoms can be expected to improve further by 2009–10 when Delhi gets an additional 8000 MW from Dadri, Bawana, Bamnauli, and Jhajjar power projects.

AT&C losses have been declining consistently at the rate of 4 per cent every year, from an average of 50.5 per cent in 2002 to 30.9 per cent in 2007. This is much higher than the target of 15 per cent set by the Planning Commission, but Delhi has taken measures to achieve this target over the next few years.

Multi-Year Tariff regulation to determine tariff principles in the power sector has been submitted to the Delhi government by the Delhi Electricity Regulatory Commission (DERC) and will be notified soon. With basic tariff principles now being determined for a four-year period from 2007–8 to 2011–12, unlike earlier years, it will help in bringing an element of certainty for both the discoms and the consumer.

Incidentally, the power supply companies also have done fairly well. NDPL has been in profit ever since privatization took place. Its cumulative profits till the year 2006–7 stood at Rs 406.57 crore. Its profit for the financial year alone was Rs 185.79 crore. On the other hand, BSES Rajdhani has shown an accumulative profit of Rs 88.98 crore in the last five years. It has been making profits continuously for the last three years after some losses in the first two years. The third company—BSES Yamuna—has shown accumulated losses of Rs 55.32 crore in the last five years. It too made losses only in the first two years after privatization and since then has been making profits,

albeit marginally. The two companies of BSES have not yet declared any dividend (*Hindustan Times*, 13 September 2007). The government of NCT (Delhi) is confident that all proposed plants within the city and sourcing of power from states and the neighbouring country of Bhutan will make Delhi power-surplus by 2010–11.

To improve services to consumers DERC has gone a step further to introduce, for the first time in India, a system of penalties of up to Rs 200 per day (subject to pre-defined time-limits for various services) on outages, wrong billing, and meter testing. DERC has set a time-limit of 90 days for the discoms to credit the dues to the consumers in their next bill of the two-month billing cycle. From 1 July 2007 large electricity consumers in Delhi (using load of 5 MW and above) have the option of sourcing their own power, that is, choosing their own electricity supplier. As per the open access regulations of the DERC, consumers using 3 MW will be given this option six months later, and those allotted 1 MW load will get it from 1 July 2008. The Commission is in the process of announcing the charges applicable to open access consumers soon.

As for domestic consumers with a capacity requirement of less than 1 MW, DERC may allow them the facility after July 2008 following review of operational constraints and other factors. DERC is also exploring the possibility through a pilot study of charging users according to time of day (TOD) of use of electricity. The Commission is currently examining the modalities of the pilot study. Currently, the TOD is in operation in West Bengal, Andhra Pradesh, Gujarat, and Uttaranchal in commercial and industrial sectors where there is a shift system. Delhi may be the first state to introduce the TOD in the domestic sector.

Dubhash and Rao (2007) have examined how electricity regulators in Andhra Pradesh, Karnataka, and Delhi function on the ground. DERC was found to have taken important initiatives towards careful scrutiny of investment plans and proposals. In particular, DERC reduced expenditures to levels well below those proposed by the discoms on a number of occasions, introduced a requirement for scheme by scheme scrutiny, undertook site visits to verify investment, and substantially censured the discoms in situations where considerable under-investment was observed on site against the approved amount; it even imposed a fine on one occasion.

It may be said that Delhi has drawn significant benefits from the reforms and in a couple of years’ time its citizens will be able to avail of choices that are not available to consumers in other metropolitan cities in India.

Gujarat

The Gujarat government is considering ways to obtain surplus power from companies with CPPs by investing

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state funds to connect them to the grid. Gujarat State Electricity Board (GSEB) has been unbundled into six discoms (including the private player, Torrent Power, in Ahmedabad and Surat) catering to various parts of the state. The transmission and distribution (T&D) losses in the state have been brought down to 20 per cent from 45 per cent in the last four years. The government has announced that PLF of power generating stations has improved by 3.44 per cent (to 72.28 per cent) (*Business Standard*, 15 December 2006).

Maharashtra

MahaVitaran, the state government-owned power utility's distribution arm, has decided to act tough with power thefts which have now been made cognizable and non-bailable offence. Power pilferage would now be dealt with more effectively following stringent provisions for imprisonment and heavy fine made against power thefts in the recently amended Electricity Act 2003. The amended Act now provides MahaVitaran with an effective weapon to wield during its special drive against power thefts launched across the state since 2007. It has also announced 'disincentive' schemes for employees who fail to perform in bringing down AT&C losses.

Privatization of power distribution in the powerloom town Bhiwandi through the distribution franchise model by the state government met with a major roadblock due to the increased load shedding by MahaVitaran. Torrent Power, which was awarded the loss-making Bhiwandi circle with transmission and distribution losses of over 45 per cent for the next fifteen years, has approached the state government for a bail-out as it has been receiving threats from the locals. Load shedding was increased from 8 to 12 hours per day from 7 February 2007 by the MahaVitaran following the yawning power deficit situation it was facing.

West Bengal

The newly formed West Bengal State Electricity Distribution Company Limited (WBSEDCL) has introduced pre-payment metering system for rendering better services to consumers. Under the system the consumer will not have to deposit any security money. There is an opportunity of a rebate up to 2.5 per cent for pre-paid meters.

POWER TRADING

Short-term power trading on a daily basis comprises around 15 per cent of total power trading. Currently, power prices are determined bilaterally by the buyer and seller mostly over the phone. A power exchange would basically function on the lines of a commodity exchange and provide a

platform for buyers, sellers, and traders of electricity to enter into spot and forward contracts. A power exchange would primarily identify the price for the day ahead, that is, the electricity sector's equivalent for the spot price. This will help to tap shortfall of power in the short term. The power exchange would offer a market-based institution for providing price-discovery and price risk management opportunities to power generators, distribution licensees, traders, consumers, and other players in the sector.

Indian Energy Exchange Ltd (IEEL), a joint venture of Financial Technologies (India) Ltd (FTIL) and MCX (Multi Commodity Exchange), is just one step away from getting approval to set up the country's first power exchange, likely to come up in 2008. The Central Electricity Regulatory Commission (CERC) has asked IEEL to frame rules to settle disputes between the exchange members and the regional load dispatch centres (RLDCs) and get them approved by the Commission. The proposed exchange would broadly enable participants to trade electricity on the subsequent day through standard hourly contracts and block contracts that commit them to injecting into or drawing power from the grid, a volume of electricity at a given hour at a market price.

Power Trading Corporation (PTC) is currently the largest trader of power in the country with power purchase agreements (PPA) with generation companies for trading 7000 MW. PTC is likely to pick up 26 per cent stake in the Indian Energy Exchange Limited. The exchange will protect all the existing PPAs of PTC while allowing it to undertake trading of additional power being made available through the exchanges.

Another exchange which may come up soon is promoted by NTPC, PGCIL, PFC, NHPC, and National Commodities and Derivatives Exchange Ltd (NCDEL). This exchange is in the process of obtaining regulatory approval from the CERC.

The CERC may reserve transmission capacity in the national grid under open access arrangement for the power exchanges. This would facilitate trading at the exchanges that would be crucial for sale and purchase of power and its transmission to user areas. The power exchange will help merchant and captive power generating companies to leverage tradable surpluses besides bringing buyers and sellers together.

NON-CONVENTIONAL ENERGY SOURCES

Wind power, solar power, small hydro-electric units, nuclear power, and co-generation plants are considered to be non-conventional energy sources.

The present installed wind power capacity in the country stands at 7093 MW and is expected to touch 10,500 MW by 2011–12, according to the Ministry of New and

Renewable Energy (MNRE). The problem with harnessing wind energy is that wind is brisk enough only during monsoons and is also temperature dependent. Being weather dependent, it does not allow for planned addition of wind energy to the grid. This means it cannot be used for meeting the peak demand.

Most of the wind power projects are being set up in the captive sector for private use. Capacity Utilization Factor (CUF) does not work in favour of wind power with most wind power plants working on a PLF (plant load factor) of 10 per cent to 20 per cent. Thus, it can in no way compete with coal and gas-based plants where the PLF is over 80 per cent. Since generation of wind cannot be controlled and relied upon, it is impossible to plan electricity production unlike thermal and hydro-power.

After its successful venture in hydro-power generation, NTPC is now planning forays into wind power generation and is currently looking for sites to set up wind farms. A number of large companies, including some foreign ones, are also putting up wind farms in the country with Maharashtra emerging the preferred location mainly because of its attractive renewable energy policy.

The Wind Power Policy 2007 of Gujarat²⁰ encourages not only corporate bodies to set up wind turbine generators (WTGs) but also individuals. Any company or association or individuals, whether incorporated or not, will be eligible for setting up WTGs, either for the purpose of captive use and/or for selling of electricity, in accordance with the Electricity Act 2003.

Gujarat is set to become the first Indian state to come out with a policy on solar power which will pack in incentives to attract large players. After the recently announced wind power policy, this is seen as another big step by the state in the non-conventional energy sector. With energy conservation topping the priority list, the state government has prepared a blueprint to make the state capital a solar city. The project cost is pegged at around Rs 300 crore.

Nuclear Power Corporation of India Ltd (NPCIL), which accounts for about 3 per cent (4120 MW) of the country's power generation capacity, is the only company authorized to build nuclear power plants in the country, besides Bharatiya Nabhikiya Vidyut Nigam (Bhavini). The government would like to produce 40,000 MW of power through the nuclear route in ten years. It is a steep target to achieve, not because NPCIL does not have the capability, but because the supply of nuclear fuel is a constraint. A realistic target would be around 30,000 MW by 2020.

Funding the new projects would not be a problem as NPCIL has a cash reserve of Rs 10,000–Rs 11,000 crore and it earns four-figure net profit every year (Rs 1571 crore

for the year ended March 2007) and it will continue this way till 2020. By leveraging the funds NPCIL can invest over Rs 60,000 crore.

According to the government, in the coming years, civil nuclear cooperation between the US and India will offer enormous strategic and economic benefits to both countries, including enhanced energy security, a more environment-friendly energy source, greater economic opportunities, and more robust non-proliferation efforts. The nuclear cooperation deal between the US and India upholds India's rights to reprocess spent fuel in national safeguarded facilities. India has to reach an agreement with the International Atomic Energy Agency (IAEA) on safeguards and NSG (Nuclear Suppliers Group) also has to approve the agreement, after which the US President will submit the proposal to the US Congress for approval. The United States has urged India to bank more on renewable energy sources to meet its soaring demand as that would help to curb rising global fossil fuel prices.

Nuclear energy, however, will remain only a small part of India's power supply for the next 25 years even if the country seals a civil nuclear deal with the United States, and is able to reach an agreement with the 45-nation Nuclear Suppliers Group (NSG). Until that time, India will remain dependent on coal.

TRANSPORT

Roads, ports, airports, and railways have been growing at varying rates since last year. The civil aviation sector has attracted private capital essentially due to short gestation periods and the comparatively low capital requirements. Ports have been attracting private capital for some time now. Other transport sub-sectors, especially the railways, have not been able to make any significant dent in attracting private capital. Though there is no formal inter-modal plan for the country as a whole, ports, airports, national highways, and railways are moving in a direction which, in a few years' time, will provide seamless inter-modal transportation services to passengers and goods.

In the first exercise of its kind, the government is in the process of preparing an integrated transport policy for the nation, which would take into account all the four principal modes of transportation—highways, railways, airways, and coastal shipping. The Planning Commission has commissioned RITES to conduct a study, wherein it would determine the total transport output or volume of the country. All the four transport sectors would be sending their assessments for the next five years to RITES. RITES would submit this study to the Planning Commission. Based on its inputs, the government would

²⁰ http://www.geda.org.in/pdf/wind/wind_power_policy2007.pdf.

draft the integrated transport policy. The current study would provide the basis for the 12th Plan and other subsequent Five Year Plans (*Business Standard*, 7 August 2007).

The targets for the Railways for the 11th Plan are 1100 mt of freight loading in the terminal year compared to 726 mt at the end of the 10th Plan. Passenger traffic is expected to reach 8400 million from 6242 million in 2006–7. To meet these ambitious targets, the Railways have projected an investment of Rs 3 lakh crore. Of this, 40 per cent is to be raised via the PPP route including container trains, dedicated freight corridors, Delhi–Mumbai Industrial Corridor, logistic parks, and ware-housing.

ROADS

According to data compiled by the Ministry of Shipping, Road Transport, and Highways (MoSRTTH), the bidding process for highway projects within the National Highways Development Programme (NHDP) is getting delayed by an average of 3.5 months due to the additional approvals that projects have to get from the Public Private Partnership Appraisal Committee (PPPAC). PPPAC is an inter-ministerial committee set up following a directive from the Cabinet Committee of Economic Affairs (CCEA) in October 2005. Its approval is required for all PPP projects with capital costs of over Rs 250 crore before the concerned ministry invites bids. The data show that without the PPPAC procedure, highway projects required about 17 months from completion of the detailed project report to the award-of-work stage. However, after the PPPAC procedure was introduced, highway projects now require about 21 months on an average for the same.

Following this revelation, the government has done away with the requirement of Cabinet approval for clearing road sector projects to hasten their implementation. Highway projects up to Rs 500 crore will now be cleared by the National Highways Authority of India (NHAI). Now, a road project above Rs 500 crore only will require the PPPAC approval compared to Rs 250 crore for a PPP project in general. So far, NHAI could clear projects up to Rs 100 crore and projects greater than that required approvals of PPPAC and CCEA.

The government was to award national highway projects worth Rs 35,000 crore in the fiscal 2007–8. The government has set a target of awarding 175 contracts covering a length of 15,803 km on build-operate-transfer (BOT) basis by March 2008. The contracts are under different phases of the NHDP. Reliance Energy Limited is keen to develop its road construction business. The company is implementing five projects in Tamil Nadu on the BOT toll model. REL's future national highway projects include the 135 km-long eastern peripheral expressway in Delhi at a cost of Rs 2335 crore, which is

one of the costliest road projects in the country. The six-lane project will connect the capital with Haryana and UP on the eastern side of Delhi. The company will also undertake construction of the 180 km stretch between Delhi and Agra at a cost of Rs 1040 crore and the Gurgaon–Jaipur stretch at a cost of Rs 230 crore. Total project cost of REL's future NHAI projects comprising a total length of 1060 km, is Rs 7681 crore.

NHDP Phases I, II, and III

NHDP is being executed in five phases. The Phases I, II, and IIIA envisage improving more than 25,785 km of arterial routes on national highways to global standards. The NHDP Phases I and II are likely to be completed by December 2008.

The average per kilometre cost for upgrading to four-lane for flexible pavement and for rigid pavement under Phase-II has been revised upward to Rs 6.52 crore at 2006 prices, against the earlier cost of Rs 4.75 crore per km at 2002 prices. The increase in per kilometre cost for upgrading and expanding national highways under this phase has been approved by the Prime Minister's Committee on Infrastructure. The awarded contracts for NHDP Phase-II provide for price escalation and therefore, the final cost of construction will be assessed only after completion of the projects.

Work on 7300 km length of north–south and east–west corridors had been awarded for most of the stretches and it is expected to be completed within the next two years. The government has approved implementation of upgradation of 12,230 km as against the approved length of 12,019 km of national highways under the NHDP Phase III on BOT basis.

Problems in land acquisition have resulted in massive delays for several projects. To avoid such delays, the new model concession agreement has clauses to ensure that 60 per cent land acquisition and utilities clearance are done by NHAI and passed on to the road developer before the financial closure of the project.

Phase IV

Under the NHDP Phase IV, lane doubling of about 1000 km of intermediate lane and single lane roads is to be taken up. Under NHDP Phase IV, 20,000 km of national highways have to be upgraded with paved shoulders. On priority basis, the entire phase has been divided into four sub-phases. The four phases comprise 5000 km each and have to be approved by 2009 and completed by 2015. As per the plan, upgrading of 5000 km of single, intermediate and two-lane national highways to two lanes with paved shoulder is to be taken up under NHDP Phase IVA. While upgradation and strengthening of 800 km of national

highways have to be completed on BOT (toll) basis, the remaining 4200 km have to be executed in BOT (annuity) mode (*Financial Express*, 29 August 2007).

This phase of NHDP has failed to evoke any response from private consultants, either domestic or foreign, for the bids floated by NHA for conducting feasibility, alignment, and other studies necessary before the projects are awarded. Bids were invited thrice but no company has responded, according to the ministry. Even the companies who are already constructing several expressways through the BOT route in different sections of national highways have not showed any interest. NHDP Phase IV is likely to be implemented directly by the department of road transport and highways with some help from the concerned states.

Phase V

Phase V of NHDP envisages six-laning of 6500 km of already four-laned national highways. This phase is going to involve investment of Rs 41,000 crore. The ministry has approved five stretches falling under the GQ for six-laning. These are Surat–Dahisar (239 km) stretch on NH-8, Panipat–Jalandhar stretch (291 km) on NH-1, Gurgaon–Kotputli–Jaipur stretch (200 km) on NH-8, Chikaluripet–Vijaywada stretch (90 km) on NH-5, and Chennai–Tada (43 km) stretch on NH-5. The estimated cost of these five stretches is around Rs 5200 crore.

New Toll Policy

The draft rules of a new toll policy have been firmed up and now need to be vetted by the law ministry. Each year the rates are slated to increase by three per cent. Government vehicles will no longer be exempt from paying tolls unless they belong to the President, the Vice-President and Union Ministers, among others. Moreover, commercial vehicles will have to pay more depending on the number of axles they sport. So, vehicles with 3–6 axles would have to pay lower toll rates than those with 7 or more axles. At present, only the length of the road is taken into account while calculating the toll.

The Planning Commission wants the toll for bridges to be fixed on the basis of their length and concession on toll to be offered to local commuters using national highways only if there is no alternative route available for them. Further, according to the Commission, toll should be higher during peak hours. The MoSRTTH has objected to these suggestions because it is difficult to find alternative routes for various highways across the country and the concept of peak hours does not apply on highways.

State Highways

The MoSRTTH has approved 4229 projects since 2000–1 for improvement of state roads from the Central Road Fund (CRF) for an aggregate amount of Rs 8143 crore as on January 2007. One of the problems in attracting private capital in state highways road projects is the lack of homogeneity in procedures adopted by states. The Model Concession Agreement (MCA) varies from one state to another. The states with a more standardized MCA like Maharashtra, Madhya Pradesh, Gujarat, Punjab, Haryana, Rajasthan, Kerala, and Karnataka have more PPP projects. The Planning Commission has suggested that the states should plan out a State Highways Development Programme on the lines of NHDP.

Road construction firms have sought duty concessions and dedicated funding mechanisms to make these projects attractive. It is argued by some developers that duty concessions extended for national highways construction should be extended to state highways as well. Andhra Pradesh, Gujarat, Madhya Pradesh, Maharashtra, Rajasthan, Punjab, Kerala, Chhattisgarh, and Tamil Nadu have already initiated development of some important state highways under the PPP mode, while some other states have advanced quite far in this direction.

PORTS

The Union Government plans to double the total capacity of major and non-major ports in the country to 1500 million tonnes per annum (mtpa) from the current capacity of 750 mtpa by 2012. Ports handle almost 95 per cent of the export–import trade in the country. For India to facilitate a GDP growth of 10 per cent in the next few years, large capacity addition in the port sector is a must.

The present port capacity just about manages to handle the prevailing levels of traffic though ports are getting increasingly congested. The Planning Commission has planned to create surplus port capacity of around 30 per cent by 2011–12. The Commission estimates that by the end of the 11th Plan, cargo traffic at major ports is likely to grow to 709 million tonnes.

While bulk of the funding for increased cargo handling capacity would be obtained from the private sector and the ports themselves through internal resource generation and borrowings, the government would only be contributing Rs 3000 crore towards dredging of major ports to enable them to cater to large ships.

Jawaharlal Nehru Port in Mumbai has lined up projects costing more than US\$ 200 million, Mumbai Port Trust (MbPT) has drawn up plans for new berths and terminals requiring US\$ 500 million, Kandla Port is

expecting an investment of US\$ 300 million, and Tuticorin port has lined up berth development projects costing more than US\$ 200 million. As part of the capacity expansion programme, the MoSRTTH has proposed to set up five mega ports with a total capacity of 500 million tonnes. The proposal is yet to be approved by the Planning Commission.

MbPT plans to set up a container terminal. The proposal includes construction of two offshore container berths and a container terminal with about Rs 366 crore invested by MbPT and the remaining Rs 861 crore to be invested by the BOT operator. The project is slated for completion by 2009.

The second container terminal comprising two berths at the Mundra Port and Special Economic Zone in Kutch district of Gujarat, became operational in August 2007. This terminal is capable of handling about 1.25 million twenty-foot containers per annum and it will be mainly catering to the needs of the northern hinterland of India. The MPSEZ container terminal has a deep water draft that can handle large container vessels, popularly known as super post panamax. Some of the salient features of the terminal are a quay length of 618 meters, four rail-mounted quay cranes, 12 rubber tyred gantry cranes, four reach stackers, round the clock berthing and unberthing, coupled with modern tug boats (*The Hindu*, 28 August 2007).

In order to decongest Indian ports the government has prepared a draft report to reduce the high dwell time—the duration for which ships or cargo (including containers) stay at the port terminal's in-transit storage area while awaiting shipment to other countries or evacuation by rail or road to their final destination. To reduce the dwell time the shipping ministry has proposed round the clock comprehensive operations to ensure higher productivity and eliminate delays owing to restricted working hours and holidays. The government is planning to implement a hot seat exchange system to eliminate time lost in shift changeovers and recess hours. The non-working time is expected to reduce from three hours to half an hour in a day.

Any reduction in dwell time will increase and optimize utilization of port capacity and infrastructure. The turnaround time for vessels will be reduced thereby enabling ports to attract and handle more traffic. For shippers, reduction in dwell time will directly reduce transit time for cargo, thus lowering both transportation cost as well as inventory cost.

Fifteen companies, including six foreign ones, have shown interest in the Chennai Port ro-ro (roll on/roll off) car terminal that is being planned by the Chennai Port Trust (ChPT) at a cost of Rs 80 crore under BOT, for a period of 30 years. The ro-ro terminal will help transportation of wheeled vehicles that may be driven into and out

of the ship. It will be constructed at the southern end of the container terminal and have a capacity to park around 5000 cars in an area of 10,000 sq.m. A ro-ro berth will also be constructed that will be 250 m in length, 30 m wide, and 12 m deep.

The New Mangalore Port Trust (NMPT) is also gearing to meet large future needs and the focus is on creating more facilities for users. The port plans to create more berths and other related infrastructure during the 11th Plan. The port, which has the capacity to handle 38 mt of cargo a year, plans to handle 60 mt by 2011–12.

A committee under the Chairmanship of Anwarul Hoda of the Planning Commission working on pricing of port services has suggested that port tariffs be fixed upfront and then a competitive bidding process be engaged in to select the operator on the basis of revenue sharing with the port authority. At present, the tariffs are fixed by the Tariff Authority for Major Ports (TAMP) ex post, based on a cost-plus formula which allows a 15 per cent return on the capital employed—in practice, bidders usually submit inflated expenditure figures to TAMP. TAMP revises the tariffs every three years on the basis of 'current traffic'. This method does not offer any incentive for cost efficiency and is directly responsible for high prices of port services and thereby the cost of exports and imports. If the Prime Minister's committee on infrastructure approves the Hoda Committee's proposals, it could lead to a drastic reduction in transaction costs for exporters. When implemented, the proposed system could also spur investments in the port sector. The PPP model in the port sector has already gathered momentum and there would be a further fillip to this investment drive if the new system is adopted.

Though tariff fixation would be vested with TAMP in the new system as well, the process of tariff fixation would be more transparent. The proposed partial correction of the present flawed system of tariff fixation along with a slight surplus in port capacity would force the port authorities to cut costs and offer services at lower prices.

The Prime Minister's Office has asked the Cabinet Secretariat to finalize the proposed Model Concession Agreement (MCA) for ports to be developed through the public private partnership (PPP) route. The draft MCA is being discussed by an Inter-Ministerial Group since 2005 but due to differences between the Planning Commission and the shipping ministry it is yet to be finalized. MCA is a standard document that defines the duties and responsibilities of the government and the private partner. (*Business Standard*, 23 August 2007). In fact, bids for even those projects that have received the in-principle approval from PPPAC cannot be invited as the approvals have been given subject to the new MCA getting finalized (*The Hindu*, 13 August 2007).

Technological Challenges and Natural Barriers

Global merchandise trade is growing by around 15 per cent a year. Containerization has helped in handling this trade in a secure and efficient manner. Vessel sizes have increased to cater to increasing volumes. The draft (depth of sea) required to service these vessels has increased from 9.1 m to 15 m in the last 38 years (Table 1.1). As the length of these vessels has increased from 180 m to 399 m, the facilities available in the existing ports such as berths, turning circle, channel and so on have ceased to match vessel size.²¹ Economies of scale have pushed bulk cargo transportation container ships to the limits set by natural oceanic features.²² The existing major ports such as Mumbai Port and JNPT face formidable obstacles because the draft is not deep enough, berths are not large enough, turning circle cannot be wider, and approach channels are required for newer container ships which can carry 11,000 or more twenty feet equivalent units (TEUs). Draft restrictions force the Mumbai Port and JNPT to use the Panamax class of vessels only. More than 50 per cent of the existing tonnage under construction is of post-Panamax class which will become operational in three to four years' time and the Panamax class of vessels, though comparatively new, will be broken up.^{23, 24}

achieved financial closure in February 2007 from a consortium of eight banks led by IDBI. With iron ore exports under a cloud, the port is now looking at steel as its main cargo. Project cost has gone up by Rs 1260 crore since it was first planned in 1998. Dhamra Port in Orissa is expected to be the deepest all-weather port in India with a draft of 18.5 m, located between the mainland and the Konica Sandheads on the confluence of the Dhamra river and the Bay of Bengal.

With the availability of deep draft, the port will be able to accommodate super cape-sized vessels of up to 180,000 deadweight tonnage (dwt) that would be ideal for export trade based on the mineral hinterland of north Orissa, Jharkhand, West Bengal, and Chhattisgarh. The port has been designed for 13 berths to handle 83 mt of cargo per annum, but operations will start with two berths once the core infrastructure is in place.

The shipping ministry has invited proposals from international engineering consulting firms to conduct the techno-economic feasibility study for constructing a deep-sea port in West Bengal. Apart from conducting the study, the consultant would also be required to do the site-selection for the port. The consultant has to identify a suitable location after taking into consideration various factors such as availability of draft, various marine,

TABLE 1.1
Generation of Container Ships

Year	Type of Vessel	Avg. Size (in TEU)	Length (in m)	Beam (in m)	Draft (in m)
1968	First generation vessel	900	180	24	9.1
1969	Second generation vessel	1500	220	25	10.71
1971	Third generation vessel (Panamax Class)	2300	275	32	11.75
1984	Fourth generation vessel (Post-Panamax Class)	4400	290	32.2	13.7
2006	Biggest vessel in operation as of now	13500	399	53	15
2010	Malaccamax vessels under construction	18000	—	—	20

India is waking up to these technological developments. Dhamra Port Co Ltd—a 50:50 joint venture between Tata Steel Ltd and Larsen & Toubro Ltd—

meteorological, hydrographic, morphological, hydrological, geotechnical, topographical and other parameters, dredging requirements and hinterland connectivity by

²¹ Container vessels go to Mundra Port to top up the large container vessels after the loading of containers at JNPT (Jawaharlal Nehru Port Trust, Mumbai), where there is draft restriction of 12.5 m.

²² There are three natural barriers to international trade, namely, Panama Canal, Suez Canal and the Straits of Malacca. For a ship to sail through the Panama Canal, it should not be wider than 32.3 m, longer than 294.1 m or have a draft of greater than 12 m to cope with the locks along the 80 km journey between the Atlantic and Pacific. In Suez Canal maximum permissible draft is 17.4 m. The Strait of Malacca which is 805 km long between the Malaysian Peninsula and Sumatra has shallow points only 25 m deep, limiting the ships which have less than 20 m draft to navigate in this water.

²³ Historically, 30 per cent of tonnage has usually been under construction and 50 per cent is a comparatively large number. The introduction of the Super Panamax class of vessels has already reduced the average container handling rate (US\$ per TEU) by 8 per cent in December 2006 compared with the previous year.

²⁴ In October 2006, the people of Panama approved, in a referendum, a controversial US\$ 5 billion project to expand the capacity of the 93 year old Panama Canal. The new locks will be big enough to handle vessels requiring up to 18.3 m of draft. Construction work started in September 2007.

rail and road. Firms technically qualified to undertake such studies would have to submit their proposals to the ministry by September 2007.

Rewas Port Ltd—a JV of Maharashtra Maritime Board and Reliance India Limited—is being developed near Mumbai. The port is located strategically where a draft of 20 m could be provided. The port will be a nodal point for exports from the Navi Mumbai and Maha Mumbai special economic zones (SEZs). The Reliance Group and the Railways are likely to form a joint venture for a 22-km rail link between Panvel and Rewas Port to provide the much-needed rail connectivity to the 2850 hectare port-based SEZ at Rewas (*Economic Times*, 11 August 2007).

Reliance hopes to provide both rail and road connectivity between Reliance's Navi Mumbai SEZs and its Haryana SEZ. The connectivity will provide easier evacuation of cargo from the port which plans to accommodate 18 berths at the end of Phase II. The draft of 20 m (which can be increased to 22–23 m) will allow the biggest ships under construction to berth, thus suppressing port costs 20 per cent below that of other Indian ports and making the port the cheapest in the country. The Rewas Port, when operational, will cater to bulk, container, and liquid cargo. It will have dedicated berths with sufficient backup area for storage and pre-delivery inspection. The port is yet to get clearance from the Ministry of Environment and Forests. The construction work is expected to start by the end of 2007. In Phase I, the plan is for 10 berths to be constructed by October 2010.

STATE PORTS

The Gujarat Maritime Board, custodian of ports in Gujarat, is firming up plans to float an SPV to undertake large-scale dredging operations to the tune of at least 60 lakh cubic metres annually along the 1600 km coastline. Private maritime players from across the country have shown keen interest to be a part of the SPV. The SPV will not only dredge the Gujarat coastline but also compete for national and international assignments.

Gujarat ports located at Mundra, Pipavav, Hazira, Dahej, Jamnagar, and Sikka currently have the capacity to handle 180 mt of cargo. These ports handled over 130 mt of cargo in the year ended March 2007. By 2011–12, Gujarat should have a port capacity to handle 400 mt of cargo per year. This means, it needs to create an additional capacity of 220 mt in the next five years.

The development of the nine greenfield ports at Bedi, Modhva, Mithivirdi, Simar, Vansi Borsi, Dahej,

Sutrapada, Khambhat, and Mahuva, is expected to cost about Rs 13,500 crore. The response to bids called by the Gujarat government in August 2007 for developing nine ports indicated the overwhelming interest of private sector firms in building and operating ports. Each of these ports will cost more than Rs 1000 crore to build.

Interestingly, for seven out of the nine ports, private firms have submitted in their price bids that they are ready to pay the full waterfront royalty fixed by the state government on a per tonne basis for handling various types of cargo at these ports. For the other two ports, they are willing to pay a premium over the prescribed royalty. According to the bidding criteria, the firm quoting the least number of years for paying the concessional waterfront royalty (that means it will pay the full waterfront royalty in the most number of years) to the government will get the 30-year contract for developing and operating each of these ports. As these ports are to be owned by the state government, the successful bidder will be free to fix tariffs for the services provided at each, unlike the major central government-run ports where tariffs are set by the TAMP every three years.

The state government had fixed a full waterfront royalty of Rs 30 per tonne for solid cargo, Rs 60 per tonne for liquid cargo including liquefied natural gas (LNG), Rs 36 per tonne for crude oil, Rs 600 for loaded TEU containers, Rs 150 for empty TEU containers, Rs 900 for loaded 40 foot equivalent unit (FEU) containers and Rs 225 for empty TEU containers.

The Tamil Nadu government has formulated a new minor ports policy under which the private sector would be invited to participate in developing the ports. The policy covers 16 minor ports in the state²⁵ and any other port that might be identified by the Tamil Nadu Maritime Board (TNMB). The government hopes that with the development of new ports with modern cargo handling facilities, many of these ports will emerge as transshipment ports for handling cargo in international trade with countries such as Sri Lanka, Mauritius, Madagascar, and South Africa (*The Hindu*, 11 August 2007).

The objectives of the minor port policy were: to increase the share of Tamil Nadu in the export and import activities; in national and international trade and commerce; to decongest the ports at Ennore, Chennai, and Tuticorin so as to improve their productivity; to create sufficient infrastructure facilities to handle 25 per cent of the country's total cargo in Tamil Nadu maritime waters; to provide facilities to encourage shipbuilding, repairing, breaking, and manufacture of cranes and floating crafts and so on.

²⁵ The minor ports covered are Cuddalore, Nagapattinam, Rameswaram, Pamban, Valinokkam, Kanyakumari, Colachel, Kattupalli, Ennore, Cheyyur, Thiruchopuram, Silambimangalam Shipyard, Thirukkadaiyur, Thirukkuvalai, Punnakayal, Manappad.

Ship Building

The engineering and construction major Larsen & Toubro, in the light of the cost implications of constructing a break-water facility, is planning to broaden the scope of its proposed Rs 2000 crore mega greenfield shipyard in favour of an integrated port-cum-shipyard facility. The proposed shipyard is being billed as India's largest. If all goes as planned, three years from now, India will join a league of nations that possesses the expertise to build and repair huge ships up to 3 lakh dwt. Currently, Indian yards can build up to 1.1 lakh dwt ships only.

The Mukesh Ambani-owned Reliance Group is also set to make a splash in shipbuilding and dredging. The company is expected to invest around US\$ 1 billion each in two companies and has begun talks with international majors for a strategic tie-up for the dredging business. This US\$ 2 billion investment is over and above the US\$ 1.3 billion investment committed for the Rewas Port, off Navi Mumbai. The shipyard will come up at Rewas, where Reliance is setting up a mega port and special economic zones. The company is also looking at a ship repair yard at Kakinada for servicing offshore/platform vessels and rigs. This facility is expected to be the hub for all its offshore activities in the Kavary-Godavari (KG) basin, where Reliance Industries (RIL) has struck oil and gas in abundance (*Economic Times*, 14 September 2007).

The Shipping Ministry has also received 'Expressions of Interest' from nine companies, both Indian and foreign, to set up a shipyard of international standards on the eastern coast. A similar yard is planned on the western coast with MbPT as the nodal agency.

RAILWAYS

There is a revival of the railways not only in India but the world over. Be it urban mass transport system or freight haulage, the fortune of railways has turned course. The recovery of rail's fortunes stems partly from the rapid growth of cities, which has put a premium on rail's ability to transport large numbers of people while using comparatively less urban land which today is very precious. The clogging of roads in both the rich world and developing economies has persuaded policy-makers to believe that rail has a vital role to play. While in the past, engineering excellence took precedence over passenger comfort, now new trains have improved tremendously in terms of customer comfort, aesthetics, comfort of the seats, and lighting. Indian Railways (IR), though committed to remain a monopoly operator of long haul freight trains, passenger trains, and the dedicated freight corridor, is keen to adopt new ways of functioning with the private sector. It is looking for avenues to use its resources to build new

capacity and exploit its land commercially all over the country.

The IR registered a growth rate of 14 per cent in passenger earnings and 17 per cent in freight earnings, and clocked a surplus of Rs 20,000 crore in 2006–7. But the railways' modernization and infrastructure projects require Rs 60,000 crore and hence, railways will need more funds to complete the existing and new projects in a time bound manner using PPP mode in all sub-sectors of railways except operations.

The newly set up Rail Land Development Authority (RLDA), which was formed to commercially exploit the large tracts of land available with the Indian Railways, will offer the land through a PPP model under which the Railways will form JVs where the land will represent the Railways' portion of the equity. The plots will be developed for commercial use in the form of shopping malls, office space, plazas, and multiplexes.

In order to utilize its land, the government plans to amend the Railways Act, 1989, empowering the railway ministry to utilize excess land without hindrance, in the same manner as the NHAI acquires land for highway projects. The Railways are currently unable to tap nearly 43,000 ha of land along tracks for commercial purposes due to encroachment and illegal occupation. The amendment, if passed by the Parliament, will take away the powers of the states. The Railways is planning to utilize part of the land to build commercial projects like agri-business hubs and organized retail for which it has been in talks with companies like Reliance Retail, Future group (Pantaloon), Tatas, and AV Birla group.

The Railways has decided to offer over 500 acres of prime land to private developers in over thirteen locations across the country. The cities that have been earmarked for the purpose include Delhi, Mumbai, Kolkata, and Bangalore, besides Lucknow, Vishakapatnam, Gwalior, and Gaya. Apart from commercial exploitation of prime land in cities, there is a new-found vigour in developing railway stations, freight terminals, and rail link projects.

Railway Stations

The Indian Railways has identified 22 stations which would be modernized under the public-private partnership (PPP) in various parts of the country. These include New Delhi, Chhatrapati Shivaji Station (Mumbai), Howrah, Chennai Central, Amritsar, Ahmedabad, Bangalore, Bhopal, Bhubaneswar, Chandigarh, Lucknow, Mathura, Pune, Patna, Secunderabad, and Thiruvananthapuram. Meanwhile, the ministry has selected the UK-based company Terry Farrell and Partners, an architectural firm, for preparing the feasibility report and master plan for modernization of New Delhi

railway station. The move is a part of the Railways' new thrust to modernize stations and improve facilities for customers through private sector participation as the battle with low cost airlines heats up. The modernization of stations will include setting up shopping and food plazas, budget hotels, and retiring rooms. It also includes setting up spatial segregation of facilities at different floor levels for smooth passenger flow.

In the first phase of its modernization, the Railways has decided to develop world-class facilities at six stations—New Delhi, Patna, Agra, Anand Vihar, Jaipur, and Amritsar (*The Hindu*, 5 September 2007).

Freight Terminals

Whereas newly designed railway stations will present the customer-friendly face of Indian Railways, its freight stations with new inter-modal facilities will be its cash cows in the years to come. The railway ministry has selected sixteen such terminals in places like Mumbai, Bhopal, and Danapur (Bihar) which would be provided with amenities for better communication facilities with control offices and road connectivity. The other freight terminals are located at Gonda, Saharsa, Noamundi, Laxmibai Nagar, Barbil, Ballabgarh, Sukinda Road, Yamuna Bridge, Sanvardam, Sankaval, Gosalpur, and Mandi Govindgarh. As most of the terminals and sidings (rail lines meant for carriage of goods from trains directly to terminals) are outdated and saturated, state of the art terminals are required urgently. Once the terminals are modernized, it will not only help in reducing wagon turnaround time but also facilitate quicker material handling at terminals. In order to make these changes, land around these terminals would have to be acquired, which may take some time. To realize this, the ministry is planning to modernize and upgrade various freight terminals across the country through PPP initiative.

Rail Link Projects

Rail Vikas Nigam Ltd (RVNL), the SPV of the Railways to execute PPP on behalf of the Railways, is considering a move to adopt competitive bidding while choosing its partners for lucrative rail link projects. RVNL generally selects equity partners for its rail link projects, to be built on PPP basis, based on the traffic guarantees the user companies provide for the rail link to be built. RVNL has so far undertaken construction of bankable port links, construction of new line, and gauge conversion projects on a PPP basis. They select stakeholders who are going to be directly benefited by the construction of a particular stretch of rail link and ask them to commit traffic volumes over the concession period.

RVNL now has several rail link projects in its portfolio where there are no traffic risks as they are located near power plants, mines, and so on and are thus assured of certain traffic volumes. In these projects, several companies who are not direct users of the rail link would also be interested to invest. It is for such projects that RVNL proposes to select partners through competitive bidding. The projects being implemented or being planned for implementation through creation of project-specific SPVs having equity participation by both strategic and financial investors include Haridaspur–Paradeep new line in Orissa; Bharuch–Samni–Dahej gauge conversion in Gujarat; Surat–Hazira new line in Gujarat; Obuvallirapalle–Krishnapatnam new line in Andhra Pradesh; Arsikeri Hassan–Mangalore gauge conversion in Karnataka; Gandhidham–Palanpur gauge conversion in Gujarat; and Angul–Sukinda new line in Orissa.

FREIGHT BUSINESS

Food courts, vegetable marts, banks, and shopping-cum-office complexes may soon sprout on unused land along railway stations if the ambitious plan of the railway ministry to earn about Rs 5000 crore takes off. Big business houses like Reliance approached the railways with proposals to set up fruit and vegetable marts while Pantaloons is looking at the prospect of establishing retail stores.

Logistics Parks

The Railways also proposes to develop logistic parks along major stations in the country through PPP. Major stations in metro cities, like Delhi, Mumbai, Kolkata, Chennai, and Howrah, are likely to have such parks along the railway stations. Through this, the railways is planning to offer its land to the private sector for setting up facilities like banks, repair facilities for trucks, godowns, custom facilities.

In non-metro cities which are the hub of freight business, the Railways is planning to set up about 20 logistics parks over the next few years, requiring an investment of about Rs 10,000 crore. The logistics parks would be situated along the route of the dedicated freight corridor. While their exact location is not finalized yet, states such as Punjab and West Bengal have evinced interest in the endeavour.

These parks are modelled along the lines of the Chinese logistics parks; each of these will be expected to be built on about 600 ha of land and will include a multi-modal transport system, along with warehousing, packing and cold storage facilities, and business centres. The Railways will provide surplus land to build the parks and expect the rest of the investment to come from the private players. Interestingly, the Railways hopes that the logistics

parks will also help private container train operators; many of them still look for infrastructure support in the form of depots and warehouses. The container train operators can use the infrastructure available at these parks by paying a user fee. The Railways also hopes that these parks will help make freight more competitive and lower the unit cost of rail transportation. At least one of these logistics parks is likely to be built and functional in 2008. It will serve as a model project and the rest will be fashioned along its lines.

Private Container Trains

Almost sixteen months after the Indian Railways decided to privatize container transportation, ending the monopoly of state-owned Container Corporation of India (Concor), private players have yet to roll out their services.

What initially attracted private players to the fledgling sector is the sheer volume of export–import containers. The current volume of 4 million TEUs is expected to jump to 20 million TEUs by 2014. But, ‘high user charge’ by Concor, ‘poor supply of rakes’ and ‘lack of infrastructure’ such as container freight stations (CFSs) and inland container depots (ICDs), where cargo consolidation and deconsolidation take place, have upset the private sector apperception. Besides, railway lines in India are running at a super-saturation level of 115 per cent. The routes that connect the four metros have even higher levels of 150 per cent. Key bottlenecks are shortage of wheels and axle.

Three companies which have managed to start services are Gateway Distriparks, Hind Terminals, and India Infrastructure Logistics—a JV between Singapore-based NOL and Hindustan Infrastructure Projects & Engineering.

Multi-modal Facilities

At present, the Railways carries about 30 per cent of all the freight transported in the country. The Railways would like to increase this share to at least 40 per cent in the coming fiscal, as it would give a major boost to its earnings. Realizing that the congestion in ports is primarily due to slow evacuation of cargo rather than a lack of handling capacity, the Railways would like to improve connectivity to the hinterland through an efficient multi-modal system, which uses the most efficient mode of transport at each stage from origin to destination.

The Railways commissioned a survey to identify commodities which can be carried by the Railways and that can help in increasing its share in the freight transport of the country. The Railways is confident that it can

spearhead the multi-modal link facility and ride the freight boom as import–export volume increases in the future.²⁶

FREIGHT CORRIDOR AND DELHI-MUMBAI INDUSTRIAL CORRIDOR

Freight Corridor

The Railways has established Dedicated Freight Corridor Corporation of India Ltd (DFCCIL) to implement the freight corridor project over the next five years with a deputed team of about twenty officers to start preliminary work. DFCCIL has an authorized capital of Rs 4000 crore at present, which is likely to be increased subsequently depending on the requirement.

The proposed freight corridor alignment is almost like a track doubling task—two new tracks are expected to run alongside the present railway track; at major stations, the route takes a diversion only to join the present track at a later stage. This approach will help avoid major land acquisition requirements as land belonging to the Railways exists along the tracks. However, the time and cost overruns in building rail overbridges (ROBs) are likely to offset the land acquisition benefits of not building alternate routes. At present, every year, the Indian Railways manages to build some 300 km of parallel track.

The railway ministry will review the routes for the dedicated rail freight corridor project so that laying lines for them requires minimal disturbance in terms of construction or removal of too many older structures. A feasibility report submitted by RITES after studying the Delhi–Kolkata and Delhi–Mumbai routes (the two routes under the first phase of the project), says there are 50-odd ROBs and flyovers on the Delhi–Mumbai route and 30-odd ROBs and flyovers on the Delhi–Kolkata route whose height would have to be raised for laying tracks.

The PPP route would be used to generate more funds for the expansion of freight corridor. Railways hopes to complete the project within a period of 5 years. The ministry has already invited tenders for project consultancy services to construct four more wings, namely north–south (Delhi–Chennai), east–west (Kolkata–Nagpur–Mumbai), southern (Chennai–Goa) and east coast (Kharagpur–Vijaywada). Thus, capacity augmentation programmes will almost triple during the 11th Plan compared to previous plans. But, as none of these would be operational during the Plan period, the Railways may need support from the government.

The funding plan for the dedicated freight corridor project is almost complete now. According to the plan, the railways would shoulder about 34 per cent of the total cost,

²⁶ To understand how railways can benefit from origination–destination study, see Chapter 5 on Freight Business Marketing Model for Indian Railways by Raghuram and Gangwar in this report.

while the rest would be funded by Japanese agencies. Private investments will be used only if fund balances fall short. The railway ministry will provide Rs 9000 crore as equity for the project in the first two years. The total cost of the project is estimated to be Rs 28,000 crore. The Railways sanctioned about Rs 1300 crore during the current financial year to carry out initial survey work. The Railways is keen to construct the dedicated freight corridor without using PPP.

The Japan International Cooperation Agency (JICA), in its second draft report, has suggested several junctions where the dedicated freight corridor would be linked to the Indian Railways network through feeder routes. JICA conducted a feasibility report independently and submitted the final report to IR.²⁷

With the location survey of the eastern and western parts of the dedicated rail freight corridor in its final stages, the Railway Ministry has proposed an amendment to the Railway Act for faster acquisition of land. The Ministry has suggested that the provisions for land acquisition should be similar to those in the NHAI Act, which says: 'Where the central government is satisfied that for a public purpose any land is required for the building, maintenance, management or operation of a national highway or part thereof, it may, by notification in the official gazette, declare its intention to acquire such land.' The Railways Act 1989 has been amended through an ordinance for expeditious acquisition of land. Using the amended act, special organizations will be set up in each state falling under the jurisdiction of the eastern and western corridors of the project. These bodies will be controlled by DFCCIL.

Delhi-Mumbai Industrial Corridor

Only 38 per cent of the Indian population lives within 100 km of sea-navigable waterways, compared with 45 per cent in China and over 90 per cent in Japan and the EU. Of the 75 cities in India that will have a population of more than 1 m by 2050, the overwhelming majority has no direct coastal access. In this context, an industrial infrastructure between Delhi and Mumbai along the 1483 km railway freight corridor is envisaged at an initial estimated investment of US\$ 50 billion with Japanese assistance.²⁸

The government plans to build three ports as part of a large industrial zone along the Delhi-Mumbai freight corridor. The Delhi-Mumbai Industrial Corridor (DMIC) will span five states (Uttar Pradesh, Haryana, Rajasthan,

Gujarat, and Maharashtra). In addition to the new ports, infrastructure in this zone will include roads, power plants, industrial estates, and SEZs. Work on the industrial corridor will begin in January 2008 and is expected to take seven years to complete.²⁹ The mega-project is modelled on Japan's Tokyo-Osaka Industrial Corridor and will be funded in part by grants and investments from Japan.

India hopes that the Japanese Government will contribute 50 per cent of the US\$ 250 million project development fund. The rest of the US\$ 125 million would have to be raised from Indian entities in the form of PPPs. The fund will be used to lay the groundwork for various projects in the corridor. The projects will be given to the private sector to execute after a bidding process.

The first phase of the project, due to start in 2008, involves development of twelve investment regions, industrial parks, SEZs, and other supporting infrastructure. The project is to see six investment regions and industrial areas coming up during the first phase. The six investment regions to be covered include the Manesar-Bawal region in Haryana, Bharuch-Dahej region in Gujarat, Pitampura-Dhar-Mhow investment region in Madhya Pradesh and Igatpuri-Nashik-Sinnar region in Maharashtra. Each investment region would be of more than 200 sq km (*Financial Express*, 17 August 2007). The six industrial areas include Meerut-Muzaffarnagar region in Uttar Pradesh, Jaipur-Dausa in Rajasthan, Neemach area in Madhya Pradesh and Vadodara-Ankleshwar in Gujarat. This phase would coincide with the construction of the Delhi-Mumbai freight corridor and is planned to be completed by 2012. The second phase of the project would be completed by 2018.

AIRPORTS

India is one of the fastest growing large markets for airlines. A bevy of new airlines is making air travel more affordable for the country's increasingly prosperous middle classes. The Indian civil aviation sector is witnessing double-digit growth, with the sector growing at 25-30 per cent in 2005-6. It is expected to grow at 25 per cent annually for the next five years (*Business Standard*, 26 May 2007). Investments in the aviation sector are expected to be US\$ 30 billion by 2012 and about US\$ 50 billion by 2015.

The entry of low cost carriers like Air Deccan, Spicejet, GoAir, Indigo Airlines among others, have driven down fares, resulting in strong market stimulation. The airport

²⁷ This is despite issues raised by Japan International Cooperation Agency (JICA) on cost factor and technology to be used in the freight corridor. Japan Bank for International Cooperation (JBIC) has suggested electric locomotives to run the container trains whereas IR wants to use diesel locomotives. JBIC has also raised the issue related to land acquisition.

²⁸ The government has doubled the total investment requirement for the ambitious Delhi-Mumbai industrial corridor to a whopping US\$ 100 billion (over Rs 400,000 crore). Note that these investments were not considered by the Parekh Committee Report.

²⁹ First phase may be ready by 2012.

sector is wrestling today with a strange dichotomy where the infrastructure on the ground is not fully prepared to handle the onslaught of traffic while the infrastructure in the air already is. India's major airports are overloaded. Analysts estimate that during peak passenger traffic hours, New Delhi and Mumbai international airports operate at about 20–25 per cent overcapacity.

Rapid expansion of airport infrastructure has become essential due to an unprecedented growth—international air traffic has been growing at 15 per cent annually, while domestic passenger traffic growth has at times surpassed 40 per cent. The domestic market size is expected to cross 60 million and international traffic 20 million, by the end of 2010. The vibrancy in the Indian aviation market has been overwhelming: over 135 aircraft have been added in the past two years. And by 2010, India's fleet strength will stand at 500–550.

The consolidation in airlines business is underway even before the industry has achieved a state of stable and orderly growth. The sector was opened to private competition just a few years ago. Government-owned Air India and Indian Airlines have announced a merger, Jet Airways has taken over Air Sahara and the Kingfisher has taken controlling stake in Air Deccan.

Vision 2020

The government is planning to come up with a new civil aviation policy. A draft of the policy put forward by the Civil Aviation Ministry to the Cabinet was referred to a Group of Ministers (GoM) after some Cabinet Ministers raised questions about certain proposals mooted in the policy—allowing more domestic airlines abroad, creation of merchant airports, and plans to corporatize the air traffic control system. The civil aviation ministry had earlier proposed the promotion of fully private airports with no equity participation by the government through this policy. These airports are developed and operated fully by private companies, which can use them for commercial (passenger as well as freight) and private use (*Financial Express*, 8 September 2007).

The 10-member GoM, will frame a new civil aviation policy and suggest changes to the ideas put forward by the Ministry of Civil Aviation in its Vision 2020. However, all airports will not be modernized on the lines of PPP due to lack of political consensus. Some of the modernization work will be done by the Airport Authority of India (AAI). The AAI has been given the task to develop the Kolkata Airport (*Financial Express*, 8 September 2007).

AERA

The Airport Economic Regulatory Authority (AERA) Bill, was introduced in the Parliament in the monsoon session

in September 2006, to usher in a new institutional mechanism for independent regulation of airport services in the country. AERA would monitor the performance standards relating to quality, continuity, and reliability of services offered. The regulators have a role only when airlines, airport operators, and other airport users are unable to negotiate an agreement on pricing or for settlement of operating/service delivery issues between them.

The Bill also proposes setting up an Appellate Tribunal that would have the powers to adjudicate disputes between two or more service providers or between a service provider and a group of consumers. The Tribunal would also have the powers to hear and dispose of appeals against any directions, decisions, or orders of the regulatory authority. The Bill clearly states that unfair and restrictive trade practices will come under the jurisdiction of the Monopolies and Restrictive Trade Practices Commission (MRTPC). The purpose of AERA is to maintain pre-set standards and to foster competition among airport operators.

AERA will soon appoint a regulator, whose principal mandate would be to review and determine tariffs for aeronautical services, besides monitoring compliance of airport operators based on pre-set performance standards. Airport operators would need prior approval from the regulator for fixing airport development charges, user fees, and other levies. The regulator would also keep a check on the economic and operational viability of airports.

The Airports Economic Authority Appellate Tribunal, will have the right to punish any person with a fine of up to Rs 1 lakh and in case of a subsequent offence, with a fine of up to Rs 2 lakh if anyone falls short of complying with the tribunal's order. In case the offender does not take corrective action immediately, the penalty could result in additional fine, which can go up to Rs 2 lakh for each additional day that the default continues. The tribunal would spare itself from looking into issues that come under the domain of the Competition Commission Act, 2003. According to the civil aviation ministry, the power to levy such stringent penalties will help the Airport Economic Regulatory Authority to effectively regulate the rapidly expanding civil aviation sector.

Existing Airports

The civil aviation ministry has classified airports into five categories: sub-continental hubs, international hubs, national hubs, regional hubs, and airports at state capitals and other places. The airports at Delhi and Mumbai, which together handle 52 per cent of all traffic, are to be developed as sub-continental hubs with world-class facilities. New airports will be developed using PPP or as merchant airports as far as possible.

Delhi

New Delhi will overtake Mumbai as India's busiest airport by 2010. The gap between passengers using the two airports is closing, with more aircrafts landing and leaving Delhi than Mumbai for both domestic and international travel.

Mumbai

The GVK consortium-led Mumbai International Airport Ltd (MIAL), which took over operations of the Chhatrapati Shivaji International Airport in Mumbai in May 2006, has re-worked the original master plan for upgradation of the airport. The major change proposed is to have one integrated terminal at Sahar airport, instead of the original plan of one terminal at Sahar for international and domestic traffic and another at Santa Cruz for domestic passengers. The master contract for the redevelopment of the airport has been awarded to L&T. The new terminal, which forms part of the US\$ 1.5 billion master plan prepared by Netherlands Airport Consultants BV, will be rolled out in phases over the next ten years.

As per the revised MIAL master plan for renovating the country's busiest airport—with around 650 air traffic movements per day—a fully integrated airport terminal with the capacity to handle 40 million passengers will come up at Sahar by 2012. This will handle both domestic and international flights. The terminal at Santa Cruz is likely to be converted into a dedicated cargo terminal (*Business Standard*, 6 September 2007).

MIAL hopes to increase its share of non-aviation revenue from 20 per cent at present to 50 per cent over the next five years. Eventually, these revenues are expected to overtake contributions from its existing revenue streams—aircraft landing and parking fees. Globally, a host of airports like Changi (Singapore), Dubai, and Schipol (Amsterdam) earn most of their revenues from non-aviation sources that include business centres, duty free shops, food courts. In this way, pure aviation related services would cost less and the airport would be competitive and attractive for airlines.

The airport launched a free wireless network available within the domestic and the international terminals in September 2007, in partnership with the telecom major Bharti Airtel. MIAL also plans free internet kiosks, to be operational from June 2008. On the cards are business centres, complete with high speed internet access.

Kolkata and Chennai

Airports Authority of India (AAI) fought tooth-and-nail to bag the Kolkata and Chennai airport modernization projects. The AAI will appoint a developer for the

turnkey projects to modernize Kolkata and Chennai airports. Instead of grappling with several contracts separately for civil engineering and electrical and the like, the effort will be to award one large contract. The AAI will only monitor its implementation and a private firm with a 'strong balance sheet and sound technical experience' will carry out the construction.

The project implementation will begin in 2008. The modern airport will be ready for use by mid-2010. While the ministry has earmarked Rs 5000 crore for the Kolkata airport's modernization, the investment in the first phase is pegged at Rs 1542 crore. Of this, about Rs 1300 crore has been earmarked for the new terminal, Rs 100 crore for a new runway and cargo complex, and Rs 100 crore for communication and navigation systems. After Phase 1 is completed, the revamped airport will be able to handle 20 million passengers as against 5 million now.

Though Tamil Nadu and West Bengal have opted for modernization of the Chennai and Kolkata airports through the AAI, the draft civil aviation policy envisages a role for the private sector in these ventures since the AAI itself is proposed to be restructured.

New Airports

India expects to add aircraft worth about US\$ 80 billion by 2020. This would necessitate an investment of about US\$ 30 billion in airport infrastructure. Since it would be very difficult to generate such resources from either the public sector or even under PPP, the government has felt the need to explore the option of merchant airports.

Hyderabad Airport

With 76 check-in counters, 18 immigration counters, 42 aircraft parking bays (including 12 aerobridges), 2300 seats spread across domestic and international areas and automated baggage transfers, the upcoming GMR Hyderabad International Airport (GHIAL) is all set to offer a different kind of experience to the passengers. The 4.26 km-long runway, the longest in the entire South Asia region, can handle thirty air traffic movements (the total number of take-offs and landings) per hour as against the figure of sixteen at the existing Begumpet airport.

The first phase of the airport started functioning in March 2008, airport can handle 12 million passengers a year which will be increased to 40 million passengers a year in the second phase. The airport expects to generate 20–30 per cent of its revenues from non-aeronautical streams such as retailing, advertisement, car parking, and other activities.

Bangalore International Airport

The Bangalore International Airport has commenced trial operations and it will start commercial operations in 2008. The civil works of the airport was ahead of schedule and got completed by December 2007. The state government has speeded up work on access roads.

New Airport at Navi Mumbai

For Mumbai, air traffic projections for passenger traffic is 27.5 million passengers annually by 2010 which is expected to increase to 40 million passengers per annum in 2015 and peak at about 80 million in 2026. Despite the ongoing restructuring and modernization of the existing airport in Mumbai, it would, at this rate by completely saturated by 2013. The Union Cabinet has accepted the proposal to build an international airport at Navi Mumbai. The airport is to be developed as a greenfield project through the PPP route and is slated to be operational before 2013.

The government has identified a location on National Highway 4B, roughly 35 km from the existing international terminus at Santa Cruz, for the new airport. Navi Mumbai is an appropriate choice for the location of the second airport because of the availability of developed infrastructure, power, water supply, roads and communication, minimal environmental disturbance, and limited rehabilitation issues. The project, to be developed in four phases, is estimated to cost Rs 9970 crore. During the first phase, which is to run from 2008–12 and investment of Rs 4200 crore, the airport would have a capacity to handle 10 million passengers annually; during the second phase (2015–17), the capacity would be doubled.

MIAL, which operates the existing Mumbai airport, would have first rights of refusal for the second airport in line with the concession agreement signed by the government with the MIAL. City & Industrial Development Corporation (CIDCO), Maharashtra, and IL&FS have started work on the business plan for the project. The corporation, alongwith AAI, would hold 26 per cent equity in the second airport and the rest would be held by a private developer.

New Airport at Greater Noida

Delhi will soon have a second airport in suburban Greater Noida. The Uttar Pradesh government wants to revive the Taj International Airport and Aviation Hub project. The GMR Group, which is currently operating Delhi Airport, has the first right of refusal to develop the second airport that may come up near Delhi.

The Ministry of Civil Aviation has decided to put the proposal for the Greater Noida airport project to

speedy implementation. The decision was taken after a techno-feasibility study and project report was submitted to the civil aviation ministry by the Uttar Pradesh government. The project cost is estimated at Rs 3505 crore as per the feasibility report submitted by the state government.

New Airport at Mohali, Chandigarh

The Punjab government has sent a proposal to the civil aviation ministry for setting up an international airport in Mohali—the second in the state after Amritsar—near Chandigarh. The state government also proposes to develop Bhatinda, an Air Force base station, and the airport in the industrial town of Ludhiana, which gets one flight a day, into full-fledged domestic airports. An airport in Mohali is considered viable as Amritsar airport has already absorbed a lot of international traffic of Delhi airport. As a result, Amritsar airport has seen a huge increase in the number of the international passengers. Although the number of international passengers at Amritsar airport (0.48 million for 2006–7) is just 7.33 per cent of Delhi's 6.6 million, the former has grown much faster.

Punjab has also witnessed a rise in the number of international flights. For instance, Malaysian Airlines started flights to Amritsar last year. Flight movement in the city increased by 61.2 per cent in March 2007 while the international traffic at Delhi airport grew by a mere 10.6 per cent during the period (*Business Standard*, 3 September 2007).

Non-Metro Airports

The AAI has decided to modernize 35 non-metro airports to world standards in a phased manner with a focus on air side and city side development and enhancement of non-aeronautical revenues at an estimated cost of Rs 41,000 crore. The government plans to select the joint venture partners or private consortia that would take up the development of these airports. The process of selection of JV or private consortium for development of individual airports or airports in a cluster approach will be finalized in 2008. The government has appointed Capital Fortunes, Hyderabad, as consultants for preparing the project reports for development of twelve non-metro airports in the southern and western parts of the country. In addition, UTI Bank, Mumbai, has been given the mandate to prepare similar reports for twelve airports in the north and north-eastern region. The Ministry plans to have all the development work completed by 2010. Contracts for air side development at twenty-four airports have been awarded and for rest of the eleven airports, contracts are being processed (*Economic Times*, 2 August 2007).

Regional Connectivity

To improve regional connectivity and create regional hubs, the ministry has mooted a proposal to set up 'regional airlines', defined as carriers with aircraft having less than 80 seats and which operate exclusively on regional routes from any one metropolitan airport, which includes Delhi, Mumbai, Chennai, Kolkata, Bangalore, and Hyderabad. The ministry has also suggested that the first airline to connect cities that are not linked by air should be exempt from all airport and navigation charges at both airports for the first year of operation. For regional airlines, navigation and landing charges often constitute up to 10 per cent of the overall costs.

Close on the heels of its Air Deccan acquisition, Vijay Mallya-owned Kingfisher Airlines will bid to partner the North Eastern Council (NEC), which is mulling a separate airline for the northeastern region. Other private carriers are likely to decide on bidding soon. Constituted by an Act of Parliament in 1971, the NEC is the nodal agency for economic and social development of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura. Under the proposal, the private airline will provide not only aircraft and scheduled services but also maintenance and engineering support at airports in the region. NEC will provide financial support for these operations. Kingfisher has a fleet of twenty-nine aircraft, of which eight are ATRs; it is ready to use its ATR fleet for the NEC. NEC had an arrangement with Alliance Air for servicing the region but that agreement which expired in December 2007. Now eleven destinations in the northeast are connected by eight operators, which operate 258 flights a week.

The Maharashtra government will adopt PPP model for building airports in seven cities of the state. In Solapur, Phalton, Dhulia, Karad, Jalgaon and Chandrapur airstrips exist already but there is no airport infrastructure at present.

After low-cost airlines, it is the turn of no-frill and low-cost airports. In a bid to encourage regional airlines and provide air links to small cities and towns, nearly twenty-five greenfield airport projects have been identified for development by various states. Planned in the tier-II or tier-III cities, these airports would be developed in addition to the Ministry of Civil Aviation's ambitious modernization programme for thirty-five non-metro airports. A no-frill airport is built at a minimum cost and allows operation of small jets as well as slightly bigger aircraft like Boeing's B737 or Airbus' A320. The investment in such an airport could range from Rs 40 crore to Rs 100 crore.

The places identified for the purpose include Hassan, Shimoga, Gulbarga, Bidar, Mysore (all in Karnataka), Shirdi, Jalgaon, Solapur, Akola (all in Maharashtra), Kannur (Kerala), Madurai, Tiruchirapalli (Tamil Nadu), Rupsi (Assam), Ajmer, Mount Abu, Kailashar (Rajasthan), Behala, Cooch Behar, Malda (West Bengal), Jharsuguda (Orissa), Muzaffarpur (Bihar), Kamalpur (Tripura), and Passighat (Arunachal Pradesh).

Merchant Airports

After private roads and ports, the country is all set for its private airports, also called merchant airports. Infrastructure developers such as Reliance Industries, Pragati Growth and Development, and Anil Ambani-promoted Reliance Airport Developers have already shown interest in owning and operating airports across the country. Internationally, merchant airports have been developed as specialized low-cost airports, cargo centres, or airports private business. Merchant airports would be especially useful as cargo hubs, thereby providing a thrust to freight handling. The merchant airport policy is likely to be finalized in 2008. The private sector is showing huge interest in the merchant airport policy, being prepared by the civil aviation ministry for building dedicated cargo airports to boost logistics chain in the country. Such cargo specific small airports can also be built with a small investment of Rs 200 crore.

The finance ministry has called for a complete examination of issues relating to the upcoming policy on merchant airports. These include, the selection criteria for private players willing to build merchant airports, possession of minimum land holding, criteria for awarding licenses, and financial requirements for companies applying for such projects. The government will also take into consideration locational advantage and commercial viability of projects while selecting private players.

Air Cargo Ports

The government plans to raise the FDI cap in air cargo business to 74 per cent as part of efforts to further open up the sector for foreign investment. The weekly cargo capacity is estimated at 474 tonnes which highlights the huge opportunity in the cargo business. According to the civil aviation ministry, Nagpur should be made the cargo hub of the country because of its geographical advantages. The central government may provide all required support to make it a truly world-class cargo hub.

EASF

Under the new proposed civil aviation policy, the Ministry of Civil Aviation has suggested the establishment of an

Essential Air Services Fund (EASF) to provide subsidy to airlines that operate on 'uneconomical but essential routes' such as the North-east. With the success of Universal Services Obligation (USO) of the telecom sector, the government is of the view that the subsidy support from the fund should be provided through a transparent process of minimum subsidy bidding.

Under this system, the bidder who asks for the minimum subsidy from the fund will win the maximum number of routes. This would enable subsidies to be paid to the most efficient operator at the lowest cost to the public and might lead to the development of specialized smaller airlines as well, the policy states. The fund, however, is to be created through a cess levied on both domestic and international air travel.

After the new system is put in place, the route dispersal guidelines would be progressively replaced. The current route dispersal guidelines of the Directorate General of Civil Aviation (DGCA) make it mandatory for all scheduled carriers to deploy at least 10 per cent of the total capacity of their trunk routes on Tier-II routes comprising the North-East, Jammu and Kashmir, Andaman & Nicobar Islands, and Lakshadweep.

New Opportunities

Private sector participation in airports has given rise to new opportunities for new businesses. GMR Infrastructure Ltd, which has MIAL concession, has made its first foray in the international arena. A joint consortium that includes the GMR Infrastructure Ltd has bagged the contract to develop Sabiha Gokcen International Airport in Istanbul. The BOT project includes not only the construction of a new international terminal within thirty months capable of handling 10 million passengers annually but also managing the existing domestic and international terminals. The total investment is estimated at about € 400 million.

The GMR Group plans to set up an airport-based SEZ near the new Hyderabad International Airport, which it has the mandate to develop. Planned on the lines of free trade zones in Hamburg and Dubai, the SEZ will house aircraft component manufacturing industries and also see high-end aircraft engineering support activities. Besides, the SEZ will house high-end electrical and auto-component manufacturing facilities and software units. The group also has plans to set up high-precision pharmaceutical equipment-manufacturing to cash in on international air connectivity. Maharashtra Airport Development Company (MADC) is also developing an SEZ at the Nagpur airport. Cochin International Airport (CIAL) has approved a 480 acres land utilization plan for an aircraft maintenance facility, an aviation academy, and a golf course, among other things.

If allowed, the GMR group has plans to develop aerotropolis—new 'cities' springing up around airports—a new concept which is seeded in an urban hub. An aerotropolis offers operational convenience for companies and organizations to maximize benefits, while cutting down on expenditure significantly. The GMR group would like to give the concept concrete shape around the new Hyderabad airport. When the new international airport gets ready for commercial operations in early 2008, it would not be just another airport. It is going to be the nucleus of the country's first aerotropolis, a new urban form that would house business parks, hotels, residential units, and entertainment areas. The GMR group, which also bagged the international airport project at Delhi with Fraport of Germany, will develop the aerotropolis near Delhi airport as well (*The Hindu*, 12 February 2007).

Changi Airports International of Singapore, rated among the best airports in the world, has expressed interest in developing an integrated airport township near Durgapur. Bengal Aerotropolis Projects Ltd, the consortium working on the Rs 10,000 crore project received the EOI from Changi Airports. While the 2300 acres project at Andal, about 10 km from Durgapur and 35 km from Asansol, will be modest, its scope will be diverse. The focus will be on cargo, supply chain, and logistic hub with maintenance, repair and night parking facilities. An aviation academy is also proposed there (*The Times of India*, 10 September 2007). These airport cities would be taken up on the lines of Incheon (South Korea), Dubai, and Munich airports.

URBAN INFRASTRUCTURE

Dharavi Redevelopment Project of Mumbai has attracted many developers. Many real estate developers have joined hands with reputed town planners of Singapore and China who have experience of integrated large urban projects. The big draw of the project is the high floor space index (FSI) of 4, which will allow companies to develop more area in Dharavi. Mumbai, barring some places, has an FSI of 1.33. The developers will provide 30 million sq ft of space, including housing, schools, parks, and roads. In return, they will be allowed to build 40 million sq ft of home and office space for sale. The Slum Rehabilitation Authority (SRA) of Maharashtra had received twenty-six bids from various consortiums, including seventy-eight real estate firms, many with considerable experience in township construction.

The 57,000 families that live in Dharavi will be rehabilitated in 225 sq ft multi-storeyed tenements, which will be maintained by the developer for fifteen years. The entire area has been divided into five sectors of about 1.5 crore sq ft each on an average. The project is expected to

generate close to Rs 25,000 crore in revenues for the Maharashtra government.

Out of the total consortiums who had submitted the bids, nineteen consortiums have been short-listed by Maharashtra government. The selected consortiums will submit financial proposals, of which five will be selected for project implementation. The final selection and development work to start in 2008.

SPECIAL ECONOMIC ZONE

India's efforts to replicate China's successful development of SEZs began to generate controversy as soon as the policy came into force in early 2006. The government was forced to tweak the guidelines in the face of dire opposition. Under the new policy some thirty-six new SEZs have been approved, bringing the total number approved to 339. In addition, another 170 proposed projects have received 'in-principle' approval. But, because of social protests, the government has drifted from China's tested model to SEZs that are too small, too numerous, and too inflexible in terms of labour laws to ensure success.

The average size of SEZs approved in India is a mere 4 sq km—a tiny fraction of the size of their Chinese counterparts. China's SEZ in Shenzhen is a massive 327 sq km. Placing further limitations on the size of India's SEZs could make their task of emulating the success of SEZs in China a distant dream.

Navi Mumbai SEZ has already been split into four separate projects in order to skip the contiguity issue and also to avoid procedural roadblocks. The Navi Mumbai SEZ's multi-product project was to have been developed on 1240 ha. Now Reliance India Ltd has planned products specific SEZs in Navi Mumbai. These SEZs are light engineering (179 ha), pharmaceuticals (103.25 ha), and bio technology (63.74 ha). The Ministry of Commerce and Industry, which is the architect and implementer of the SEZ policy, views it as a major initiative for expanding exports, improving infrastructure, attracting foreign and domestic investment, and providing employment.

The government is taking a fresh look at the issue of stand alone SEZs for power generation projects. The move follows concerns regarding the utilization of SEZ generated power in the non-processing areas and domestic tariff area (DTA). Though the Electricity Act provides for power generation for captive purposes on individual or collective basis, the concept of stand alone power SEZs needs examination, according to the Ministry of Power.

The Maharashtra Industrial Development Corporation decided that instead of setting up individual power

generation facility in each SEZ, they would set up two power sector SEZs to supply power to all such zones. Other two sector-specific SEZs in Gujarat were allowed, as the location proposed was not contiguous to the main SEZ. SEZ developers get exemption on building material, capital goods and operation and maintenance of goods, and services (*Business Standard*, 5 September 2007).

Land Acquisition

Acquiring land for infrastructure projects is often problematic, in part because India is a democracy. People who are displaced by projects and perceive inadequate compensation can express their dissatisfaction openly through political participation and protest. When land is acquired for use by private companies—as opposed to infrastructure projects such as roads meant for public use—the level of dissatisfaction is often higher. A common perception has built up over a period of time that SEZ projects are mere land-grabbing exercises, with real estate being acquired at unfairly low costs. Meanwhile, the Ministry of Rural Development has formulated a comprehensive resettlement and rehabilitation policy, according to which SEZs will be required to provide a livelihood for at least one person from each displaced family.

To tackle the opposition from farmers to land acquisition for industrial use, Maharashtra Industrial Development Corporation has come forward with a novel initiative. It will offer 15 per cent land in the industrial park to farmers' cooperatives at 50 per cent concession as well as give vocational training to the youth in the area, so that they can get industrial jobs. Under the scheme MIDC is encouraging the farmers to form cooperatives or joint stock companies and offering them 15 per cent of the land which is available for sale to industrial units. Besides, MIDC is also offering 5 per cent of the land which is earmarked for commercial purposes in the industrial park to such cooperatives or joint stock companies.

URBAN MASS TRANSPORT SYSTEM

The Union Ministry of Urban Development (MoUD) has recommended that all states, which have cities with a population of more than a million, establish urban metropolitan transport authorities as the single regulatory body that will coordinate a variety of transport mediums that compete for space in urban areas. The move is seen as a way to reduce the fragmentation of transport-related institutions in the country's cities and help urban planners and local governments formulate a cohesive transportation plan taking into account each city's peculiarities.³⁰

³⁰ The GoI is amending the Delhi Metro (O&M) Act 2002, to cover development, construction, operation and maintenance of metro railways in any metropolitan area. It will give legal sanctity to metro rail when corridor is extended beyond municipal limits. The Act will also have provisions for allowing privately-owned and operated metro rail system.

The MoUD believes that the government is in dire need of funds to boost public transport development in the country. On the lines of the fuel tax in the United States and the European countries, the MoUD is considering the imposition of a cess of up to 30 paise per litre on diesel and petrol to create funds for its Mass Rapid Transit System (MRTS). The revenue generated through the levy would form the corpus for the proposed Rs 5000 crore National Transport Revolving Fund that would finance state-of-the-art MRTS in the country. The money could be used for various transport related projects such as introduction of a new bus fleet, metro rail, mono rail system, and modernization of an existing transport system. States could use this fund for improvement of streets, horticulture, and pedestrian facilities too.

It is estimated that over twenty-six cities in the country require MRTSs. Five cities including Chennai, Hyderabad, Bangalore, Ahmedabad, and Mumbai have already opted for it. Delhi and Kolkata have metro rail systems in operation. With this in mind, the government has been working out a number of measures to bring in an element of uniformity in the execution of these projects. It is planning to bring all metro rail systems across the country under the purview of a single central authority.

To bring consistency and transparency in the execution of urban transport projects, the Government of India is planning to introduce an MCA for metro rail projects across the country. To be signed between the state government and a private player, the agreement will be for a period of thirty-five years. Of this period, the player will have five years for construction and another thirty years for operation. Line 2 of the Mumbai metro rail project and the Hyderabad metro project will be amongst the first projects expected to use the MCA.

The centre has approved the operation of a bus rapid transit system (BRTS) in four cities—Ahmedabad, Pune, Nagpur, and Indore—in an effort to improve urban transportation. BRTS is a good model for PPP programmes. Wherever it has been implemented, public transportation has improved in the city. The system reduces the stress on the cities' transportation infrastructure.

Delhi Metro

The GoM formed for the expansion of metro projects in Delhi has come up with a new cost-sharing model based on which states of Uttar Pradesh and Haryana will have to contribute 80 per cent of the cost (for stretches within their jurisdiction) for the recently cleared proposal to extend the Delhi Metro to Noida and Gurgaon in Phase II. The cost of the remaining project in Phase II (20 per cent) will be financed by the Delhi Metro Rail Corporation (DMRC).

DMRC has started running special feeder buses, which provide connectivity to commuters from metro stations to their nearest bus stops. These buses have solved the long standing problem of last mile connectivity for commuters and it provides a modern, efficient, and commuter friendly transport system to commuters.

Interestingly, of every Rs 3 that Delhi Metro Rail Corporation (DMRC) earns by selling tickets, Re 1 comes from property development. In fact, out of its operating revenue of Rs 70 to 75 lakh per day, as high as 25 per cent comes from property development. The property development activities include renting out of shops, advertising, development of malls and housing, and setting up of IT parks. Hence, a UMTS has more than one source of revenue which can be exploited by the operating company.

Mumbai Metro

Mumbai may be the first Indian city to have a single-fare structure for transport. Globally, cities like London, New York, and Singapore already have such a system in operation. The authorities plan to create a sub-system for road, rail, waterways, and air transportation, which will include rail network, parking lots, private and public modes of transport. The single fare structure will make travelling in the city a bit convenient as commuters would not need to buy separate tickets for different modes of transport (*Financial Express*, 17 August 2007).

The Prime Minister has assured that the first line of the Mumbai Metro project—the Andheri-Versova-Ghatkopar corridor will get Rs 650 crore VGF. Earlier, the VGF for the first line had been reduced by the finance ministry on account of certain technical faults in the bidding process (*Economic Times*, 24 August 2007).

The second line will connect Charkop to Mankhurd via Bandra and bids for this line have already been invited. The third line of the project connecting Colaba to Mahim is expected to be totally underground. According to initial feasibility estimates by MMRDA, it will cost Rs 12,000 crore to build. At present, the urban development ministry along with the Planning Commission is contemplating a move wherein it intends to increase the VGF component for infrastructure projects to almost 30 per cent for the project to become viable for private partnership, in comparison to the earlier 20 per cent assistance (*Economic Times*, 24 August 2007).

Kolkata Metro

The much publicized East–West Metro, to connect Kolkata's twin city Howrah in the west with IT hub Salt Lake in the east, is a Rs 5000 crore project that has been cleared by the West Bengal government. The project will involve the construction of a tunnel under the Ganges with

the assistance of Japan Bank for International Cooperation (JBIC). The work will begin from end 2008 and is likely to be completed by 2014. While JBIC will be contributing 45 per cent of the project cost, the state and central governments will bear the rest.

To repay the loan, an agency called the Kolkata Metro Rail Corporation will be formed. The state government's allocation will come from its funds for the capital expenditure outlay. The Delhi Metro Railway Corporation is the project consultant to this phase of the metro.

Hyderabad Metro

Hyderabad Metro Rail Ltd is the SPV that has been established to supervise the implementation of Hyderabad Metro. The project will be awarded on a BOT basis to a single developer who quotes the lowest amount of viability-gap funding to be arranged by the government. The technical bid documents for the Rs 8482 crore Hyderabad Metro Rail project have been issued to five international consortia that had pre-qualifications to establish metro rail system in the state. The proposed metro rail will operate in three routes covering sixty-three stations. The prospective developer will have to build the system within five years and run it for thirty years.

The Andhra Pradesh government is considering putting in place a unified metropolitan transport authority for better integration and coordination of all modes of public transport in the Greater Hyderabad by the time the developer for the 67 km three-corridor metro rail project is finalized. All the modes of public transport including buses, the present multi-modal transport system, and the proposed metro rail project will be integrated into a single system.

RURAL INFRASTRUCTURE

RURAL ELECTRIFICATION

In a bid to improve and strengthen the power scenario in rural areas, Jaipur Electricity Distribution Company (Jaipur Discom) has come out with a unique programme under which the power supply management and supervision in the villages will now be looked after by the local villagers.

This will first be implemented in Bagwada village of Jaipur district. Under the scheme a village representative will be selected by the concerned gram panchayat. These representatives will be given a monthly remuneration and they will operate from the concerned panchayat. The representative will have to make the discom headquarters aware of the ground realities of the power problems of the village. He will also inform the headquarters about the duration of power supply. He will be responsible for the

distribution of bills and will also motivate the villagers to deposit the bill on time. He will be expected to disseminate information on various schemes of the department and encourage people to stop power theft. A proposal to provide a mobile phone to the representative is also under consideration so that villagers can lodge their complaints directly through the phone.

Jharkhand, endowed with many rivers, rivulets, and waterfalls, has identified 47 locations in the state where hydel projects of various sizes can come up for producing around 64 mw of power for the people living in its remote villages. The Jharkhand Renewable Energy Development Agency (JREDA) has already floated national tenders for erection/construction of hydel projects at twenty-five such locations.

The government has set the goal of electrifying all the remote villages in the country during the Eleventh Plan period by March 2012 under renewable energy. 4,000 remote villages and hamlets have been covered under the rural electrification programme under Rajiv Gandhi Gramin Vidyutikaran Yojana through renewable energy so far. The renewable resources energy ministry is working to extend this programme to cover another 2700 villages (*Economic Times*, 11 September 2007).

RURAL ROADS

The ambitious rural road connectivity programme of the government recorded a dismal performance in 2006–7, falling short of the target by nearly 54 per cent. According to the targets under the Bharat Nirman programme, nearly 35,182 km roads were to be constructed during the year. The total sanctioned amount for the Pradhan Mantri Gram Sadak Yojana (PMGSY) for 2006–7 was Rs 38,569 crore, of which the value of work done was less than half, at Rs 18,886 crore. A look at the progress of the PMGSY reveals that only 16,328 km of new roads were laid till February 2007. In addition, work on the upgrade and renewal of the existing roads fell 34 per cent short of the target. As against the target of 54,669 km for 2006–7, only 36,590 km of roads was completed.

The Union Ministry for Rural Development has drafted a vision document for giving direction to the programme for the construction of village roads. The ministry released 'Rural Roads Plan: Vision-2025' in April 2007. The National Rural Road Development Agency (NRRDA) has been monitoring the PMGSY in various states based on standardized parameters. On a state-wise basis, Punjab, Himachal Pradesh, and Orissa appear to be implementing the programme in the best possible manner with over 90 per cent of the completed roads being graded 'satisfactory.' Other states, where over 85 per cent of rural roads satisfy the quality norms set by NRRDA are

Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu, and Uttar Pradesh. The rural development ministry has a standard bidding document (with some scope for flexibility) and has set a maximum time limit for each road building activity. Once the work starts, it is subjected to a three-tier inspection—from in-house quality control by the contractor, to state-level independent quality monitors, and national level quality monitors.

RURAL TELECOMMUNICATION

Far from being unwanted, uneconomical, and unviable, offering telephone services in rural India has suddenly become an attractive business proposition for private telecom firms. The aggressive bids received by the government for its rural mobile project under the USO Fund (USOF) in 2007 point to the fact that telecom service providers and infrastructure providers are falling over each other to be the first one to go where no operator has gone before, something that only the state-owned BSNL was mandated to do till a few years back. Private companies are willing to roll out infrastructure in rural areas at nearly 80 per cent cheaper rates than the subsidy benchmarked by the government. For instance, while the Department of Telecom (DoT) had set a benchmark of Rs 4.02 lakh per year for each tower to be set up in Andhra Pradesh's East Godavari district, it has got bids as low as Rs 2.4 lakh from the likes of Reliance Infrastructure and GTL Infrastructure.³¹

State-owned Bharat Sanchar Nigam Ltd (BSNL) commands a lion's share of rural mobile phone users by virtue of its massive country-wide network coverage. Still, rural mobile penetration is pretty low—just 4.92 per cent—though it has touched double digits in some prosperous states like Punjab, Kerala, and even Himachal Pradesh.

In Bihar, while DoT had set a subsidy benchmark of Rs 4.2 lakh per tower per year in places like Begusarai and Darbhanga, operators are willing to set up units for as low as Rs 1.7 lakh. For the services part of the project, cellular operators have quoted zero amount which means they are willing to offer their services without any subsidy support from the government. Market analysts point out that stiff competition in the cellular market, which has as many as seven operators, and a saturated urban market is forcing companies to look for subscribers in the rural areas.

Leading mobile phone vendors like Nokia, Motorola, and LG have identified Indian villages as their future growth turf. The players are coming up with a number of

marketing innovations targeting mandis, haats (village markets), and rural retail chains to connect the unconnected millions. Handset vendors are in the throes of major brand-building initiatives across villagers through 'touch and feel' experiences. Some vendors, on the other hand, have already ensured distribution tie-ups with rural retail chains—ITC's e-choupal, DCM's Hariyali Kisaan Bazaar, and Godrej Agrovet. A recent Nokia study revealed that mobile phones were a means to overcome infrastructure hurdles. The report also noted that prospective rural subscribers were reasonably heavy users, making an average of 40 calls a month (Nokia 2006).

RURAL BROADBAND CONNECTIVITY

DoT has finalized a five-phase strategy to provide broadband to all the villages using the Universal Service Obligation Fund (USOF). BSNL will cover about a tenth of the 60,000 villages. Private telecom operators will be chosen to cover the rest of the villages. The winner will be decided on the basis of the least subsidy sought through a bidding process. The government is dipping into the USOF to subsidize the projects. Subscriptions will be provided free to the villagers. The move is aimed at utilizing the huge amount of USOF, which stood at Rs 9194.12 crore in March 2007. Telecom operators pay 5 per cent of their adjusted gross revenues towards the USOF which is used to provide telecom services in rural areas (*Economic Times*, 17 August 2007).

DoT has also kick-started discussions with both private and state-owned telecom operators to utilize the USOF for broadband rollout in rural India through a bidding process. DoT's plans include providing broadband connections within a 10 km radius of all block headquarters in the country. It envisages a minimum speed of 512 kbps, where the network connects community centres, primary schools, banks, health centres, panchayats, and police stations located close to all block headquarters.

The project proposes that users be charged only annual rentals with the subscriptions being provided free of cost. In a bid to ensure that the broadband infrastructure created with USO support is utilized to the hilt, DoT has decided to rope in various other government agencies from sectors such as panchayati raj, health, agriculture, and education to jointly evolve a strategy for it. With more tenders in the pipeline, rural India looks set to keep its date of having 150 million telephone users by 2010 from less than 20 million currently.

BSNL has already brought 600 towns under broadband coverage and plans to add another 900 by the end of

³¹ See paper on 'Application of Descending Auction Bidding Model to Telephony in Rural India' by Rekha Jain and G. Raghuram in chapter 4 of this report.

2007. The government is also planning to extend broadband coverage to all secondary and higher secondary schools and public health care centres by 2010.

India's plan to cover all its six lakh villages with broadband connectivity in the next three years has kick-started with BSNL shortlisting equipment vendors for the first phase of its share in the Rs 4000 crore project. The project has already got a funding of Rs 170 crore from the Department of Information Technology (DIT). For the second phase, BSNL will get Rs 160 crore assistance. These villages are part of 1000 blocks where BSNL is the only service provider and the rollout is expected to be completed by June 2008.

CONCLUSION

India has made considerable progress in the past decade in attracting private investment into infrastructure: first in telecommunications, then in ports and roads, and most recently in airports and container freight. But progress in other sectors is painfully slow.

There is a broad positive correlation between GDP growth and infrastructure spending (as measured by the annual share of infrastructure spending in GDP) in India in the post-independence period up to 1994. As to the causality of this relationship, what is evident is that each time growth has faltered on account of drought, foreign exchange crisis or political upheaval, infrastructure spending as a share of GDP has invariably suffered (Lall and Rastogi, 2007). India's Planning Commission, in its approach paper to the 11th Five Year Plan, acknowledges the gravity of the problem and calls for infrastructure spending to rise to 8 per cent of GDP in the period 2008–12 from 4.6 per cent achieved in 2005–6.

According to the Indian government, the country needs US\$ 320 billion in infrastructure spending over the next five years (close to half of that will need to come from the private sector) to maintain the current growth rate and to bring millions of Indians out of poverty. Even that may not be enough. The Parekh committee recommended that the infrastructure spending target be lifted another 48 per cent to US\$ 475 billion (GoI, 2007a). Public figures who used to be suspicious of profit-seeking companies are increasingly calling for PPPs, realizing that that is the only way they can get power, roads, and ports to the people, given the limits of government funding.

Few sectors of India's economy have undergone as dramatic a transformation in recent years as the telecommunications industry. Driving it on is the race to move from the traditional fixed-line voice market into the more profitable mobile phone, broadband, and soon to be launched IPTV businesses with the aim of

delivering convergence triple play packages of data, voice, and eventually TV across India. Despite the government limiting 74 per cent in the sector, it has been growing at break-neck speed and offering the cheapest services to users.

WiMax, a long-range radio network technology is being branded to provide broad based service to all when the current spectrum crunch gets abated. It is estimated that the WiMax technology would increase the demand for broadband in areas which do not have the required infrastructure such as in rural India.

However, overall rural penetration remains way below the 43.88 per cent mobile density in urban areas. Rural India represents the next big growth opportunity for mobile services operators. Of the next 250 million users who will buy mobile phones, as many as 100 million will come from rural India. Keeping this in mind TRAI has asked the Department of Telecom to sanction incentives for the roll-out of mobile networks in rural India. In its recent recommendations on licensing reform, the regulator has asked the government to incentivize rural networks by reducing access deficit charges levied for development of rural networks.

Of all the infrastructure bottlenecks that threaten to derail growth, availability of quality power at the right price is one that has been talked about the most. Power sector reforms are moving at snail's speed in nearly all states except in Delhi, Orissa, Gujarat, AP, Karnataka, and Tamil Nadu. In the minds of the consuming public, privatization has only been associated with higher tariffs with no improvement in reliability of power supply (which is subject to shortages because of limited generating capacity) (Lall and Rastogi, 2007). But, there are signs that the Delhi privatization is going to bear fruit soon not only in terms of the quality of power but the price at which per unit of electricity will be available to different types of users.

New government initiative in the power sector includes launching of a campaign by all states against power theft, along with setting up of special courts for disposal of such cases; creating a professionally-managed National Power Project Management Board attached to the Central Ministry of Power; setting up a Standing Group of Power Ministers to look into all issues affecting the sector, and a sub-committee of this group to work out the financing aspect of creating additional power generating capacity in the country.

The government's proposed new hydropower policy seeks to balance the need to attract developers to harness the country's hydropower potential and the states' prerogative to generate revenues from their natural resources. By moving away from a tariff-based bidding system to a cost-plus tariff, the government hopes to de-risk

developing hydropower projects. At the same time, it plans to invest in developing the areas affected by the project, thereby addressing the issue raised by the states.³²

The telecom sector saw explosive growth only after the regulator moved away from cost-plus regulation to competition regulation in 2003. The regulator and the government also moved to lower levies, adopting a technology agnostic stance and delivering a level playing field. Investments shot up and the private sector's network presence expanded from 20 per cent in 2003 to 70 per cent today. Even public sector services grew much faster after that. Similar to the telecom sector, the high growth trajectory for civil aviation is underway. Once the entry of low cost airlines forced air fares down, unprecedented growth in domestic air travel was unleashed creating a new constituency for reforms in this sector³³ (Lall and Rastogi, 2007). The 'Vision 2020' prepared by the Ministry of Civil Aviation will provide air connectivity to almost all million plus cities. With the AERA Bill coming into force, we may see exponential growth in the aviation sector.

The function of AERA would be to determine tariff structure for aeronautical services taking into consideration capital expenditure incurred and timely investment in improvement of airport facilities, service provided, its quality and other relevant factors, cost of improving efficiency, among others. Besides, it would also determine the quantum of development fees for major airports, determine passenger service fee to be levied under the Aircraft Rules, monitor the performance standards relating to quality, continuity, and reliability of service and also call for information as may be necessary to determine the tariff.

After private roads and ports, developers are keen to invest, own, and operate niche airports across the country. The merchant airport policy is likely to be finalized by the end of 2007. Cargo specific small airports can be built with a small investment of Rs 200 crore and can be operated efficiently.

The momentum of NHDP under which highways are being developed across the country seems to have picked up once again after the government vested in NHAI authority to sanction projects worth up to Rs 500 crore without going through the PPPAC. PPPAC is an inter-ministerial committee that has to approve infrastructure projects (being taken up on a PPP basis) before the bids are invited by the ministry concerned.

Major ports have not attracted any investment due to stalemate among ministries over the model concession

agreement with respect to bidding parameters to be used. But, maritime states such as Gujarat, Maharashtra, and Tamil Nadu are keen to develop their maritime potential and Gujarat has attracted many private port developers to develop minor ports in the state.

A port combined with an SEZ is gaining currency. MPSEZ is one of the first port-based multi-product SEZs in the country to have a seaport with an additional container terminal, railhead, and airstrip. MPSEZ is developing and managing one of the leading non-captive private sector ports in India, based on volume of cargo, along with a multi-product SEZ.

The rationale behind India's SEZ policy is simple; inadequate infrastructure continues to dog manufacturing units in India, constraining their capacity to compete overseas in export markets and deterring foreign companies from setting up manufacturing base in India. Since establishing world-class industrial infrastructure throughout India is a Herculean task, the next best solution is to build pockets of infrastructural excellence in the form of SEZs. By offering various incentives to private developers, the government is also attracting private investment for setting up such zones, easing the financial burden of the task.

After achieving the turnaround, the Railways is pursuing development of their realty assets around stations. New look stations and freight stations are being designed to provide facilities to attract more customers as well as develop logistics parks. The Railways is keen to provide rail connectivity to all parts of the country and is ready to compete head on with roadways as well as air freight.

The Delhi-Mumbai Industrial Corridor is slated to be developed with Delhi-Mumbai freight corridor as its backbone. The corridor's feasibility report includes upgrade of key airports, setting up food processing parks, one or two ports on the west coast, and power plants. The corridor will encompass many SEZs, for which tax sops are offered by the government. The project, when fully implemented, will boost the manufacturing sector in Delhi, Uttar Pradesh, Rajasthan, Maharashtra, Madhya Pradesh, and Gujarat. The US\$ 100 billion investment estimated to be required is not part of the estimated US\$ 320 billion that the country requires in the infrastructure sector during the 11th Plan. Besides the government, private players as well as foreign funding will be tapped for completing the project.

Concerned about the high dwelling time of vessels at major Indian ports, the shipping ministry is mulling

³² Hydroelectric power plants which are of storage water variety require rehabilitation of project-affected people. The GoI has directed the states which want to develop hydroelectric power plants that they should spend a substantial amount on the project-affected population so that the project may be developed smoothly without any resistance and agitation from the affected people.

³³ More than half of the passengers using Deccan Airways, for example, are first-time air travellers.

over the possibility of extending the reach of the dedicated rail freight corridor to these ports to enable transporters to operate their fleet round-the-clock, leading to faster movement of cargo, reducing dwelling time and per unit transport costs. At the moment, the freight corridors are proposed to be linked to the four metro cities and linking the ports of Mumbai, Kolkata, and Chennai. The MoSRTTH has proposed to link the freight corridor to all twelve major ports, including Vizag, Cochin, and Kandla, among others. The ministry feels that such a linkage would bring down the dwelling time of cargo vessels, which is currently around thirty days, resulting in loss of revenue for stakeholders as well as choking of ports.

One of the most ambitious urban regeneration projects—Dharavi Development Project—has started on an encouraging note as many developers have shown interest in the project. Its full development will be watched and scrutinized by many in the years to come. UMTS of almost all metropolitan cities—Delhi, Mumbai, Kolkata, Hyderabad, and Chennai—are at different stages of development. Positive response to Delhi Metro by the

public and its beneficial impact on the city's environment has attracted other metro cities to go for rail based UMTS.

Travelling in Mumbai could become convenient as the Government of Maharashtra (GoM) is planning to set up a unified metropolitan transport authority that would issue a single ticket for various modes of transport. An Urban Transport Management Authority as mooted by the central government will be set up by 2015, when metro rail, water transport, and a network of bridges would be in place, to bring about an integrated fare structure.

Notable among the highlights of the year 2007 has been the reconfirmation that rural as well as urban consumers want quality power rather than subsidized power. Three UMPPs have been awarded to private sector. Rural mobile telephony has taken off in earnest. Minimum subsidy bidding is found to be a better way to provide infrastructure services using PPP than administrative controls. Incipient shortage of skilled construction workers and competition among IT companies and engineering firms to attract engineers, suggest that PPP to build infrastructure projects has gained sufficient maturity in the country.

REFERENCES

- Dubash, Navroz K. and D. Narasimha Rao (2007). *The Practice and Politics of Regulation: Regulatory Governance in Indian Electricity*, Macmillan India, New Delhi.
- GoI (2007a). *The Report of the Committee on Infrastructure Financing*, Ministry of Finance, Government of India, New Delhi.
- (2007b). *Economic Survey 2005–6*, Ministry of Finance, Government of India, New Delhi.
- Lall, Rajiv and Anupam Rastogi (2007). 'The Political Economy of Infrastructure Development in Post-independence India', IDFC Occasional Paper Series 2007/1, Infrastructure Development Finance Company, Mumbai.
- MoP (2006). *Study on Impact of Restructuring of SEBs*, Ministry of Power, Government of India, New Delhi.
- Nokia (2006). *India's Mobile Market*, New Horizons 1/2006, Nokia.
- Planning Commission (2006). 'Towards Faster and More Inclusive Growth, An Approach to the 11th Five Year Plan (2007–12)', Planning Commission, Government of India, New Delhi.
- SEBI (2007). 'Report and Recommendations of the Committee on "Launch of Dedicated Infrastructure Funds by Mutual Funds"', Securities Exchange Board of India, Mumbai (R).
- TRAI (2007a). Press Release No. 27/2008, Telecom Regulatory Authority of India, New Delhi.
- (2007b). *Quarterly Performance Indicators of Telecom Services for the quarter ending March 2007*, Telecom Regulatory Authority of India, New Delhi.
- (2007c). 'Review of licence terms and conditions and capping of number of access providers,' Consultation Paper No. 7/2007, Telecom Regulatory Authority of India, New Delhi.
- (2007d). Implementation of National Do Not Call Registry, Press Release No. 78/2007, Telecom Regulatory Authority of India, New Delhi.