



Image Source: Dhiraj Singh | Bloomberg

A Relook at Infrastructure

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The cost and reliability of electricity and logistics is a major drag on our manufacturing ambitions, and sewage from our cities is killing our rivers. Yet, infrastructure has fallen off the policy radar, despite the continuing challenges – evident most vividly in the financial sector's non-performing assets. What is wrong and how can we fix it? We outline the key actions that need to be taken in the major sectors to make the sector financially viable and support our economic goals.

Electricity

Today, when our installed capacity is a multiple of our expressed demand (although the expressed demand may be less than our need), the objective of 24X7 power supply to consumers – whether industrial, residential or commercial – at efficient and competitive prices, should be within reach. What is stopping us?

Many of the challenges in power have been addressed elsewhere in this document by other colleagues, so I will be brief here. Renewable energy capacity in India has grown rapidly – as befits the progenitor of the International Solar Alliance. Installed capacity of wind, solar, small hydro (less than 25MW) biomass and other such sources have grown seven fold from 11,125MW (8% of grid capacity) in March 2008 to 77,642 MW (22% of grid) in March 2019.

The share of generation from these sources is now 9%. Yet, the share of thermal sources, primarily coal, remains at 78% - except that it now operates at an inefficient 60% plant load factor instead of 74% in 2008. We have been running to stay in place. The rising share of renewables has replaced the lack of growth in large hydro sources, an outcome which may admittedly have other environmental benefits.

Integrating the full spectrum of non-fossil fuel resources into the grid is thus more difficult than just increasing capacity of renewable sources. So, we may get to our 175 GW capacity target and yet not achieve much in terms of transforming the carbon-intensity of our electricity supply.

Gas plants, the vaunted mitigators of climate elsewhere, remain almost unutilised – running at just about one-fifth of their capacity, less than half of the levels ten years ago, largely because current tariff and access regimes make them uncompetitive and they have no fuel supply. Our troubles with domestic gas exploration – KG D-6 for example – has led to relative stasis in gas-related investment. Even as the LNG market is being increasingly delinked from oil, with recent prices in Asia dropping to multi-year lows¹, our terminals remain underutilised and under-connected. A world where a gas plant can import fuel, land it at a convenient terminal and transport it to its plant by paying an access charge to a network operator seems very far away.

There is one root cause: DISCOMs that do not collect money for power they sell. This one cause has many other manifestations – protective regulators who are reluctant to allow open access, tariff regimes without time-of-day prices, overgenerous feed-in mandates for renewable power, lavish cost-plus tariffs for legacy centrally owned plants with priority power purchase agreements with states, etc.

Given the complicated mess that our power sector has been in over the past many years, spanning all governments, transcending this will need a number of actions, across the generation, transmission and distribution segments. I advocate three, focused on tariffs.

First, industrial and commercial tariffs need to fall, leading, hopefully, to a spurt in jobs. They are much more than the cost of supply, ostensibly to

subsidise residential and agricultural consumers. We cannot kill industries to keep DISCOMs alive. The network has the technical capacity to achieve this objective – especially for industries that receive power at higher voltages. DISCOMs have used their universal supply mandate as an excuse to prevent industries from accessing competitively priced power. Allowing DISCOMs to procure incremental power and supply them at competitive prices to paying industrial consumers is within the power of the state governments. The alternative is open access – part of our electricity legislation for several years – but limited in its application by our state electricity regulators, which is result of a short-sighted approach to protect DISCOMs.

Second, residential and agricultural tariffs can be rationalised, and in some segments, raised. In the era of direct benefit transfers and income support schemes, price subsidies have outlived their utility. The reduction in fiscal support to the DISCOM can be redirected to targeted consumers as a cash transfer, to insulate them from the effects of the rise in tariffs. A more rational tariff regime may also lead finally to complete metering (one can trace exhortations to meter all feeders back to twenty years ago), and a credible accounting of electricity consumption.

Third, we need to extensively expand time-of-day pricing. Today, those that consume low cost base-load power bear the burden of higher-price peaking (and other) power because of averaging of tariffs. This is being debated for a long time and is even used in some segments in some states. It can also make the gas plants, at a time of low LNG prices, competitive, reducing our carbon footprint.

These tariff actions will create the enabling conditions for ensuring that our grid is no longer bankrupt. There will still be much work to revitalise DISCOMs and address the hysteresis of long years of embedded political economy constraints, before they can be made viable. But, this is a better way than UDAY and the creation of a national

distribution company, which is akin to a heart bypass, without changing unhealthy habits. At most, if necessary, the Central government can support the states in DISCOM reform by advancing bridging loans to tide over revenue shortfalls in the initial stages, if any.

There are many other areas for action. These include enabling a network that can integrate renewable power at the scale it is being envisaged; rationalising and modernising our coal plants – the capacity glut allows us to take some of them offline, temporarily, or even permanently, if necessary; streamlining our gas pipeline grid and pricing to allow gas plants to compete and provide balancing capacity for a renewable heavy grid, etc., etc. There are also many actions that need to be taken to grow an energy-related manufacturing sector. But, all of that is only possible when the final cash-generating end of the sector – distribution – is viable and healthy. It is time we took this head on.

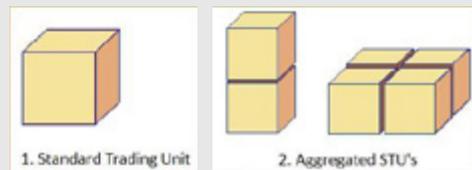
Telecom

The telecom sector, bar one firm, seems to be struggling despite increasing use, so much so, that one wonders whether the public monopoly before telecom liberalisation will return in a different avatar. Despite rapid growth and the spread of smartphones, we are yet to ensure that a seamless network covers our country with both reliable data and voice. Why are we in this situation?

One major reason is that spectrum is mispriced. It should be virtually free in sparsely populated rural areas. Unless there is congestion, there is no reason to price it. Yet, our current spectrum pricing model makes rural spectrum as expensive as that in cities. This is because Licensed Service Areas (LSAs) are congruent with telecom circles, i.e., states, mixing areas that are both abundant and scarce in spectrum. This does not allow rural spectrum to be separated and affects

spectrum availability across the LSA. Auctions are not necessarily efficient if the good being sold is incorrectly bundled. Instead, spectrum needs to be defined in much smaller geographical units (see Box).

Example of Standard Spectrum Trading Unit from Australia



The Australian Communications and Media Authority (ACMA) permits spectrum space to be traded in terms of standard Spectrum Trading Units (STU). These STUs may be visualised as a cube. Its base covers a geographic area (length and breadth), while bandwidth is measured vertically. The geographic area is uniform and defined by ACMA (5 minutes by 5 minutes of arc, approximately 9x9 km) as a cell of its spectrum map grid. The frequency bandwidth of an STU is set at 1 Hz for all spectrum licence bands. Though a single STU may not be useful, its regular shape allows it to be combined with neighbouring STUs vertically (to provide increased bandwidth) or horizontally (to cover a larger area). Such an aggregation of spectrum space allows spectrum licences to be combined and subdivided. Every spectrum licence has a specified minimum contiguous bandwidth (MCB). Although an STU is the minimum amount of spectrum that can be traded, trading may be restricted if an STU does not meet the MCB.²

Source: https://www.acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Spectrum-licences/spectrum_21

If one moves to define and sell spectrum over smaller geographical units, aggregate revenue may remain the same but places with excess spectrum may get more service providers. But, even if it falls, one must question whether the rationale for spectrum allocation is to raise fiscal resources or whether it is to expand connectivity across the country.

Another reason is that telecom services may be priced below economic cost, an issue for the sector regulator and Competition Commission of India to examine. If even the growing firm is sustained more by infusions outside the sector than its own surplus, then, as 5G becomes the global standard, we may find that Indian telecom sector is too under-resourced to adopt the new technology. This would not be a good outcome. Cheap prices now is too high a price to pay for outdated technology later.

Finally, our Universal Service Obligation Fund was supposed to bring data to our rural communities and transform their access to education and health. Yet, instead of schoolchildren learning from high bandwidth digital content, they are addicted to low bandwidth social media separating one from the other.

Logistics

Twenty years ago, the government levied a rupee of cess on petrol and diesel, to fund national highways, rural roads and, lest one forget, rail-over bridges. The humble but path-breaking cess of 1999 is now the monster eight-rupee road and infrastructure cess that no one protests paying. Why, then is our logistics still so outmoded?

Highways

There has been substantial investment in highways in the last administration. The adoption of models like Hybrid Annuity reversed a slump caused by concession models that transferred excessive risk to the private sector, who, regardless had bid

aggressively for projects. Public sector banks lent to them on the back of projected cash flows that never materialised. Post the 2008 Financial Crisis, banks were left holding unfinished projects. Most of these have now been restructured and restarted. However, the sector still needs to solve three challenges:

- (a) Barrier free movement for freight road traffic – trains, after all, are not stopped at state borders
- (b) Ensuring maintenance of the national highway network
- (c) Avoiding white elephant highways, while retaining an appropriate risk-reward framework

For a long time, open road tolling was not possible because offenders could not be identified, absent a national vehicle number database. Now we have one – VAAHAN – and we have e-way bills too. We should remove all our toll plazas and move to toll gantries, beginning with high traffic routes.

For highways on the BOT model, on annuity or hybrid annuity concessions, there is a built-in mechanism to penalise operators for poor maintenance. Is that working? What about highways on a BOT-capital grant model or those being tolled by NHAI? As the highway network expands and begins to age, a transparent mechanism to monitor and maintain the quality of roads needs to be rolled out.

Finally, hybrid annuity models do not transfer traffic risk to the private concessionaire. As the network grows beyond the obvious congested routes, there is a risk that roads will get built where there is no traffic, even in the near future. To forestall this, we should switch to concession models that limit the transfer of periodic traffic risk, but still retain transfer of lifetime traffic risk – like Least Present Value of Revenue models. For this, we need to familiarise our financial institutions with such methods.

PMGSY: Rural Roads

The construction of 600,000 plus kilometres of rural roads, over the last twenty years, across governments of different political persuasion is testimony to the consensus over rural connectivity. Many states now have supplementary rural roads programmes financed from their own budgets. It has undoubtedly played a major role in moving our workers off the farm, to new activities and locations. The maintenance of this network should now be our primary concern. The initial PMGSY contracts had a built-in maintenance period, many of which have now concluded. An institutional mechanism to maintain the PMGSY network needs to be put in place. One model can be the performance based CREMA contracts of Argentina, broadly similar to the initial PMGSY contracts, but for rehabilitation and maintenance, with penalties for not meeting performance outcomes.

Railways

Even the lowest tariff freight train makes more money than the Rajdhani. We need to shift the conversation around Railways from passenger to freight – a critical logistics function essential to support manufacturing. Currently, track capacity is exhausted running passenger trains. In the short term, it is necessary to: (a) prioritise signalling investments on a war-footing to expand capacity and (b) rationalise passenger trains, by combining capacity and retiring trains.

In order to determine which trains to retire, the Railways needs to develop the ability to cost each train, which it currently does not do. The passenger subsidy numbers bandied about are an artificial construct and an over-aggregated exercise. Developing this costing methodology is a priority.

The Dedicated Freight Corridors should also free up capacity by taking traffic away from existing lines. The transport of coal, which still makes up about half

of Railway's traffic, will slow down or even decline as coal power is reduced and produced progressively at the pithead. Can Railways fill this freed-up capacity with other cargo, containerized or otherwise, and with revenue generating passengers? Can it become a logistics company from a mere transporter from one station to another? The strategy that is chosen will have implications for number and types of locomotives and rolling stock. The e-commerce parcel segment is a good way to start this transformation. It will force the Railways to deal with inter-modality, a necessary ingredient for its medium-term survival.

Suburban passenger services are urban public service obligations. This activity needs to be separated and costed. Then it should be funded separately, as for example the urban metro rail projects.

Finally, the Indian Railways needs financial engineering. Today, a huge portion of its revenue is spent on pension benefits for its retirees. This is an obligation that will progressively reduce over time, as the effect of the National Pension Scheme begins to show. Railways can restructure this predictable liability to reduce its current expenditure and free up resources for investment.

Ports

Today, JNPT is quite possibly no longer the Indian port that handles the most containers. That position is likely held by Mundhra, a port owned by the Adanis, connected by a joint venture rail track to the Delhi-Mumbai rail corridor. Mundhra has an unfair advantage – it can decide its prices, JNPT cannot. The tariffs at our major ports (i.e., those owned by the Union government) are determined by the Tariff Authority for Major Ports (TAMP), an anachronistic holdover in a competitive sector. The Tariff Guidelines notified this year are a far cry from the price flexibility that Mundhra enjoys.

Not only are the tariffs rigidly determined, the structure of our major port concessions are designed to make it costly for our traders to transport. Between a third and a half of the tariff is shared with the government, depending on the port and berth, since the gross revenue share is the bid parameter. It means that tariffs could be reduced by half in some cases and the port would still be viable. Like spectrum, this is again an instance where the urge to raise fiscal resources prevailed over the need to ensure competitive logistics costs for our industry. It is time to take three actions.

First, disband institutions like TAMP, treat ports as a competitive sector, with tariff freedom for operators and improved competition oversight. This should be accompanied with a move away from a revenue share concession structure to a fixed concession fee.

Second, invest in port connectivity to spur inter-port and intra-port competition. The rising share of non-major ports indicates that there is growing inter-port competition, even with problems in road and rail connectivity. Added to this is intra-port competition, when there are multiple operators in a port.

Third, we need to re-examine our approach to coastal shipping. Our eastern ports, together with ports in Bangladesh, Myanmar and Thailand, can act as a sea-bridge to our northeast and integrate our industry with South East Asian value chains. The Bay of Bengal will buzz with crisscrossing ships.

Together, these actions, across road, rail and ports, along with regulatory action and investment to facilitate multi-modal transport, will reduce our logistics costs and make industry more competitive.

Water Treatment

Every major city in India kills at least one river. Even as Chennai dries and Mumbai drowns, Delhi blithely pollutes the Yamuna. Our farms mismanage water

and our cities poison it. Yet, with the possible exception of the National Mission for Clean Ganga, there is little programmatic effort – like the National Highways Authority for India for highways – to preserve our rivers and water bodies.

This is not just a matter of building sewers and sewerage treatment plants – a significant portion of such treatment capacity lies unused. We also need to consider the reckless destruction of even groundwater resources by industries that dispose their waste underground, aided by incapacitated pollution control boards – the corridor from Vatva to Vapi rivals the worst polluted areas of China – and the damage caused by chemical run-off from overuse of pesticides and fertilizer in agriculture.

More than inland waterways, river inter-linking and large dams, we need focus on wastewater.

The Digital Future

Even as we address these basic issues, digital technologies are changing the way infrastructure is provided, operated, charged for and maintained across sectors. These technologies permit services to be delivered more efficiently, less expensively, use less resources, cause less damage to the environment and reach a wider user base. This will not happen automatically or quickly but the process can be accelerated with an appropriate mix of regulatory mechanisms and financing tools.

The availability of funds is not the constraint that will restrain growth of digitally enabled infrastructure. The challenge is to design projects to balance risk and reward in a way that providers are incentivised to serve users well, while financiers are insured from the realisation of uncontrollable risks.

One such financial risk is the fast-obsolescing nature of these technologies, where yesterday's cutting edge is tomorrow's discard. This structural

risk can slow down the adoption of socially beneficial technologies. Slow adoption can also be engineered by those who will lose their investments from new technologies. This will need public action in terms of financing models and regulatory oversight.

Conclusion

Our infrastructure models are still operationally inefficient, financially fragile and future-unready, both

in terms of technology and the environment. For too long – across governments – we have focused on making money from infrastructure rather than seeing it as a service that can power growth and enable the transformation of India. If we did manage to convince our private sector to invest enough to get us to 8%+ growth, we will hit a wall of infrastructure constraints. We have lived too long off our earlier investment in the past few years. We cannot do so any longer.

END NOTES

1. Henry Hub, the US local benchmark and increasingly an alternative basis, vis-à-vis oil, for export pricing, has stayed below USD 3 per mmbtu for three fourths of the time over the last five years.
2. This is to avoid situations where spectrum trading leads to licences that are too small to be practical, resulting in inefficient use of spectrum and unnecessary administrative costs.