Promoting India's Energy Security

Good infrastructure is a pre-requisite for accelerated economic growth. The Chinese economy is a testimony to this basic truth. China has been growing at almost double digit growth rates mainly because of the focus the policy makers there places on strengthening infrastructure.

India's economy too has been, lately booming at the rate of about 8-9% but it is universally believed that the growth rate could be still higher if we could assure good quality infrastructure – ports, roads, rail network, power, etc – to the constituents of the Indian economy.

Amongst all the infrastructure segments, power is considered most critical. And unfortunately, it is in this segment that India has been faltering a great deal – both in terms of policy and performance. Never has it been so apparent as in the case of the serious shortfalls in the attainment of the Tenth Plan targets.

Performance of the power sector during the Tenth Plan

The Tenth Plan initially placed the target for capacity addition at 41,110 MW. The target of 41,110 MW was subsequently scaled down to 36,956 MW at the time of the Mid-Term Appraisal.

However despite the scaling down, the likely achievement during the Tenth Plan period is only expected to be around 23,250 MW, which is 57 per cent of the original target and 63 per cent of the target in the Mid-Term Appraisal.

Tenth Plan target achievements – by ownership

By type of ownership (Table-1), the shortfall (73 per cent) was the highest in the private sector, while by type of plant (Table-2), it was the highest (43 per cent) in hydro plants.

Table – 1: Tenth Plan targets and achievements in power sector (by ownership)

(in MW)

	Target		**Additional Capacity : Status**		
	Original	**Mid-Term Appraisal**	**Commissioned**	**Under execution**	**Overall anticipated**
Central	22832	19817*	11115	2610	13725
State	11157	12240	5460	2135	7595
Private	7121	4899	1931	0	1931
Total	**41110**	**36956**	**18505**	**4745**	**23250**

Table – 2: Tenth Plan targets and achievements in power sector (by type)

(in MW)

	Target		**Additional Capacity : Status**		
	Original	**Mid-Term Appraisal**	**Commissioned**	**Under execution**	**Overall anticipated**
Thermal	25417	23261	10129	3535	13664
Hydro	14393	11125	7196	990	8186
Nuclear	1300	2570	1180	220	1400
Total	**41110**	**36956**	**18505**	**4745**	**23250**

The alternatives

The growing demand for power accompanied by the shortfall in supply clearly demands a re-look at our power sector. Out-of-the-box solution need to be conjured to ensure that power (rather its non-availability) does not become a hindrance to accelerated growth. The power scenario also needs to be looked at in its wider perspective. It's not power security alone – but energy security that India has to strive for.

At present, coal is the mainstay India's power sector, with 54.2 per cent (69,199 MW) of total installed power generation capacity in the country – i.e. of 1,27,673 (MW) as of December, 2006 in coal-fired thermal units.

Trends in power sector (utilities only)

With around 67 per cent of total power generation coming from coal fired power stations, the power sector is the major consumer of coal in the country – absorbing around 78 per cent of the country's total coal production.

In the past, coal has been imported for blending by the power stations to maintain the environmental stipulations regarding use of coal of less than 34 per cent ash content, and also occasionally supplementing supplies from indigenous sources.

To augment power generation, the Ministry of Power, Government of India has recently launched an initiative for development of coal-based Ultra-Mega Power Projects (UMPPs) in India – each with a capacity of 4,000 MW or above.

Sassan and Mundhra have already been awarded, and the recent budget (2007-08) has said that two more will be offered by July 2007. But these initiatives for power itself necessitates never solutions.

Trends in Gas availability in the Power Sector

(In MMSCMD)

Year	Required*	Gas in MMSCMD	Shortfall	Estimated Generation Loss in BU
(1)	**(2)**	**(3)**	**(4)= (2)- (3)**	
2000-01	44.54	24.40	20.14	33.0
2001-02	46.31	4.33	21.98	36.1
2002-03	48.26	25.12	23.14	38.0
2003-04	49.25	25.62	23.63	38.9
2004-05	49.73	30.70	19.03	31.2
2005-06	53.38	35.37	18.01	23.88
April-October 2006	53.45	34.28	19.17	18.43

*Generation loss calculated by considering the demand-supply gap of gas at 90 percent OLF, Gross Calorific value of gas = 9000 Kcal/SCM, station heat rate = 2000 Kcal/KW hr. and no generation made using liquid fuels.

Note: MMSCMD – million metric standard cubic meter per day; BU – Billion Units

There is no doubt that India faces a formidable challenge in meeting its energy needs in a sustainable manner, and at reasonable costs. The current level of per capita consumption of energy in India is one of the lowest in the world. India consumed 0.53 tonne of oil equivalent (TOE) per person of primary energy in 2004, compared to 1.25 TOE in China and the world average of 1.77 TOE. The per capita consumption in the US was 7.91 TOE. To deliver a sustained growth rate of 8% to 9%, India will thus have to face the energy challenge head on.

It will have to be as innovative as some countries like France and Brazil have been augmenting energy supply. It may be recalled that when the first oil crisis occurred in 1973, France – which is not endowed with oil reserves, embarked on the path of nuclear power development; while Brazil- which does not have the natural resources necessary for large-scale conventional thermal power plants, invested heavily in hydro-electricity. Presently, France and Brazil meet about 40% of their primary commercial requirements from nuclear and hydro-electricity, respectively.

India too will have to look at other energy options, especially in the wake of stagnation in production, growing import dependence, and fluctuating global prices of crude oil.

Gas and nuclear energy seem the interesting options. However while new finds of Gas reserves are no doubt being announced, the pricing still remains a contentious issue.

To augment supply of crude oil, the Government is also encouraging acquisitions abroad. The Government is pursuing gas imports through pipelines from Iran via Pakistan and from Myanmar via either Bangladesh or the North Eastern States. But, given the geopolitical environment in the region, these projects are still facing uncertainties.

Besides, although the 2005 Indo-US Agreement on civil nuclear co-operation, is expected not only to give India access to US nuclear technology and fuel, but also strengthen India's energy security by ensuring adequate supplies of nuclear materials from other members of the Nuclear Suppliers' Group – it has triggered off a great deal of debate about the actual benefits from this treaty.

Given this scenario, it can be inferred that apart from traditional sources, India also needs to more aggressively look at our non-conventional energy sources.

Non-conventional energy sources:

For true Energy independence, a major shift in the structure of energy sources from fossil to renewable energy is mandated. India must focus with renewed efforts on renewable sources like solar energy, hydro-electric power generation etc.

During the last two decades, there has been a vigorous pursuit of activities relating to the development, trial and induction of a variety of renewable energy technologies. However, there is still considerable scope for us to experiment with a variety of energy sources outlined below:

- India could tap the technologies now available for generating power from municipal waste. The electric power generation and creation of clean environment would be the twin advantages.
- Biomass (i.e. the use of agricultural residues as fuel in conventional gas turbine technology, for power generation) is the most versatile of renewable energy systems. Two types of biomass-based systems are typical: cogeneration systems in sugar mills (bagasse as fuel); and stand-alone systems, which may burn residues directly, or gasify them into biogas. The abundant availability of cheap agricultural residues across the country, makes them particularly attractive for rural applications. Biomass systems in rural areas can also serve multiple energy needs (e.g. biogas can be used for cooking and for generating electricity).
- Wind power. So far the historical experience with wind farms in India has been poor. The policy measures that led to the initial wave of wind farms were high on upfront subsidies and low on performance incentives. This led to poor location of farms, and reduced equipment life.

Nevertheless, the historical experience of wind ought not to be a basis for future projections of performance. New policy measures must be developed based on lesions learned to exploit more fully the technology's potential.

Energy conservation

Simultaneously with a focus on non-conventional sources, India must also pro-actively promote energy conservation.

Energy audits

Emphasis should be placed on carrying out stringent Energy Audits to identify areas where there is maximum opportunity to reduce losses, and thereby collect more revenue.

Focus on demand-side management

Extensive consumer awareness campaigns on energy conservation measures need to be undertaken. Maharashtra has succeeded in this area through its Akshay Prakash Yojana scheme. This is a scheme under which a village (Goathan) can avoid load shedding in the evening by reducing the load voluntarily to 20% of the existing load. About 500 villages in Western Maharashtra have already adopted this scheme and are thus free from load shedding in the evening. The scheme can be replicated all through the country.

Energy saving can also be effected through other means. From experience in other countries, the most obvious candidate for peak load reduction are Compact Fluorescent Lights (CFLs), and T&D loss reduction schemes. The energy saving potential of both these options has been recognized, but the peak reduction benefit has been under-estimated.

Replacement of incandescent (GLS) bulbs with Compact Flourescent Lights (CFLs) is one of the most popular (DSM) measures in the world, due to its assured savings. The reason is that CFLs represent a win-win-win situation for all stakeholders: Industry, Utilities and Consumers. Light manufacturers profit more from the sale of CFLs than from that of GLS bulbs. Utilities stand to gain significant capacity deferral benefits from peak reduction. And, consumers see significant reduction in their monthly bills.

Other steps like the Single Phasing scheme for providing nearly 24 hr electricity in all towns and villages; use of energy efficient pumps and installation of capacitors; curbing theft; encouraging captive generation; encouraging captive generation; encouraging the private sector in generation/transmission to meet the large investment requirements etc; are the other measures which need to be adopted.

In sum, the self-sustaining growth of the power sector and its financial viability is essential for the speedy and sustained socio-economic development of the country. A healthy power sector alone would pave the way for further industrialization, increase in agricultural production, and economic growth.

Reference book:

Electrical India,
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