An Alternative Energy Plan for the Konkan

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The proposal to generate nearly 20,000 megawatts of power by building new power plants on a narrow strip of the Konkan coast is a recipe for an ecological and social disaster. The government should learn from the past experience of such coal-based power plants, reassess the true demands for energy and encourage ecologically sustainable planning, which will also benefit the local people. Such alternatives are already available and have been demonstrated to be workable but is the government listening?

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The proposed plan of the government of Maharashtra to set up new power projects for a total capacity of 19,240 megawatts (MW) along the narrow Konkan coastal strip of the state in the coming five years is going to be a planned eco-social disaster. This area has become an attractive location for new power projects in the state as it is close to both the electricity load centres and the ports to import coal. A total of eight imported coal-based projects with a total capacity of 15,200 MW are planned. These include, amongst others, two 4,000 MW ultra mega power projects (UMPP), one of which has been awarded to Reliance Energy Limited (REL) and a 1,600 MW plant to Tata Power Company (TPC). The proposal also includes a 3,000 MW nuclear project and a 1,040 MW gas based project. The proposed capacity addition of 19,240 MW is about 120% of the existing power capacity of Maharashtra and serious conflicts are emerging at these proposed project locations over the control and use of land, air and water resources.

This note argues that these proposed projects in the Konkan are eco-socially disastrous. The government should ensure that fossil fuel-based thermal power plants are sited at locations that have the least social and environmental impacts and the affected people are compensated in a just manner. It further asserts the importance of increasing efficiency, cutting down transmission and distribution (T&D) losses and theft, least cost planning, demand side management, integrated resource planning (IRP), and renewable energy sources for new power generation to meet the long-term needs of energy self-reliance. Finally, the state should work towards an agro-industrial developmental pathway which is eco-regenerative, decentralised, equitable and democratic.

Need for an Alternative

The first and foremost issue of concern is the impact of such a high concentration of coal-based power plants. These coal-based plants would release huge quantities of hot water and machine oil every day into the sea, adversely impacting the local marine wealth, especially fishery. The de-sulphurisation of coal leads to leaching of acidic waste into the soil and thereon to the drinking water resources. The coal dust and fly ash pollute the air and cause respiratory problems for the local population. The dumping of fly ash would create new wastelands in and around the dumping ponds and can lead to a reduction in crop yields in the surrounding area because of wind-borne fly ash deposition. The consequent pollution would significantly reduce the biodiversity and bio-productivity of the region. It is also important to keep in mind the global implications of greenhouse gas (GHG) emissions and the resultant issues of global warming and climate change.

A look at the environmental impact assessments (EIAs) carried out for the Tata and Reliance plants in Raigad district shows that they ignore the cumulative effects of large power plants coming up near each other, while also being inadequate in many other respects. There is an urgent need to carry out a regional EIA by an impartial agency to estimate the cumulative impact of all the proposed power projects before going ahead with any one of them.

Moreover, most existing power projects have not implemented preventive measures to reduce pollution. Simple equipment like electrostatic precipitators are not installed or, where installed, are not run to save small money, while cooling water is reduced to save on auxiliary consumption and fly ash disposal has been a perennial problem. A walk in the areas surrounding most coal-powered power plants – for example, the one at Nashik (run by the Maharashtra State Power Generation Company) or the Singrauli power plants (run by the National Thermal Power Corporation and Uttar Pradesh Power Corporation) – is sufficient to corroborate this. Similarly, the 500 MW REL power plant at Dahanu, earlier known as the BSES plant, received permission only on the grounds that it will set up a de-sulphurisation plant to remove the SO_2 from the stack gases. Yet BSES, and later

REL, resisted doing so and the residents of Dahanu had to fight several cases in the high court and the Supreme Court to get this done. Even now there are complaints that the spent cooling water released into the Dahanu creek is too hot for fish to survive and that the fish catch has reduced.

Even on economic considerations, the option of imported coal is inferior to options based on Indian coal blocks offered by the central government.[1] Two of the competitively bid power projects in the country, the UMPPs of Sasan and Mundra clearly illustrate this. While the Sasan plant is proposed to be fed by an Indian captive coal mine, the Mundra plant will run on imported coal. Nearly 50% of the tariff in Mundra is directly linked to the cost of imported coal and the difference in levelised tariff is Rs 1.07 per unit.[2]

More importantly, there is a need to change our sanguine approach to coal. There is increasing concern about the future of coal. There are predictions that coal would soon "peak". World-proven coal reserves are decreasing fast and production costs are steadily rising all over the world. In fact, estimates of world coal reserves have been downgraded by 15% and those of coal resources by a shocking 50% between 1980 and 2005 (Zittel and Schindler 2007). If oil and gas depletion too continues at current rates then the world could run out of economically recoverable reserves of coal much earlier (Kavalov and Peteves 2007). This needs to be a central part of energy planning in India; otherwise we are in for an ecological and social disaster combined with growing energy insecurity.

Energy Planning for Maharashtra

The Central Electricity Authority (CEA) estimates the peak demand in Maharashtra by 2012 at 22,000 MW,[3] implying total capacity requirement (including imports from the national grid) of about 27,500 MW.[4] The existing total available capacity is about 18,000 MW.[5] So, even by the CEA's estimate the extra capacity needed is 9,500 MW.[6] Moreover, the CEA's projection is a "business as usual" (BAU) scenario that simply extrapolates trends, and does not take into account the potential reduction in demand possible through immediate improvement in technology or by improving efficiency via institutional and management options and reduction in theft. This "business as usual" approach implicitly accepts and allows inefficiencies to continue and creates unnecessary expansion pressures and uncertainty. What is needed is an IRP approach that does not restrict itself to supply side solutions alone.

Energy saving options through increase in energy efficiency are as important as, if not more than, capacity addition in the IRP method. Many measures such as a shift from electric boilers to gas heated boilers, more efficient air conditioners combined with reduced air conditioning needs and a shift to more energy efficient pumps and lamps are well recognised methods and accepted to be cheaper and ecologically non-destructive. They do not involve an increase in emission of GHGs, environmental pollution or displacement.

The time involved is much less as compared to setting up new power plants. Given the huge potential for energy saving and these additional benefits, increased energy efficiency would be given the topmost priority within the overall framework of "least cost option" prioritisation.

In Maharashtra, as in rest of India, the T&D losses are much above standard norms all over the world. The high T&D losses reported are the combined effect of technical inefficiency and theft, and the Maharashtra State Electricity Distribution Company Limited (MSEDCL) has not even established their respective contributions. There are many immediate remedial measures possible. Recently, due to pressure from consumer groups and the Maharashtra Electricity Regulatory Commission (MERC), the Maharashtra State Electricity Board (MSEB) has started putting up areawise and transformer-wise data on losses on its web site. If reliable, these can help initiate focused action by targeting high loss transformers and/or areas. Shifting to metered electricity supply, individually or collectively, and adopting measures to reduce theft can also reduce losses. Maintaining the quality of equipment is as important and replacement of sub-standard equipment is urgently required. For example, it is said that a large number of sub-standard capacitors have been installed by MSEDCL which could be contributing to energy loss several times their initial cost, over the next few years. It would be possible to estimate that better management of the distribution system can reduce the losses and theft – and consequently, demand by at least 10% to 15%.

An IRP exercise for Maharashtra based on least cost options carried out by the Prayas Energy Group (PEG) in 1994 estimated an increase in demand that was almost half of the official estimates. Similar exercises by other researchers for other states and regions also indicate that official BAU scenarios exaggerate demand by a similar order of magnitude. Thus, it could be argued that the increase in capacity needed could be about half of the CEA estimate of 9,500 MW, or about 4,750 MW. However, let us work with a more conservative estimate of about 7,500 MW capacity addition required by 2012. Following the PEG exercise, it may be estimated that half of this requirement could be met by energy saving as described above, better utilisation of existing capacity and better load-management measures like separate feeders for agricultural and household consumption in the villages. All this would imply that the additional new capacity generation requirement would only be about 3,500 to 4,000 MW.

The Example of California

What this means is that if IRP is adopted in Maharashtra, the same level of service (and freedom from crippling power cuts) can be provided with half the capacity addition estimated by the CEA, and this at a substantially lower cost of social conflicts and environmental impacts. However, this requires prioritising energy efficiency over capacity addition. Since this is considered a novel approach, many feel the need for its prior demonstrated success. Ironically, such a demonstrated example is provided by California. While there is much talk about turning Konkan into California, the example it provides for the power sector is conveniently ignored.

California achieved its growth objectives mainly by prioritising energy efficient devices and mechanisms. The California Public Utilities Commission has established a rule that "Electricity and natural gas utilities must first meet (their) unmet resource needs through all available energy efficiency and demand reduction measures that are cost effective, reliable, and feasible".[7] Consequently, in California, even though the per-capita usage of electricity has remained constant for nearly 30 years, the state has achieved large economic growth and has had a rising per capita end use benefit. For example, in California, the annual energy usage of an 18 cubic feet frost-free refrigerator was reduced from 2,000 kwh to 417 kwh! Similarly, a shift to compressed fluorescent lamps (CFL) resulted in 7.5 million CFLs being sold which led to energy savings of more than 500 giga watts annually. California, while growing at the same rate as the rest of the US, has half the per capita electricity consumption of the rest of the US. In the absence of IRP, California's peak demand would have been about 30,000 MW more than its current peak demand. The target in California for 2004-13 is to save more than 26,000 GWh/year which is equivalent to eliminating the need for 10 new power plants, net savings of $10 billion to consumers and avoiding 9 million tonnes of carbon dioxide emissions!

Options for New Capacity

The above discussions clearly show that the required new capacity addition could be as low as 4,000 MW. However, two critical issues remain: one, where to site the plants, and two, should all the additional energy come from coal-based generation?

Regarding the issue of siting, the first criteria to locate power plants should be to minimise environmental and social impacts.[8] Second, given the fragile ecology of the Konkan region, a regional EIAs and Social Impact Assessment (SIA) should be carried out by an independent and reputed agency to estimate the cumulative impact of all coal-based powers plants. In our estimate, such a high concentration of coal-based plants in the Konkan will prove disastrous. Third, measures to prevent environmental degradation (including precipitators to control air pollution, desulphurisation of imported coal, etc) must be included and strictly implemented. The increase in the cost of generation by 40 paise per unit as a consequence of these measures is marginal and certainly justified. Fourth, the issue of displacement and the dispossession of the local populations from access to local resources is also important. For example, in the Konkan, some of these power plants not only displace people, but also require access to water that could have irrigated the lands of the displaced people – in effect a double displacement. Given these constraints, coal-based capacity addition that could reasonably be sited in the Konkan region would be quite limited, perhaps not exceeding 2,000 MW.[9]

The remaining 2,000 MW could be met through distributed generation from various renewable sources like wind, solar, small-hydro, biomass and so on. Power generation from the renewable sources is becoming increasingly competitive, and more so if we take into account the long-term environmental and social costs of fossil-fuel based power generation. For example, in 2007-08, MSEDCL bought power from renewable sources at a unit cost of

Rs 3.63/kwh which compares very well with Rs 4.06/kwh, the unit cost at which it bought power from other sources. Distributed power generation from renewable sources also offers much wider latitude of location for siting the plants with minimum social impact.

The Maharashtra Energy Development Agency (MEDA) estimates the power generation potential from renewable sources in Maharashtra (excluding solar[10]) to be more than 10,000 MW. Out of this, the present installed capacity is only 2,039 MW. MEDA has already drawn up a plan to add renewable power capacity of 5,640 MW in the state in the 11th Five-Year Plan.[11] This implies that all of the estimated capacity addition requirement of IRP could come from renewable sources alone.

New Energy Paradigm

While the above discussion focuses mainly on immediate measures to meet energy requirements, it is also important to work for a long-term policy and strategy shift from the current, unsustainable, high energy path of development to a sustainable and equitable development model which continuously reduces its reliance on fossil fuels and adopts the "end-use" principle and least cost options which are increasingly being advocated throughout the world by more enlightened policymakers.

The late K R Datye, well-known technologist with a pro-people orientation, and his colleagues have tried to outline such a model, which goes beyond subsistence to ensure prosperity for all.[12] Their strategy has two important planks: one, equitable distribution of water to all households to meet livelihood needs; and two, agro-industrial development based on decentralised and extensively available biomass and other renewable energy and material. Various livelihood studies indicate that this approach would meet basic needs (like food, fuel, organic inputs into agriculture, and fodder for cattle) to all families in the rural areas. This implies access to as much as 18 tonnes of biomass generated by a typical farmer family of five persons. This would still leave a surplus biomass of about 3 tonnes/family for processing and value addition and could, with proper policy support, become a key resource for energy self-reliance and dispersed agro-industrial development.

This surplus biomass could be in the form of small dimension timber, bamboo and various types of fibres and could be used in the infrastructure sector to replace energy intensive, fossil-fuel based materials like steel, plastics and cement. Considerable work has already been done in this field and many technology options are now available.[13] Such use of biomass in construction technology can bring down the use of energy intensive materials like steel and cement by a factor of five, thus increasing fivefold the infrastructure facilities that can be provided with the same amount of fossil-fuel energy and can also ensure basic infrastructure without adding to the energy burden. Moreover, it would also mean less environmental pollution, reduced emission of GHGs and reduced contribution to global warming and climate change, and, equally important, increased incomes for local people – both producers of biomass and the artisans and workers involved in its processing. Biomass processing leading to replacement of fossil fuel-based chemicals would result in even bigger gains. The energy gains and economic returns could increase manifold if this surplus biomass is fruitfully used. Integrated production-cum-energy generation units (IPEUs) which would use such technology options in conjunction with the various renewable energies like wind, solar, small hydro, etc could be set up in a decentralised manner in the rural areas paving the way for dispersed industrialisation based on renewable, local materials and renewable sources of energy.

However, this requires the abandonment of the proposed coal power projects in the region and re-deploying resources along these lines. For example, the 110.5 m^3 Amba basin project in the Alibag area would provide for about 8,000 families in 40 villages if the water is not diverted to the power projects. Preliminary estimates show that if the project is restructured on equitable lines along with local water harvesting through watershed development, then it can meet the requirements of the growing agro-industrial development in this area. In addition, it can support a diverse primary production system taking into account the special characteristics of the region in terms of land use, cropping pattern, agricultural practices, horticulture potential, high value products like medicinal herbs, inland fisheries, and so on, paving the way for a sustainable future for all in the region.[14]

It is this approach and not the proposed power projects that can make the Konkan region prosperous and beautiful.

Notes

1 Maharashtra government has made this option more difficult for itself. It has failed to capitalise on the coal blocks offered and has in fact forfeited some of them. Nor has it acted to take advantage of this cost difference and only a handful of projects built in Maharashtra over last 15 years have utilised this advantage.

2 With the rise in imported coal prices this advantage will now be larger and could further increase if Coal India operations could be made more efficient.

3 CEA's 17 Electric Power Survey of India.

4 An assumption of 80% availability is used to arrive at the figure of 27,500 MW.

5 This is the total installed capacity of Maharashtra including Mumbai and also the power imported from central generating stations.

6 The 19,240 MW in Konkan represents 86% of the CEA's projected total peak demand of 22,000 MW for all of Maharashtra and it is being situated in a 25 km wide, narrow strip in Konkan! Locating more than double the needed capacity expansion in such a small region is clearly unscientific.

7 California Public Utilities Code #454.5(b), 454.56 (b), 701.1(b).

8 Often the availability of land with the promoter or of infrastructure, such as a railway line, jetty, or road, becomes the deciding factor. What is important to consider is that both land and infrastructure are amenable to human action. Land held by promoter could be surrendered to original owners if it is not appropriate for the project while infrastructure can be built with care and its cost can be minimised. However, it is difficult to undo environmental impacts.

9 As a last resort perhaps 2,000 MW could be generated at the proposed two plants of Ispat at Shirkichal in Raigad district (1,000 MW) and by Finolex in Ratnagiri district (1,000 MW) as no fresh land acquisition would be required. In these two cases land has already been acquired for some other projects and now these two companies have sought permission to use this land to set up the power plants.

10 Solar energy estimation is extremely sensitive to technological and institutional assumptions and with a proper combination of these could have a much bigger potential than all the other renewables put together.

11 MERC RPS (renewable purchase specifications) regulations on MEDA web site http://www.mahaurja.com, accessed on 25 April 2009.

12 It is rather difficult to go into the details of the approach in this short note and the details could be got from his book (Datye 1997).

13 The applications include a wide range including (1) buildings (housing, public utilities like hospitals, schools, warehouses); (2) water conservation and storage structures, conveyance, delivery and distribution systems for irrigation, water supply for habitats and industry; (3) sanitation and waste water and other waste treatment facilities; (4) flood control and erosion control; (5) restoration of degraded lands; (6) storage and handling facilities for industrial establishments; (7) a large portion of the structural components of renewable energy facilities; (8) roads and other means transport; (9) embankments and retaining walls; and so on.

14 Minimum water requirements of a family comes to about 6,400 m^3 and includes 6,000 m^3 of water to produce 18 tonnes of biomass and 400 m^3 of water for domestic and cattle requirements.

References

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