

**COGENTRIX POWER TOO COSTLY,  
UNECONOMICAL  
BY**

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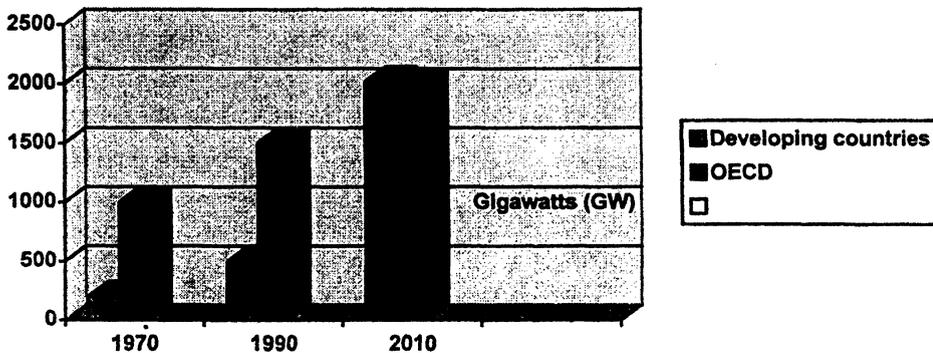
# COGENTRIX POWER TOO COSTLY, UNECONOMICAL

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**Political economy of power sector reforms:** The growth rate of demand for electricity for the developing countries is much higher than that of developed countries. According to the World Bank<sup>1</sup> 'to meet the current demand for electricity, and to provide service to the 2 billion people currently doing without, developing countries will have to invest an estimated \$100 billion per year over the next decade. In fact, it is estimated that by 2010 the developing countries will have surpassed the OECD countries in total installed generating capacity, if they can raise the needed capital.'



Nearly two-thirds of the incremental demand for electricity for the whole world will be coming from developing countries—of which China and India will account for the major share—while the developed countries will be facing a tapering off of demand. The international power equipment industry is facing a glut and they have only the developing countries as their potential customers. But then the power sector in the developing countries is neither having the finances to buy the equipment now, nor are their utilities financially sound to qualify for loans. Hence the structural reform, mainly to facilitate equipment sales of developed countries to developing countries through promotion of IPPs and tariff reform (price increase) to make the buying utilities able to pay for the equipment purchase.

To be sure, power sector reforms are sweeping throughout the world, not only in funds starved developing countries, but also in developed countries including UK, USA, Australia and Japan. But then there is a big difference. The reforms in the developed countries are aimed at making the electricity sector *more efficient by bringing down the prices to the consumer by replacing monopoly with competition wherever possible*. But in India and most other developing countries, the reforms are driven by resource mobilization objective and the need to reduce fiscal deficit. Electricity supply expansion is sought to be achieved from private sector financing instead of government financing.

This, in turn, has made the reform process externally driven, principally by the World Bank, which has put 'reforms' as a conditionality for its loans. However, while insisting on the reforms, the World Bank's prescription has been ad hoc and piece meal with a blurring of the distinction between the ends and the means. The end objective of reform is introduction of competition to bring down the prices and improve quality. Privatisation is a means, wherever it will lead to competition. Achieving private ownership without achieving competition, will only displace public sector inefficiency with private sector monopoly profits and there is no guarantee for improvement. The World Bank has been chanting the mantra of Privatisation whereas it should be chanting the mantra of competition. This is also illustrated in Mexican energy sector reforms. There with the advent of Mexican crisis, the World Bank and IMF imposed conditionalities to 'open up', viz. allow the Mexican Public Sector Oil companies --which were a 'pride' of the nation-- to be bought by the US multinationals.<sup>2</sup>

**When we globalise, we must get global prices:** By now it is established that competition is possible in the electricity generation industry. This should result in a price convergence, except for some minor differences due to location. The glut in the electricity equipment market, which can open up possibilities of sales below full cost of equipment, is also to be borne in mind. In the US, coal based electricity prices are in the range of 4 to 4.5 US cents (about Rs. 1.57 per kwh @ Rs.35 = \$.1 exchange rate) and are falling. In U.K. the average pool output price in 1988-89 was 2.08 pence per kwh <sup>3</sup> (Rs.1.20 per kwh @ Rs.58 per 1 GBP).

**Impact of a one paise increase in tariff:** A one paise increase in tariff, for a 1000 MW plant at 80% plant load factor means an increased payment of Rs.7 crores per year, which for 30 years at 12% interest rate, works out to a present value of **Rs.56 crores**.

**Comparison of alternatives:** In 1993, Janson and Lako conducted a study of analysis of alternatives for the thermal power plant at Mangalore<sup>4</sup>. They considered 4 alternatives viz. Power plant at Mangalore with imported coal from South Africa, Power plant at Mangalore with domestic coal from Talcher, Pit-head plant at Talcher with HVDC line from Talcher to Cuddapah, and finally LNG based combined cycle power plant. Both financial and economic analysis were done, the latter taking the border prices sans duties and taxes. The results are shown in the following table:

Alternatives	Financial Cost	Economic Costs
	Rs. per kwh 1992 prices	Rs. per kwh 1992 prices
Mangalore Plant with South Africal Coal	1.44	1.27
Mangalore plant with domestic coal from Talcher	1.71	1.42
Pit head plant at Talcher with HVDC transmission	1.63	1.28
LNG based CCGT	1.78	1.63

The choice of alternative must be made based on economic costs. The financial costs would provide a bench mark for comparison of the cost of power from MPC. Thus, from the economic cost comparison, we find that there is no significant difference between imported coal option and the Pit head generation at Talcher option. If a suitable shadow price is put on the domestic resource availability, a premium on foreign exchange outgo and a premium on domestic employment objective--**do you prefer to give jobs to Indian coal miners or South African coal miners**--the pit-head generation option with domestic coal will stand out as the best option. Thus there appear to be no significant benefit in going in for imported coal, despite higher calorific value and lower ash content. *Going for imported coal --and even imported gas as in the case of Enron -- when domestic coal and hydel resources are available, is ill conceived as it will lead to avoidable foreign exchange out flow and impair the balance of payments position.* It must be remembered here, that one of the World Bank's initial objection to Enron project was just this, viz. going for gas when domestic coal was available.

Importing coal, in the past has lead to the **coal import scandal**, a la TNEB. With the poor monitoring mechanisms in India, it is possible for the coal importer to contract for high calorific and low sulphur coal and actually get low calorific and high sulphur coal. However, what makes imported coal attractive vis-a-vis domestic coal for power plants located far away from domestic coal mines is the huge transport cost of coal and the high ash content of coal. Here the solution is not importing coal, but locating the power plants at the mine mouths and carrying the power through long distance transmission lines.

We are not entering into the debate on higher sulphur content of imported coal, as it is arguable that on a per btu basis, the sulphur content of imported coal can be comparable or even less. The pithead generation option will solve one more problem, viz. that of ash disposal, if the plant were to be located at Mangalore.

Comparing the financial cost, the bench mark cost turns out to be Rs.1.44 per kwh at 1992 prices, and this has to be compared with the Cogentrix prices . But Cogentrix prices are not firm, they being cost plus and the costs being not decided now. This is elaborated later. There is another bench mark which is available, viz. KPC's cost of its latest 5th and 6th units in Raichur, 2 x 210 MW plants. For these plants, the capital costs including interest during construction has come to Rs.3.68 crores per MW in 1997 prices and the levelized tariff has been worked out as Rs.2.55 per kwh. But this is not the best alternative, and therefore not the right bench mark because cheaper power is available from a hydro source or a pithead thermal source located outside the state and its power wheeled to Karnataka. It must be pointed out here, that despite funds crunch, and despite the fact that the 4th unit at Raichur was financed by Japanese OECF credit, with tied equipment purchase, KPC was able to raise indigenous consortium financing for the 5th and 6th units and retain the independence of ordering the equipment on the State owned BHEL. [The only one more thing they could have done to excel themselves was to have tried a global tender for equipment, with cash in hand and gone in for competitive bidding to secure the lowest bid].

**Associated transmission from Mangalore to Bangalore:** The Karnataka Government has called for global tender for putting up the associated transmission through private sector financing. They have done so even when the *MPC project is sub-judice, thus taking the court for granted*. However, the Government has not understood the complications of transmission privatisation. Unlike in a road project - say Rampur-Pitampur stretch in M.P.--where the revenue collected can be proportional to the no. of vehicles, which can be forecast with some measure of independence, in the case of electricity flow in a transmission network, cannot be pre-determined along a transmission path, but is governed by the flows in all other paths in the transmission network. For instance even if the transmission line is built to carry say 1000 MW of power from Mangalore to Bangalore, at times it may carry only 200 MW depending on the flow of power in other lines. This is because, electricity flow obeys only Kirchoff's laws and not the office orders of the bureaucrats who have floated the transmission tender. The implication of this is that it is extremely complicated to define a one to one correspondence between the service level parameters of transmission and the associated fees.<sup>5</sup> In the event the specifications would end up KEB paying for the asset created rather than the service provided by it.

Recent newspaper reports about Orissa Grid Corporation charging **exorbitant wheeling charges** of around 40 paise per kwh to carry NTPC power to M.P. highlight the dangers of adopting an ad hoc and piecemeal approach to transmission privatisation. Such a step will negate all the advantages of integrated regional operations, by artificially hiking up the transmission charge in one segment. Transmission being a natural monopoly, transmission pricing is naturally subjected to regulatory oversight. Interestingly, this exorbitant price has been cleared by the Orissa Regulatory Commission. All it means is that unless the regulatory body is professionalized, these aberrations will continue to occur.

**The PPA between MPC and KEB wants a firm commitment from KEB and State Government about unspecified payments in future!** The future payment requirement is an undecided figure because, Cogentrix prices are not fixed, they being cost plus, unlike, say Enron prices, which are fixed. The prices will vary with the interest rate that will be negotiated, the future price of coal, future inflation, and any other costs like the additional cost of Flue Gas Desulphurisation plant that it may be asked to put up. Cost of power at Bangalore or other load centre will be doubly undecided, because of the additional cost of wheeling through the transmission line.

**Adverse impact of deemed generation, guarantees and escrow accounts on Karnataka Power Corporation:** The PPA with MPC requires that its plant must run to 85% or so of the plant load factor, or attract deemed generation provisions in case there is no load to give this PLF. In other words, it must be paid for being ready to supply power upto 85% of the times, irrespective of whether it actually is required to supply power or not. A study of the growth of HT loads in the State of Karnataka suggests that HT loads are actually declining. While part of the decline may be due to power shortage and power cuts, there are also more fundamental causes for this decline. This means that the increase in demand is mainly for intermediate and peak loads, whereas by giving deemed generation provision for the costliest power, we are encouraging increase in supply at the base load. **This is against all cannons of electricity economics, and against the merit order operation which every electricity systems engineer will swear.** While part of this deemed generation can be accommodated by the provision of 'banking', i.e. backing down the hydro sets without consequence, a major portion of the deemed generation will have to come out of backing down the thermal sets or the hydro sets (near monsoon period, when backing down will result in spilling of water) of KPC which will result in forever lost generation and hence lost revenue.<sup>6</sup> Nowhere in the developed world IPPs are given deemed generation. In the U.K. for instance, the suppliers quote a price for every half hour for the next day and are awarded the order to supply by the pool based on the forecast demand and who can supply that demand at the least cost.<sup>7</sup> Demand uncertainty is considered a natural business risk and supply firms in the U.K. hedge this risk through what are called "contracts for differences" --between the System Marginal Price, a spot price awarded by the pool, every half hour and the contract price, fixed for the year, between the supplier and the user firm directly.

Similarly the guarantees and escrow accounts set up by the State government and KEB for MPC have the effect of eroding arrear collection prospects for KPC, which indeed supplies about 80% of Karnataka's power. A more responsible KPC would have insisted on a similar PPA with KEB for supply of its own power and incorporated a negative pledge into that PPA that required that KEB's revenues shall not be pledged to any one else before KPC's dues could be met. Since the Chief Minister is the Chairman of KPC, it is strange that his actions with respect to assigning of the KEB's revenues to MPC have not protected his own organization, KPC. This arrangement will lead to the low cost supplier KPC meeting financial disaster while the high cost supplier is kept healthy.

**BOO vs BOT:** In Project financing there are mainly two types of structures, Build-own-and operate (BOO) and Build-operate-and transfer(BOT). IPPs in developed countries are put up on the BOO basis, since they take both the demand risk and market risk ( i.e. price of electricity is determined by the 'spot' market , there is no guaranteed return, no deemed generation provisions etc.). But in India, the IPPs are given a guaranteed 16% return on equity. Read along with PLF incentives of the Ministry of Power, and the deemed generation insisted in the PPA, the guaranteed return can go upto 26-28% on equity. The debt costs and all other costs are reimbursed. The revenues are guaranteed by the State Govt. Hence the IPPs do not face any demand or market risk The assets are fully paid for through the tariffs by the rate payers and logically at the end of the project period, should become the property of the rate payers or their proxy the government. Hence a BOT scheme is what is more appropriate under the present conditions of financing. By having the various guarantees as well as the BOO scheme, the IPPs seem to have butter on both sides of the bread.

**Consultant's reading of the PPA of KEB with MPC:** KEB itself appointed a consortium of consultants lead by Science Application International Corporation to vet the PPA. They have opined that the costs are on the high side and the PPA is weighted in favour of MPC and that there are no incentives in the PPA to reduce overall costs, in this Cost plus contract. The summary of their recommendations are given in the appendix. It is not known to what extent KEB has benefited from these comments by modifying the provisions of PPA, since the modified PPA has not been accessible for public scrutiny.

**Conclusion:** MPC's power is about two times as costly as competitive power available in global markets. This is made possible partly by converting public sector inefficiency (in terms of heat rate, PLF, equipment cost, project delays etc) into private sector super-normal profits. For this project, a proper analysis of alternatives, including alternatives of hydro power and pit head thermal power from other locations, has not been done and our contention is that this is not the least cost alternative. The import of coal will squander nation's meagre foreign exchange resources, and is ill advised especially when domestic coal and hydro options are available. From all these points of view, the Mangalore thermal project is spherically senseless -- to use a Schumacher's phrase--i.e. it does not make sense whichever way one looks at it.

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<sup>1</sup> World Bank/IFC "Power and Energy Efficiency: Status report on the Bank's Policy and IFC's activities" Joint World Bank/IFC Seminar, presented to the Executive Directors, 7 July 1994

<sup>2</sup> Victor Rodriguez-Padilla, "Energy Reform in Mexico: A new development model or modernization of statism?" *Energy Policy* 24(3) March 1996 pp265-274.

<sup>3</sup> Green Richard J. and Newbery, David M. "Competition in the British Electricity Spot market" *Journal of Political Economy*, 1992, Vol.100, no.5. p945

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- <sup>4</sup> Jansen J.C. and Lako P “Power generation in South-West India based on domestic coal: an assessment” *Pacific and Asian Journal of Energy* 5(1), June 1995, pp123-134
- <sup>5</sup> Hogan William W “Electricity Transmission and emerging competition” paper presented at the Public Utility Research Centre Annual Conference “Market and Technological convergence: Implications for regulation” Univ. of Florida, Gainesville, Fl. April 27, 1995
- <sup>6</sup> Ranganathan V “Electricity Privatisation: Case of India” *Energy Policy*, Butterworth-Heinemann, UK 21 (8), August 1993
- <sup>7</sup> Green, Richard “The British electricity spot market” *Pacific and Asian Journal of Energy* New Delhi, 6(1) June 1996, 39-52

## **KEB'S INITIAL PPA WITH MPC**

(Summary of points raised by Science Application International Corp. et. al)

The main critique of the PPA is that incentives for cost minimising do not find a place and that most of the terms are one-sided favouring MPC.

1. **Choice of a unit size of 250 MW instead of 167 MW will sav about 10 to 13% of the project cost. [The unit size is now changed to 4 x 250 MW].**
2. **Capital costs at \$1576 per kw is higher by about 20%. [The capital costs are now reduced, consequent to size change and competitive bidding for equipment supply].**
3. **The tariff heat rate of 10,813 BTU/kwh against a US average of 9600 to 9900 BTU/kwh will yield Cogentrix a 10% premium in terms of additional profits.**
4. **No incentive to reward MPC to save fuel costs. Higher quality coal costs higher cost per heat unit. The Cost is borne by KEB whereas the benefits of higher quality coal in terms of better heat rate and lower maintenance accrue to MPC; for each 1 kwh of power, KEB buys more heat units, and each unit at a higher price of fuel.**
5. **Fuel specification does not include domestic coal substitutability, so that you get stuck with foreign coal, and you pay more risk premium for transport and boycott risk etc.**
6. **KEB pays the fuel costs, but MPC chooses long term fuel suppliers.**
7. **O&M costs paid in lump sum without requiring O&M obligations thro' contracts. There could be profit sharing concepts in O&M introduced.**
8. **Since equity cost at 16% is higher than debt cost, equity ceiling must be there. ROE for private German projects is around 9 to 12%. The 16% ROE in construction phase becomes part of project costs and a component of recoverable charges. (you give an ROE on ROE. ROA for German project is 6.5%, fixed by Govt., since 1953.**
9. **Debt cost: Considering LIBOR at 5.5%, 10 year US bond interest at 7.28%, and the fact that India is not a particular risk, an interest of 8.75% may be within reach. No incentive in PPA to minimise debt cost at present. This is contrary to international practice. Suggestion: Allow a full pass through upto say 8%, and then 50% reimbursement beyond 8%.**
10. **Deemed generation provision may be OK --particularly for base loads, but not necessarily for peak loads--but there is no corresponding minimum supply obligations. Reduction of ROE for capacity below target generation is not possible, since ROE is guaranteed, but depreciation can be linked. For PLF exceeding 68.5%, upto 85%, PLF incentive may be provided only for energy delivered, and not for deemed generation.**
11. **In a BOO model of financing--which the present one is-- since MPC would own the assets indefinitely, depreciation can be extended to 20 years, actual operation time of such facilities being about 40 years.**