INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

UMI

A Bell & Howell Information Company
300 North Zeeb Road, Ann Arbor MI 48106-1346 USA
313/761-4700 800/521-0600

UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

PRIVATIZATION OF THE ELECTRIC UTILITY INDUSTRY IN INDIA

A CASE STUDY

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

Doctor of Philosophy

By

YAMINI NARAYANAN

Norman, Oklahoma

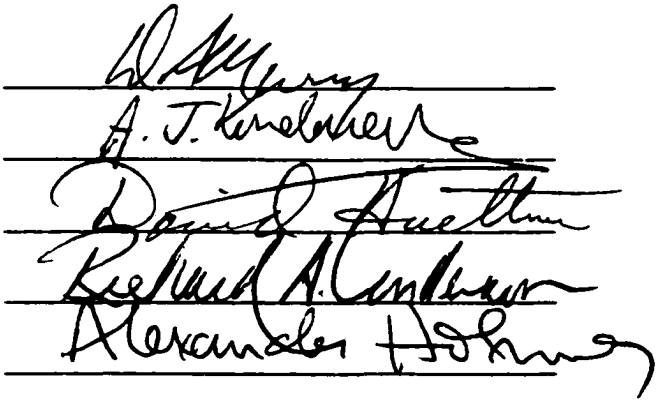
1998

PRIVATIZATION OF THE ELECTRIC UTILITY INDUSTRY IN INDIA
A CASE STUDY

A DISSERTATION APPROVED FOR THE

DEPARTMENT OF ECONOMICS

BY



ACKNOWLEDGEMENTS

I would like to take this opportunity to thank my committee members. Dr. Don Murry has been very patient in reading several drafts and offering many suggestions to make this dissertation possible. Dr. Kondonassis' knowledge of development economics never ceases to amaze me and he gave me a strong foundation in the subject. Dr. Huettner's constructive criticism and thoughtful insight made this dissertation much better. Dr. Holmes's confidence in me gave me confidence in myself. I thank him for that. Dr. Anderson has taught me the significance of commitment and the outside knowledge that he brought to my dissertation enhanced it. I thank both Dr. Holmes and Dr. Anderson for being good friends as well. I would also like to thank Dr. Bill Ray, Dean of the Graduate College for his support throughout my program.

Personally, I would like to thank my husband Suresh for all his encouragement and for proofing several drafts of this dissertation. I would like to thank my parents for their constant support both emotionally and financially and for their many prayers. I would like to thank my son for letting me work through the final stages

of this process and for just being him. He inspires me in so many ways that they can not be enumerated here. I would also like to acknowledge the patience and encouragement offered to me by my colleagues at C.H. Guernsey & Company. Last but not the least I would like to thank God without whom nothing is possible.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES (Contd.)

ABSTRACT

India is a developing nation that requires electricity for all of its development needs. It is a case, however, of demand exceeding supply. The Indian government realizing this has decided to look to private sources, both domestic and foreign, to invest in the power sector in order to augment the current generation of electricity.

Since electricity is a sector that provides maximum linkages to other sectors of the economy it is sound developmental policy to expand this sector in India. The expansion of the private sector in generation will create the much needed resources, and this analysis has proven that this is economically viable. The privatization of the electric power sector in India will be the first step the country would take toward becoming a developed nation.

CHAPTER I

INTRODUCTION

India is a developing nation that requires electricity for all of its development needs. It is a case, however, of demand exceeding supply. The Indian government realizing this has decided to look to private sources, both domestic and foreign, to invest in the power sector in order to augment the current generation of electricity.

The purpose of this study is to analyze private investment in the electric utility industry to see if it will prove to be cost effective to the Indian economy in the long run. Particularly, is attracting private capital on a continuing basis the least cost alternative for India over the next twenty-five years?

Significance of the Study

The significance of the study is the examination of assuring prompt and sufficient electric power to act as a vehicle for India's economic development. Electric utilities in India are government owned and operated. Private sources of funds are important because the government owned State Electricity Boards (SEBs) do not

have the investment capabilities to generate the required power. This situation, combined with the facts that domestic savings are insufficient to support the level of investment envisaged by the Indian Planning Commission and that the domestic capital market does not have the depth and investor confidence required, makes foreign capital investment necessary.

India depends on the SEBs to provide most of their electricity needs. However, India's electricity needs are also growing constantly, and the SEBs are unable to meet those demands. Also the SEBs are currently unable to borrow funds from sources such as the World Bank because they are considered an investment risk. Therefore, attraction of private foreign capital is an essential requirement for development.

There are considerable detractors to the idea of privatization of the electric utility industry in India. Numerous projects have been proposed and are awaiting approval. The detractors believe that private investment in the power sector is expensive, thereby increasing the cost of electricity over the present levels to the public.

Methodology of the Study

This study will test the assertion that the much needed power can be made available to the Indian market through privatization and still be cost-effective (feasible). The economic analysis will focus on comparing two major projects - one a private power corporation, Enron and the second a government-owned entity, National Thermal Power Corporation (NTPC). Enron, a multinational corporation headquartered in the United States, is a major player in the international power market. They have been negotiating, since 1992, with the central government of India to build a plant in the Indian State of Maharashtra to generate electricity. The National Thermal Power Corporation is a government owned power generator that does not provide subsidies to any customer class in India. This study will conduct net present value studies over twenty five years of both the NTPC and the Enron project, waiting approval in Maharashtra, India. Further this study will compare the costs of privatized power to the costs of energy produced by a government utility as measured by economic costs in the long run. In short, this is a test of the feasibility of privatized power meeting the electricity requirements of India.

The components of the net present value of the Enron project are as follows: electric power purchases (calculated as consumption times the rate), capital costs (fixed costs), start up expenses, operations and maintenance (O&M) expenses, and administrative and general (G&A) expenses. The components of the net present value for the government power are as follows: electric power purchases, capital costs, upgrades/replacement costs, operations and maintenance expenses, administrative and general expenses and subsidies if any.

The capital costs in the Enron case include both the principal and the interest. Enron's capital costs are expected to be $26.2 million[1]. O&M and fuel management are expected to be $714,000 per annum. Start up expenses is projected to be $18 million. G&A expenses are expected to be high in the initial years due to consultancy fees and development work in the magnitude of $10 million and $24.7 million respectively (Purchase Power Agreement, 1993). The cost per kilowatt-hour that Enron plans to charge is $0.05314.[2]

---

[1] Hattangadi, "Excerpts from the Purchased Power Agreement," Frontline, July 1995, 32.

[2] Ibid.

NTPC's capital costs are $25 million.[3] Since the system that NTPC operates is not new, there will be normal wear and tear and replacements that are required. These are assumed to be 3.0 percent of the capital costs (the entire plant will be replaced in 33 years) or $833,333 per annum. O&M and A&G expenses are expected to be $1 million per annum. The cost of per kilowatt-hour that NTPC charges is $0.05314.[4] Subsidies are zero because NTPC does not provide any subsidies.

Conclusions of the Study

Enron is the first major private entity to initiate the construction of a power generation plant in Dhabol, Maharashtra. NTPC is a state owned generation agency that is run very efficiently. It is very similar to the Enron project in that it serves high load customers and does not offer any subsidies. From the comparison between the Enron and NTPC projects it can be seen in Tables 6 and 7 that the cost of the Enron project over the next 25 years is $8.45 million less than that of the NTPC. Therefore, it costs less to have Enron build a plant compared with NTPC.

---

[3] Sashi, M. "The success of NTPC," Business India, May 1995.

[4] Ibid.

The Enron project is the first of its kind in India. It is understandable therefore that it faced several criticisms. The main criticisms against Enron were the lack of transparency and cost padding. The lack of transparency was corrected by renegotiating the project and lowering some costs. The cost padding was also reduced and this treatise proves that the project is less expensive than an existing plant in India.

Electricity is a sector that provides maximum linkages and therefore needs to be expanded in India. The expansion of the private sector in generation will create the much needed resources and this analysis has proven that this is economically viable. The privatization of the electric power sector in India will be the first step the country would have to take toward the path of becoming a developed nation.

CHAPTER II

NEED FOR FOREIGN INVESTMENT IN ELECTRIC SECTOR IN INDIA

After its independence from the British Empire, India adopted five year plans to set the country on the road to rapid development. Growth in the generation of electricity was given importance in all the five year plans. However, no special treatment was given to any particular sector throughout all the plan periods. The government fell short of its target in all of the plans. It lacked the capital investments required to increase the generation of electricity. In addition, political forces interfered with the functioning of the SEBs in a manner that would not achieve allocative or productive efficiency. Therefore, the government had to turn to alternate sources to finance the growth in electricity generation. India was unable to borrow from the World Bank as the State Electricity Boards are considered an investment risk. This is especially true of the SEBs that are considered financial risks. The choice was therefore to seek foreign investors who were eager to invest in the Indian power market.

Throughout the various five year plan periods, the Indian government attempted to increase electric

generation. The following discussion attempts to show that it was unable to meet its targets.

First Five Year Plan (1951-1956)

A total of Rs.588 crores[5] was allocated to the development of electric power, mainly for irrigation purposes. Of this amount, Rs.518 crores was to complete existing projects. These projects were aimed at increasing irrigated land by 8.5 million acres during this period. The balance was targeted on developing five new electric power projects.[6]

During the first plan period, installed power capacity went up from 2300 MW to 3418 MW, while power generation increased from 3858 million units to 9,662 million units. During the same period of time, the Gross Domestic Product at factor cost grew from Rs.9,480 crores to Rs.9,717 crores. National income grew from Rs.8,870 crores to Rs.10,420 crores. The industrial sector grew by 40 percent during that period while the index of industrial production went up from 137 in 1953-'54 to 148

---

5 One crore equals 10 million.

6 Ghosh, Arun. Planning in India. New Delhi: Sage Publications, 1992.

in 1954-'55. This occurred, in spite of the fact that the plan placed great emphasis on agriculture.[7]

Second Five Year Plan (1956-1961)

Power development was allocated Rs.427 crores, which was expected to create an increase in energy of 3.5 million kilowatts of power. The second plan concentrated more on the production of hydropower and thermal power. The most important development was that this plan called for power load surveys which were to be important tools for planning energy development, as the increase in demand for electricity was expected to be high in the future years.

Installed power capacity was 3,418 MW in 1956 and grew to 5,654 MW by the end of the plan period. Power generation went up from 9,662 million units in 1956 to 16,937 million units in 1961. During this plan, GDP at factor costs rose from Rs.9,717 crores to Rs.15,254 crores. One important feature of this plan was investment as a proportion of income grew 7.5 percent in the first year of the plan to 11 percent at the end of the plan period.[8]

---

[7] Ibid.

[8] Desai, P.B. Planning in India. Ghaziabad, India: Vikas House, 1979.

Third Five Year Plan (1961-1966)

During the third five year plan it was expected that there would be an increase of about 1,400 megawatts on an average, every year increasing the total consumption to 12700 megawatts at the end of the third plan period. The budget allocated to the development of electricity which included distribution, was Rs.1,089 crores, all of which was in the public sector. The development of hydropower, which required long lead times, was further analyzed. The plan advanced some of the planning for certain future projects. Also, the plan also called for the research on generation, transmission and distribution problems to be performed by the Power Research Institute in Bangalore.

Installed power capacity went up from 5,654 million MWs to 10,173 million MWs and power generation almost doubled from 16,937 million units to 32,990 million units. GDP rose from Rs.15,254 crores in 1961 to Rs.24,063 crores in 1966. During the third plan actual net investment was Rs.11,280 crores and net capital formation was Rs.10,266 crores. However, national income predicted to grow at 5 percent per annum, rose only by 17 percent over the five year period and per capita income remained almost the same.[9]

---

[9] Ghosh, Alak. Indian Economy Its Nature and Problems. Calcutta: NBS, 1994.

The third plan had several shortfalls in target. The worst performance was in the field of agriculture. Industrial performance (organized industry) compared better. Although there was an average increase per annum in industrial output, it was less than the 11 percent per annum visualized in the third plan. Targets were met in the fields of industry, transport, communications, health and education. However in important sectors like agriculture, irrigation and power the performance was unsatisfactory.

Fourth Five Year Plan (1969-1974)

During the third five year plan electricity generating capacity grew at the rate of 12.5 percent and between the third and the fourth Plan it grew at a rate of 12.6 percent. During the fourth plan period the target was to increase the generating capacity from 14.29 to 23.00 million kilowatts - a growth rate that was slightly greater than 10 percent per annum. Planned investment for power generation in the public sector was Rs.2,447.57 crores,[10] which was distributed according to Table 1.

[10] Ghosh, Arun. Planning in India. New Delhi: Sage Publications, 1992.

Table 1: Planned Power Generation Investment Distribution

Item	State	UT[1]	Center	Centrally Sponsored	Total (Rs. Crores)
Generation	974.06	25.48	255.10	-	1254.64
Continuing Schemes	832.82	25.00	210.10	-	1058.92
New Schemes	150.24	0.48	45.00	-	195.72
Transmission & Distribution	645.51	44.27	9.80	22.0	721.58
Rural Electrification	285.15	9.54	150.00	-	444.69
Investigation & Misc.	14.35	2.49	9.82	-	26.66
Total	**1919.07**	**81.78**	**424.72**	**22.0**	**2447.57**

Source: Government of India, Fourth Five Year Plan 1969-74.

1. UT refers to Union Territories.

This plan, for the first time included allocations for the central governments as well as the state governments. The central government investment of Rs.210 crores on continuing schemes included Rs.120 crores on atomic power generation and Rs.80.1 crores on thermal power generation. In total, 9.26 million kilowatts of generating capacity was planned for this period. In addition, the program for conducting pre-investment surveys of potential hydroelectric sites was continued.[11]

[11] Desai, P.B. Planning in India. Ghaziabad, India: Vikas House, 1979.

In 1974, installed power capacity went up from 14,296 MWs in 1969. During the same period power generation went up from 47,434 million units to 66,689 million units. GDP rose from Rs.33,943 crores in 1969 to Rs.56,954 in 1974. Most economic indicators failed to meet expectations during this period. National income was expected to rise at 5.5 percent per annum and per capita income was expected to rise at 3 percent per annum. However, average annual increase in national income was 2.8 percent and per capita income was 2 percent per annum. Growth rate targeted at 5.5 percent per annum rose by 5.2 percent in 1969-70 and it fell steadily thereafter to 4.2 percent in 1970-'71, 1.7 percent in 1971-72, 0.6 percent in 1972-73 and a little more than 1 percent in 1973-74[12]. Agricultural output was expected to increase at 5 percent per annum while industry was expected to grow at 8-12 percent per annum. Agriculture however, grew at 2 percent per annum while industry grew at 4 percent per annum. Industrial production was at 7.3 percent in 1969-70, 3.1 percent in 1970-71, 3.3 percent in 1971-72 and 5.3 percent in 1972-73. In 1973-74 industrial production was almost stagnant. Private sector progress was slow due to crisis

[12] Rao, V.K.R.V. India's National Income 1950-1980. An Analysis of Economic Growth and Change. New Delhi: Sage Publications, 1983.

in raw materials, power cuts and technical difficulties.[13]

Fifth Five Year Plan (1974-1979)

16.5 million kilowatts was the planned addition to the electric capacity during the fifth five year plan. The increase would be 12 percent annual growth rate in capacity. The estimated cost for this addition was Rs.6190 crores. 88 percent of the total investment was the responsibility of the states and union territories.[14] However, it should be noted that two-thirds of the increase was to compensate for the shortfalls experienced in previous plans.

During this plan period installed power capacity went up from 18,456 MWs in 1974 to 29,298 MWs in 1979 and power generation went up from 66,689 million units in 1974 to 102,523 million units in 1979. GDP rose from Rs.56,954 crores in the beginning of the Plan to Rs.87,351 crores in the end of the Plan.[15]

---

[13] Ibid.

[14] Government of India, Planning Commission, Draft Fifth Five Year Plan 1974-'79, 2 vols. New Delhi: Government of India Press, Volume 1-1973, Volume II-1974.

[15] Ghosh, Arun. Planning in India. New Delhi: Sage Publications, 1992.

The two main goals of the fifth plan were to step up the rate of growth of the economy and to ensure the equitable distribution of wealth among the people. In reality there were many sharp price increases during this period. In 1973-'74 the inflation rate was about 30 percent. With this in mind, the targets of the plan had to be altered several times. In addition, when the new Janata Party was elected to lead the central government in 1977, they decided to decentralize planning with a rural emphasis. This decision was in direct contrast to the urbanization and industrial growth targets of the original Plan. The Janata Party also reconstituted the Planning Commission at the end of May 1977. As a result, the new Planning Commission and the Janata Party decided to end the Fifth Plan on March 31, 1978. Thus, it went from being a five year plan to a four year plan.[16]

Sixth Five Year Plan (1980-85)

During this plan, energy received the largest share of sectoral allocations in the public sector. The allocation was Rs.26,535 crores of which electric power got Rs.19,265 crores and petroleum got Rs.4,300 crores.[17]

---

[16] Rao, V.K.R.V. India's National Income 1950-1980. An Analysis of Economic Growth and Change. New Delhi: Sage Publications, 1983.

[17] Ghosh, Arun. Planning in India. New Delhi: Sage Publications, 1992.

Installed power capacity went up from 31,307 MWs to 47,705 MWs and power generation went up from 104,627 million units in 1980 to 156,633 million units in 1985. GDP rose from Rs.93,880 crores to Rs.208,533 crores. The targeted rate of growth of 5.2 percent per annum was achieved.[18]

Agricultural performance became much higher than before. Increased use of chemical fertilizer was one reason, but another important reason was the increase in irrigation potential by 11 million hectares. An important component of modernization in rural areas is the change in the pattern of energy use. By the end of the plan, 64 percent of the villages were electrified, and electricity consumption in agriculture rose by 8.9 percent per annum for every year of the Plan. However, in industry, the Plan's performance fell short of its target, which was attributed to the shortage of power. The oil crisis of 1979 prompted the pattern of energy consumption to change from coal to oil briefly and mainly to electricity.[19]

---

[18] Ibid.

[19] Ghosh, Alak. Indian economy Its Nature and Problems. Calcutta: NBS, 1994.

Seventh Five Year Plan (1985-'90)

The success of the sixth plan gave the economy a good start during the seventh plan. The largest allocation in the public sector was in the energy sector. It was 30.45 percent of the total public sector outlay. During the entire plan period a 12 percent sectoral growth was expected in energy. Infrastructure including electricity was expected to increase GDP by 34.4 percent.[20]

During the seventh plan period installed power capacity went up from 47,705 MWs to 71,752 MWs and power generation went up from 156,633 million units to 245,141 million units. GDP rose from Rs.208,533 crores in 1985 to Rs.405,827 Crores in 1990. The seventh plan was heavily oriented towards power, agriculture and rural development.[21]

The attainment of the targets set for the seventh plan mainly depended on infrastructure like power supply. The demand for electricity was expected to grow by 12.2 percent per annum and reach 223.3 million kW hour by 1989-'90. The realization during this plan period that

---

[20] Ibid.

[21] Ibid.

India could no longer depend on oil for its energy needs led to an increase in the demand and consumption of electricity.[22]

In spite of these efforts by the government of India, to assure adequate power there have been acute power shortages both in the industrial and agricultural sectors during all the five year plans. The priority of agriculture or industry varied from state to state, but the application of electricity was always at the cost of one over the other. States like Haryana, Punjab, Uttar Pradesh experienced 25 percent power cuts, while Tamil Nadu experienced 60 percent power cuts.[23] The aluminum industry, which was heavily dependent on power, suffered and the numerous power cuts in West Bengal which adversely affected the jute industry.

There are several reasons for these power cuts. The biggest reason was the fourth five year plan, when only less than half the capacity to be added was completed (4.6 of 9.3 million kilowatts). Costs of the new power plants were also very high. Transmission losses were up to 17 percent in India as compared to less than 10

---

[22] Nadkarni, Seetharamu & Aziz. India the Emerging Challenges. New Delhi: Sage Publications, 1991.

[23] Ghosh, Alak. Indian Economy Its Nature and Problems. Calcutta: NBS, 1994.

percent in the developed countries such as 6 percent in West Germany, 7 percent in France and 10 percent in Austria.[24] So it is clear that the electric industry in India was in a critical situation thus far.

Rural Electrification

During the Fifth Plan electricity was included among the "minimum needs"[25] program. This shows the importance given to electricity. The cost of rural electrification is considerably high, and the benefits are not realized immediately. The Fuel Policy Committee of the Indian government describes the benefits of rural electrification as follows:

> *'Electrification of a village not only adds to the productive capacities of the farmers but also brings with it social, civil and domestic amenities and has a salutary psychological effect on the rural people who start having a feeling of modern age.*[26]

Rural electrification, while it has its benefits always includes some subsidies. The Fuel Policy Committee of India recognized this need and targeted those areas where villages will yield highest returns.[27]

---

[24] Ibid.

[25] Minimum needs refers to food, clothing and shelter.

[26] Government of India, Fuel Policy Committee Report, 1992.

[27] Ibid.

The main benefit is the increase of area under irrigation because of the availability of electric pump sets. Therefore, the reports now include, apart from villages electrified, the number of pump sets energized. The fifth plan (1974-79) goal for pump sets was 1.5 million and the goal for energizing villages was 110,000 villages.[28] However, around the 1970s only about 10 percent of the rural areas had been electrified. Use of biogas to decentralize rural electrification was practiced thereafter.[29]

The SEBs and their Pricing Policies

The sixth and the seventh five year plans set up a large thermal based power station. The share of the thermal stations increased from 10 percent to 25 percent in the Seventh Plan period. At the thermal power plants, the average 'plant load factor' increased from 50 percent to 56.4 percent during the seventh plan period.[30] The credit for these improvements was entirely due to the efforts of the Central Electric Authority (CEA) and the State Electricity Boards. The performances of the states

---

[28] Government of India, Planning Commission, Draft Fifth Five Year Plan 1974-'79, 2 vols. New Delhi: Government of India Press, Volume 1-1973, Volume II-1974.

[29] Ibid.

[30] Ghosh, Arun. Planning in India. New Delhi: Sage Publications, 1992.

were very varied and the states in the North and North East have been especially unsatisfactory.[31]

The improvement of the SEBS and their smooth functioning are essential in the improvement of the electricity sector in India. This, however, has left much to be desired so far. The only SEBs that made a surplus the Andhra Pradesh SEB from 1987-'88 onwards, the Orissa SEB in 1990-'91, the Maharashtra SEB over 1986-'87 and 1987-'88 and the Kerala SEB in 1985-'86. All other SEBs made consistent losses.[32]

The biggest reason for these losses is the heavy subsidy in the supply of electricity to farm users and to domestic consumers. Although heavy subsidies are given to the farm sector, the poor farmers use only diesel pump sets, while the rich farmers, with very large land holdings, use electricity.

The near free availability of electricity in the rural areas encourages the wasteful use of electricity and the wasteful use of water. This waste results from using poor quality pumps that use higher horsepower than

---

31 Central Electric Authority. Electric Power Survey, Delhi: Government of India Press, 1993.

32 Ghosh, Arun. Planning in India. New Delhi: Sage Publications, 1992.

required. While the waste is inconsequential to the individual farmer, the gross wasteful use of energy is of the order of 30-40 percent. The losses are also built into the power tariff structure, which makes the SEBs more inefficient. The inefficiency is mainly in the transmission and distribution sector.[33]

The SEBs and the five year plans have failed to reach their objectives. The energy problems of the Indian economy have been the subject of several studies based on which the various plan policies and targets were formulated. However, these plans, as observed earlier, have left serious gaps in the energy sector. The decisions made by the government of India at various times leads to the belief that the government does not have an understanding of the gravity of the situation. It is expected that, commencing with the Eighth Plan, a more coherent energy policy will be formulated, and the role of energy as an engine for economic development will be appreciated and implemented.

---

[33] Nadkarni, Seetharamu & Aziz. India the emerging challenges. New Delhi: Sage, 1991.

CHAPTER III

REVIEW OF THE LITERATURE

The review of the literature is confined to three areas. The first area discusses the literature pertaining to the economic aspects of privatization especially in Less Developed Countries (LDCs). The second discusses the unbalanced growth approach and how it is a method of achieving development in LDCs. The third discusses India's electric needs and how foreign investment maybe able to solve those needs in the presence of bankrupt or near bankrupt public enterprises.

Economic Aspects of Privatization

Over the past two decades, one successful model of privatization in the world has been in the United Kingdom. The Thatcher government was famous for its privatization efforts and its success. The British National Economic Development Office (NEDO) report published in 1976 studied nine major nationalized corporations, with the exception of shipbuilding, aerospace and airports.[34] The report concluded that there were problems in nationalized industries: "*The evidence points overwhelmingly to the conclusion that relationships between governments and nationalized*

---

[34] Hurl, Bryan. Privatization and the Public Sector (Studies in the UK Economy). Heineman, 1988.

industries can have damaging economic consequences for the country as a whole".[35]

The benefits that could accrue out of privatization have also been analyzed. These have been identified, in the UK, as two major benefits and two minor ones. The first major advantage of privatization is of allocative efficiency.[36] Allocative efficiency is said to occur when price is equal to marginal cost or the theory of first best. Privatization enhances allocative efficiency as it sharpens corporate incentives to cut costs and sets prices in line with costs.[37] In the initial stages of privatization there was not much focus on this aspect. However, after 1984, as privatization gained momentum and the framework of competition and regulation was set in place, the aspect of allocative efficiency gained importance.[38] British Telecom was one of the first British industries to be privatized. As a private industry British Telecom could borrow freely from capital markets without the borrowing constraints of the public

---

[35] Ibid.

[36] Ibid.

[37] John Vickers and George Yarrow. Privatization: An Economic Analysis. MIT Press, 1996.

[38] Ibid.

sector. This meant that privatization would facilitate more efficient capital allocation.[39]

The second major benefit, productive efficiency occurs when a firm minimizes cost of a given level of output. Since private entities are profit maximizers, they automatically seek productive efficiency.[40] The least cost technique is usually adopted by private entities. According to the World Bank 1994 Report, it is the cheapest alternative to achieve the intended objectives.[41]

There are two other minor benefits of privatization in the United Kingdom. The first is the reduction of Public Sector Borrowing Requirement (PSBR), a sum the central government has to pay itself, the local authorities and the nationalized industries when they need to borrow if their expenditure is greater than their income.[42] In the early 1980's it was the UK government's mission to reduce the PSBR. The government made it very clear that once the nationalized industries were

---

39 Ibid.

40 Hurl, Bryan. Privatization and the Public Sector (Studies in the UK Economy). Heineman, 1988.

41 World Bank. Report on the Economy. 1994.

42 Hurl, Bryan. Privatization and the Public Sector (Studies in the UK Economy). Heineman, 1988.

privatized, they would no longer be a part of the PSBR.[43] In the United Kingdom proceeds from the sale of state assets directly reduce the PSBR as they are treated as negative public expenditure.[44] Sales of shares are not considered borrowings. Hence, the idea of privatization reducing PSBR worked well with the British government.[45]

The second minor advantage is that of increasing wider share ownership, especially among the employees, due to shares being sold at affordable prices. This would prevent the problem of a small portion of the population holding most of the shares.[46] Privatization provided a good vehicle for expanding share ownership because they offered these shares at discounted costs. It also provided several incentives for the small shareholder. In conclusion, privatization was a winner both economically and politically in the United Kingdom.[47]

---

[43] John Vickers and George Yarrow. Privatization: An Economic Analysis. MIT Press, 1996.

[44] Ibid.

[45] Ibid.

[46] Hurl, Bryan. Privatization and the Public Sector (Studies in the UK Economy). Heineman, 1988.

[47] Ibid.

Microeconomic Features of Privatization

Since it is believed that there is a first best solution in privatization, there is likely welfare to be gained from setting the price equal to the marginal cost of production. In reality, however, some economists argue that it is better to have the solution of second best that could come with privatization rather than the third best efficiencies of the public sector.[48] There has been definite proof in the private transportation sector that there is a fall in prices and an improvement in quality in the long distance travel when compared to public sector owned and operated. This is an example of allocative efficiency. Productive efficiency was witnessed in Jaguar, the automobile manufacturer and National Freight Corporation post privatization.[49]

Private companies must look to sources other than the Treasury for financing. These companies need to conform to the rules of the private sector for borrowing funds, and these criteria are more stringent than that of the Treasury. This led to stricter evaluation of investment, and hence, to more efficient investment.[50]

---

48 Hurl, Bryan. Privatization and the Public Sector (Studies in the UK Economy). Heineman, 1988.

49 John Vickers and George Yarrow. Privatization: An Economic Analysis. MIT Press, 1996.

50 Hurl, Bryan. Privatization and the Public Sector (Studies in the UK Economy). Heineman, 1988.

Another advantage is that entrepreneurs are attracted to the private sector for reasons such as better profits, prestige and job satisfaction. This enhances productive efficiency. The concept of wider share ownership, another microeconomic aspect, has been discussed earlier in this chapter.

Macroeconomic Aspects of Privatization

The main macroeconomic aspect of privatization is the reduction of the PSBR discussed in detail earlier. In terms of fiscal policy some economists believe that the advent of privatization will reduce taxes on income. This was proved in 1987 and 1988 when the sale of family silver in UK reduced the income taxes by 2 percent. Privatization improved the balance of payments and the value of the currency (Sterling in England) due to heavy inflow of foreign funds seeking shares. This also enhanced the demand for the local currency.

There are other compelling factors in favor of privatization. First, state owned enterprises are more prone to be politically manipulated in terms of wages, employment, prices and investment.[51] This signifies that allocative efficiency can be better achieved where the

---

[51] James Foreman-Peck and Robert Millward. Public and Private Ownership in British Industry. Clarendon Press, 1994.

market forces interact freely. Second, the assets of private sector are managed better thereby achieving productive efficiency. This is reflected in the fact that the market is willing to pay more for the assets of the private industries than those of state owned enterprises.[52]

Privatization in the LDCs

Following the successful privatizations in the UK and Eastern Europe, privatization can be the remedy to the problems of subsidies and inefficiencies that LDCs face.[53] There have been several positive effects of privatization in various LDCs. In the Caribbean and Central America, banks, telecommunications and agriculture have all been privatized and received well by investors. Mexico has reduced its state owned enterprises by 75 percent, from 1200 firms to 300.[54] In Southeast Asia the most successful country in privatization has been Malaysia. It has helped neighboring countries like Indonesia and Thailand by opening up its private port

---

52 Ibid.

53 Cowan, Gary. Privatization in the Developing World. Greenwood Publishing Corporation, 1990.

54 Ibid.

facilities, private airlines and private communication facilities.[55]

In the LDCs, the effect of privatization has had other advantages than that of the UK. In the LDCs the growth of the private sector has encouraged the development of a more efficient banking system. Until recently commercial banks did not finance major industries. They are now, however, developing structure and policy to meet the growing investment needs. There has also been an increasing number of first time share holders in the LDCs. Until now most of the basic industries were owned by the state. Since a successful stock market has been considered essential for privatization there has been the development of an active stock market in the LDCs.

There have been doubts about the absorptive capacity of the economies of the LDCs. However, the first three projects in Nigeria have been absorbed and accepted well. The speculation that power will be concentrated in the hands of a few if there was widespread privatization has been dispelled. In Nigeria there is a silent revolution in corporate ownership.

---

[55] Nafziger, Wayne. The Economics of Developing Countries. Prentice Hall, 1996.

"To those who saw privatization as a transfer of public property to a few rich people, the message is loud and clear, that it is not. It is in fact a program of mass participation of popular criticism".[56]

Another benefit in the LDCs is that the entrepreneurial pool has expanded and improved in quality.[57]

Planning and Unbalanced Growth

India was one of the many countries that turned to planning for achieving development after it gained its Independence from the British. The country concentrated on the balanced growth approach that was put forth by Economists like Nurkse and Rosenstein-Rodan. The appeal of the balanced growth theory is that it distributes the benefits of developments more evenly through society, to remedy inequality, to control inflation and to avoid the unemployment of resources.[58] However, planners did not realize that the shortage of capital and resources in India would affect the method of achieving balanced growth. According to Hirschman, with the limited amount of investment resources, and a series of proposed investment projects whose total cost exceeds the available resources, how can projects be selected that

---

[56] Ibid.

[57] Cowan, Gary. Privatization in the Developing World. Greenwood Publishing Corporation, 1990.

[58] Thirlwall, A.P. The Economics of Growth and Development. Edward Elgar Publishing, 1995.

make the greatest contribution to development relative to their cost.[59] Hirschman supports a method of unbalanced growth. The concept of unbalanced growth is based on interdependence of activities or what he refers to as "backward and forward linkages". Backward linkages refer to the amount of an output that is composed of purchases from other activities. Forward linkages measure the portion of an output that is not meant for final consumption, but is input for another activity or activities.[60]

Hirschman recommends the encouragement of those activities with potentially highest combined linkages, as they provide the greatest incentive for other activities to develop. Countries like India are now moving toward the unbalanced growth approach where certain industries are given a thrust to act as an impetus for other industries to develop. India is particularly interested in the infrastructure of the economy to develop industrial growth.[61]

---

59 Hirschman, A. A Strategy of Economic Development. Yale University Press, 1958.

60 Thirlwall, A.P. The Economics of Growth and Development. Edward Elgar Publishing, 1995.

61 Ghosh, Alak. Indian economy Its nature and problems. Calcutta: NBS, 1994.

Foreign Investment in LDCs

The motive to assist the LDCs has been based on the economic rationale that international assistance can be mutually beneficial.[62] Critics of the international assistance theory point out that it does not work because the LDCs are in debt at the present time. The World Bank and other developed nations who have been forced to forgive several debts on different occasions also consider them risky investments.[63] Therefore, the LDCs are not able to obtain financial support from foreign lending institutions.

A solution, if not the solution to the problem of investment in LDCs seems to be foreign multinationals. The amount of investment in LDCs by foreign multinationals has almost doubled from $13 billion in 1981 to $25 billion in 1991. The benefits to the LDCs besides the transfer of funds, include the import of better techniques of production, managerial and marketing expertise, products, advertising and business practices for the maximization of global profits.[64]

---

[62] Thirlwall, A.P. The Economics of Growth and Development. Edward Elgar Publishing, 1995.

[63] Ibid.

[64] Ibid.

Foreign Investment and Electric Power Sector in India

India is a developing nation and one of most obvious deficiencies is availability of electricity for its development needs. Modernization is taking place rapidly as is the growth in population, which is currently at 6 percent per annum. The rapid increase in the industrial base of the country is creating a tremendous strain on the existing electricity situation, while increasing the need for more electricity generation. For example, New Delhi is the modern capital of this ancient country where the summer heat is very oppressive. Most offices in the expanding industrial base having ceiling fans, and some of them having air conditioners. However, at 3:00 p.m. in the afternoon, these fans and air conditioners go off. This is called "load shedding" (power cuts), and no one is surprised by it.[65] This is a common practice adopted by the SEBs in India in the summer to meet peak demand.

Electricity in India is state owned and SEBs generate and distribute power. The SEBs control the electricity in each state. The National Thermal Power Corporation (NTPC) does the only other generation. The average cost of producing electricity in India is Rs.1.61

---

[65] Michaels, J. "The Elephant Stirs," Forbes. April 1995, 158-163.

per unit[66]. The average selling price of electricity is Rs.1.31 per unit. Price is usually less than average cost. It is a political move to buy the voters, especially the farmers.[67] In the southern State of Tamil Nadu, electricity is absolutely free in the rural areas. Though the subsidy to agriculture is not that excessive in the other states, the charge for electricity to farmers is very nominal and is always below the average and marginal cost of production. The industry, however, usually pays a much higher price to make up the difference. The proportion of free power and highly concessional power is increasing every day in many states. In a June 1994 address by Mr. G.V. Ramakrishna, Member Planning Commission encouraging privatization, he stated that in some states it is as high as 46 percent of total power sold.

Official publications by the SEBs put transmission and distribution (T&D) losses at 22 percent. Unofficial reports quote this figure at about 48 percent. Poor equipment and management are not the only reasons. According to the Economist, "... the man from the

---

[66] Approximately Rs. 35.00 equals US $1.

[67] Duncan,E. "They Can't Let Go," The Economist January 1995. 20-23.

electric company says that he can reduce your bill on a freelance basis - and because of the "jumpers" that people can attach to their power lines."[68]

Another problem of the SEBs according to the Economist is that they "*have been job creation centers for friends and relatives of politicians*". The total installed capacity of the Andhra Pradesh (AP) SEB is 5,000 megawatts. Eighty thousand people are employed by the APSEB. This figure represents one hundred and fifty times the number of people that would be employed for similar capacity in the US.[69]

The final, but most significant problem is that the World Bank and most Indians consider the SEBs today practically insolvent. According to G.V. Ramakrishna, Member of the Planning Commission of government of India: "*The commercial losses of the SEBs are mounting every year.*"[70] In the last three years alone there has been a rapid increase in the SEBs losses. They were originally Rs.3,500 crores and they have nearly doubled to Rs.6,000 crores in three years from 1990- 1993. They are unable

---

68 Duncan,E. "They Can't Let Go," The Economist. January 1995. 20-23.

69 Ibid.

70 June 1994 address by Mr. G.V. Ramakrishna, Member Planning Commission encouraging privatization.

to pay their bill for coal and power that they buy from other generators. SEBs expect a rate of return of about 3 percent on fixed assets, but in some cases it is as low as about 15-16 percent.[71] The SEBs are completely dependent on state subsidies. The problem is compounded by the fact that most of the states are not in sound financial situation. Therefore, the SEBs regularly default on payments to their suppliers.

Considering these problems, the investors are reluctant to deal with the SEBs. The fact is that the SEBs are in such debt that both domestic and foreign investors are not willing to invest in them. This does not mean that the SEBs cannot be relied upon at all. Six state governments, encouraged by the World Bank, have taken up serious reform. There are several privatization projects that are being considered. The only problem is according to the Economist: "*Bureaucrats, however, do not understand the concept of privatization*".[72] This is in spite of the fact that India consumes only 382 kilowatt hours of electricity per person per year in comparison with the US, which consumes 1,000 kilowatt hour of electricity per person per year. There is a shortfall of

---

[71] Duncan,E. "They Can't Let Go," The Economist. January 1995. 20-23.

[72] Ibid.

about 20 percent that is accentuated by the continuous and worsening load shedding (power cuts). It is estimated that in the latest five year plan (1992-'97) there will be an increase of 43,000 MW of installed capacity. By early 1995 about 12,000 MW was expected to be installed.[73] During this plan period annual economic growth was about 6 percent. In India, this requires around 9 percent increase in electric capacity per year.

It has already been established that the SEBs are in a debt situation. Therefore, it would be prudent to look for investment from private sources rather than the state. It is estimated that to bring electricity generation to the required level would require an additional investment of about $200 billion over the next twelve years ($16.66 billion per year). According to the Survey of Indian Industry 1994: "*the power supply position would be critical and it may not be possible to meet the overall economic growth targets if some bold steps are not taken to rectify the existing situation.*"[74]

Though there has been some interest in privatization, the problem seems to be "*unwillingness to*

---

[73] Ghosh, Alak. Indian Economy Its Nature and Problems. Calcutta: NBS, 1994.

[74] Saggitarius and others. Survey of Indian Industry. Madras: Hindu, 1994.

handle the inefficiencies of the public sector".[75] However, politicians and policy makers are now favoring privatization after liberalization that has taken place since 1991. "*This has two advantages from the point of view of the politician: the government will not have to finance the expansion, and the politicians will make lots of money from the backhands*". This has made the government embrace the idea of privatization with great enthusiasm.[76]

According to the Survey of the Indian Industry the objective of the government has also been to permit Indian and foreign entrepreneurs to enter the power, telecommunications and even petroleum sectors so that the central and state governments can lay greater emphasis on the execution of soil welfare programs. It is also generally accepted that "*...the desired rate of economic growth can be achieved only if there is effective coordination of the activities of the public, joint, private and cooperative sectors. Those functioning in the joint and private sectors particularly will have greater responsibilities*"[77]

---

[75] Duncan,E. "They Can't Let Go," The Economist. January 1995. 20-23.

[76] Ibid.

[77] Saggitarius and others. Survey of Indian Industry. Madras: Hindu, 1994.

Several new proposals for power generation have been submitted to the Indian government as of 1994. Thirty-three proposals for coal and gas based projects, lignite power projects and hydro based projects have been cleared and are being finalized by the parties concerned. Negotiations are underway with the central and state governments.[78] Besides the thirty-three new projects, there have been plans for modernizing existing power plants. Improving productivity and Plant Load Factor (PLF) are now the highest priority to SEBs.

There are also several detractors to the concept of privatization. With success in minimizing transmission losses and reduction in subsidies, the need to raise electricity charges uncomfortably high may be keenly felt. Besides this, new projects are going to be more expensive than the capital outlay of the SEBs. "*Twice or thrice more*" according to The Survey of Indian Economy.[79] This problem adds to the pressure of increasing plant load factor in these undertakings, much more than the SEBs. There is also the additional problem of importing heavy electric equipment and boilers by foreign companies in an effort to increase operating efficiency.

---

[78] Ibid.

[79] Ibid.

It has been argued by some that the poor and rural sector will be ignored with privatization. A proposed alternative is to reduce subsidy and a stage-by-stage expansion of power supply to non-electrified rural and tribal areas. It is further argued that: "*Though privatization and urban distribution would be attractive to investors, it will leave the power boards with the only unremunerative areas, making economic operation more difficult and even impossible*".[80]

An edge that the SEBs have over the private companies is the lower average cost. The private companies are new and have high construction costs which increases the average cost of production. Another reason for the higher average cost for the private entities is the expected higher return on investment at 16 percent while that of the SEBs is 3 percent.[81]

Counter Guarantee Issue

Another reason for the unenthusiastic response to privatization is the fact that private entities have to sell power to the SEBs which are considered unreliable. The private companies expect the central government to

---

80 Editorial. Power and The Private Sector. The Hindu. September 1994, 12.

81 June 1994 address by Mr. G.V. Ramakrishna, Member Planning Commission encouraging privatization.

"plug the hole"[82] and want a counter guarantee. This means that if the SEBs are not able to pay the bill, the money would come from the state's allocation from the central government. The central government is hesitant since the financing would come out of the central government's budget. Therefore, the government is not very enthusiastic about the counter guarantee requirement.[83]

Counter guarantees have been the subject of much discussion since the privatization process began in 1991. Only two projects have been provided counter until now. The other six have only been promised. There are some alternatives to counter guarantees, but they are not without their limitations. The first alternative involves a certain percentage of the SEBs revenues or revenues from their best customers which is placed in an escrow account where the private investors, called Independent Power Producers (IPP), have the first charge. The disadvantage in this practice is that it would support only a few projects. Also, some of the less industrialized states do not have enough industrial customers to support major expansion of capacity through

---

82 Duncan,E. "They Can't Let Go," The Economist. January 1995. 20-23.

83 Ibid.

the IPP route. The second alternative is an escrow account of some of the states allocated plan funds. This type of account is however, no different from a counter guarantee.

A third alternative is privatization of distribution. This means that the SEBs would be in a worse situation than earlier as they would lose their best customers. A fourth option called "blended guarantees", is where the guarantee comes from the World Bank. Under this option, the government pays the promoter if the project is terminated due to some reason outside the control of the promoter/lender. The World Bank only guarantees the commercial lenders, not the multinational agencies. This association with the World Bank could make the project attractive to its lenders.[84]

The ultimate goal of all the IPPs is to secure a return on their investment. To do so they expect some kind of government guarantee. Their aim is to reduce risks, as their customers the SEBs, are bankrupt.[85] Although there have been many problems with counter

---

[84] Ganguli, B., "Regaining Lost Glory," Business India. May 1995, 72-76.

[85] Ibid.

guarantees, it may be a more expeditious route to privatization than without guarantees.

India has to develop its power sector to benefit from maximum linkages to achieve the status of a developed country. The bankrupt SEBs are not equal to the task and international lending institutions will not lend to them anymore. There are several benefits to privatization and many developed and developing countries have practiced it with a high degree of success. This is an option that India should consider to meet its growing electricity needs.

CHAPTER IV

THE ENRON POWER PROJECT

The Enron Project was chosen in this analysis, as it is the first project of its kind in India. This project is also unique in that it was approved initially and then canceled due to political reasons and is in progress again after a series of renegotiations. It is also the biggest private sector project in India and its success or failure will be an example for future private power projects. This chapter describes the history and the salient features of the project.

The Enron project is a 695-megawatt (MW) combined cycle gas-based power plant in Dhabol in the state of Maharashtra, India. Set up by the Enron Corporation, it is to operate as a base load station for the State. It is to be expanded to a 2,015 megawatts as part of Phase II of the project, pending SEB approval.[86]

Enron is a conglomerate based in Texas, USA that primarily deals in electricity, oil and natural gas. In 1993, Enron and its affiliates earned revenues of $7.97 billion with profits of $333 million. Enron and the

---

[86] Hattangadi. The Enron Controversy. Frontline. July 1995, 30-42.

Bechtel Group Inc. are partners in this project. The Bechtel Group is mainly involved in construction, oil, natural gas and some financial services. The Bechtel Group is a closely held company and much information is not openly and easily available. Although profits for the group are not known, the sales of the group were about $7.8 billion in 1992. Enron and the Bechtel Group incorporated the Dhabol Power Corporation of India, which was the construction contractor. General Electric, was the equipment supplier. General Electric is a Fortune 500 company dealing with a myriad of products from aircraft engines to electronics. It is the largest manufacturer of power turbines in the world whose 1993 revenues were at $60.9 billion.

The Dhabol Power Corporation project was offered to Enron after a visit to the US by an Indian delegation, which included several high-ranking officials of the Indian government. The offer was made to Enron without any competitive tendering or bidding process. Enron, in turn, also did not competitively bid out in order to get the plant and equipment for the project. In April 1995, the Purchase Power Agreement (PPA) and other documents related to the project were revealed. The general belief, when the documents were revealed, was that there was

predatory project cost padding, an inflated tariff structure that ensures indexation and high returns and that the Indian side has been a willing party to this arrangement. The documents include a 199 page PPA and accompanying schedules of about 120 pages. It also included a guarantee issued by the state of Maharashtra dated February 10, 1994 and a counter guarantee offered by the Union Ministry of Finance on behalf of the government of India dated September 15, 1994. Objections raised, to the term allowed to the foreign investors, by an Advisory Committee that consisted of experts from the Industrial Development Bank of India (IDBI) was ignored, ostensibly due to pressure from high ranking government officials in Bombay and New Delhi.[87]

These documents revealed that the project would cost Rs.4.36 crores/MW. The day the PPA was signed (December 8, 1993) the Maharashtra State Electricity Board (MSEB) issued a press statement stating that the cost was Rs.4.41 crore. The DPC will sell power to the MSEB at the rate of Rs.2.65/kWh in 1997 and the rate is expected to go up considerably thereafter. They were to maintain an average PLF of 90 percent. Specifically it was to be 92 percent during the eight peak non-monsoon months and

---

[87] Ibid.

86 percent during the off-peak months. The arrangement to be financed by the IDBI to the tune of Rs.700 crores was guaranteed by the Maharashtra State government and counter guaranteed by the government.

Cost Structure of the Project

The following table shows some of the major costs incurred by the Enron project and their share of the total cost.

Table 2 Enron Costs by Components

Components	Cost (Rs. Crores)	% of Cost
Power Generating Equip	610.0	25.42%
Technical Consultany Fees	35.2	1.47%
Initial Development Work	86.4	3.60%
Preliminary Expenses	62.7	2.61%
Pre-operative Expenses	547.4	22.81%
Fuel Management Fee	80.5	3.35%
Insurance	73.6	3.07%

Source: PPA between DPC and State of Maharashtra.

The cost of power generating equipment is Rs.610 crores, a fourth of the overall project cost. Fees for initial development work has been hitherto unknown in India, but this has been allowed to the project that total Rs.86.4 crore. This "Development Fee" is nearly 4 percent of the project cost. Objections were raised to the fact that many of these costs were being paid to affiliates of Enron. An example is the technical

consultancy fee (1.5 percent of total cost) paid to Owner's Engineer a part of Enron Mauritius Services Company. The Operation and Maintenance (O&M) contractor is an Enron affiliate, Offshore Power Operations CV (Operator), Netherlands. The Fuel Manager of the project is Enron Fuels International Inc. They have been appointed to negotiate, deliver, store and maintain all fuel and related activities for an annual fuel management fee of $2.5 million.[88]

Rs.62.72 crores was added towards meeting preliminary expenses. This was to meet travel expenses, salaries, legal expenses and administration by the promoters. The break up of the Rs.547.26 crores that was set aside for 'pre-operative expenses" was unclear. About 29 percent of all costs were project unique costs. Insurance cost was 4 percent of the total costs and was Rs.73.6 crores. The insurance cover was to be provided by foreign companies. Subordinate unsecured loans by a syndicate of international banks may give the promoters their contribution initially. It could later be replaced by equity.

---

[88] Ibid.

Objections to the Agreement

A panel of experts from the IDBI raised objections to the agreement. These objections made in May 1994, were considered but were set aside rather quickly by both the central and state governments. It was concluded that aside from those objections, the project was supportworthy.

The Executive Director of IDBI called the project supportworthy. He said in a statement to the Executive Committee of IDBI in June 1994 that it would "*result in single largest foreign investment in the country to date after the announcement of liberalization policy for private sector participation in power*". He further said the project had the virtue of being in "*the infrastructure sector having linkage effects on the economy of the region*".

Based on this the Executive Director recommended a Rs.250 crore rupee term loan plus Rs.450 crore project guarantee assistance to the project.[89]

---

[89] Mitra, N., "Private Projects are Cheaper," India Abroad. February 1994, 28.

The main concerns of the Advisory were in the area of the cost of the project and the tariff structure. The committee made the following observations:

- Cost on high side
- High preliminary and pre-operation expenses
- no competitive bidding procedures for selections of major plants and machinery
- high cost of insurance
- high foreign exchange outgo
- concern about DPC's ownership incorporation in the island of Mauritius

Enron was of the opinion that the costs were reasonable. The second objection was to the preliminary and pre-operative expenses. From Table 2 it can be observed that the latter was a little over a fifth of the total cost. The Committee remarked that the costs were "on the high side" and the Enron reiterated that they were reasonable.

There were concerns that no competitive bidding procedures were followed for the selection of major plants and machinery. Enron's reply was that "*the PPC contract was finalized after hard negotiations lasting*

several months between Enron on the one hand and GE/Betchel combine on the other, resulting in a substantial price reduction by about $150 million". The justification for appointing a fuel manager at a fee of US $2.5 million per annum especially when it could be done either by the O&M contractor or by DPC itself was countered by Enron saying that the cost was reasonable and that they were both specialized fields.

The Committee's objection to the high cost of insurance of Rs.73.6 crores and foreign insurance companies were extending the cover was set aside by Enron by saying that the high cost of the insurance was preferable both to the interest of the project and also to the institutions. Enron also doubted that any Indian insurance company could offer such a comprehensive package. It was expected that the annual foreign exchange outgo was to be Rs.965 crore (Rs.507 crore on fuel, Rs.97 crore on O&M including the fuel management fee, and Rs.361 crore on profit repatriation). According to Enron, the Foreign Investment Promotion Board (FIPB) of the Indian government had "examined and found acceptable the aspects relating to import of fuel, foreign exchange outgo and deviation from Government of India tariff notification including return on equity".

The final concerns were about the DPC's ownership structure, with special reference to incorporation in Mauritius. Enron clarified that this was resorted to in an effort to reduce the burden of taxation on the US investors and the projected dividends/distribution exceeded the profits earned, and that there "was substantial reduction in the equity share capital of the company during the period of the loans." The Indian team was not satisfied with the Enron clarification.[90]

Analysis of Costs

One of the cost comparisons done in this project was for the foreign lenders by the US based consulting company, Stone and Webster (S&W). S&W compared five other similar projects of unnamed combined cycle plants in the US and Western Europe. The comparison was based on DPC's original cost of the power plant, which increased later. S&W found the power plant's cost to be competitive. However, this study was considered flawed because S&W did not reveal the five other projects names "on the grounds of confidentiality". Also, the study was based only on power plant costs and not on the basis of all costs.

---

[90] Hattangadi. The Enron Controversy. Frontline. July 1995, 30-42.

The Advisory Committee had made a comparison with NTPC, which was not brought to the attention of the IDBI's Executive Committee. The opinion of the Advisory Committee was that the "cost of the Dhabol project was high when compared to the 645 MW gas based Kawas project implemented by the NTPC in Nov 1993 at Rs.2.4 crore".[91]

Tariff Structure

In 1992, the government of India presented a two part tariff model that was novel to India. One part was meant to reward fixed costs undertaken and the other to provide return on variable costs. The Dhabol project did not follow this model, but the Central Electricity Authority (CEA) approved it. It was agreed that the plant would have some excess capacity to service the peak periods that usually occurs during the day.

The DPC's tariff is divided into two components:[92]

(1) The Capacity Charges and payments, covering fixed costs, consisting of the following:

- return on equity
- interest on working capital

---

[91] Mitra, N., "Private Projects are Cheaper," India Abroad. February 1994, 28.

[92] Hattangadi. The Enron Controversy. Frontline. July 1995, 30-42.

- interest on term loans
- taxes on income
- dividend on equity
- fixed (O&M) operations and maintenance costs.

(2) The Energy payments covering variable costs consisting of the following:

- fuel payment
- variable O&M costs
- fuel management fee
- hot and cold start fee.

The project was to be financed by debt and equity raised by the promoters and serviced by a portion of the capacity charge component of the tariff.

Clauses 10.1 and 10.2 of the PPA describe how the capacity payments are worked into the agreement. One component is the rupee capacity charge, to provide returns on rupee investments. It is meant to service rupee denominated O&M expenditure and debt service. The other component is the real rupee capacity charge component to calculate the non-rupee capital recovery, especially the investment made in dollars. It is meant

to service dollar denominated investment equity and debt and non-rupee denominated O&M payments.

The tariff charged was considered to be built around the inflated cost structure of the DPC. Some critical assumptions that were made included a 7 percent inflation in India and a 2.5 percent inflation in the US and there is a rupee-dollar exchange rate of Rs.35. Based on these assumptions, the tariff was to increase from Rs.2.65/kWh in 1997 to Rs.3 in 2005. During the same period profits after taxes were expected to increase from Rs.140 crores to Rs.334 crores. Dividends were expected to rise from 15 percent in 1997 to 37 percent in 2005.[93]

Most variable costs were to be passed on to the Maharashtra SEB making the project virtually risk free for the multi national company.

The various fees including management fees, testing fees and commissioning fees were all indexed in an escalating factor. Variable O&M payments also figured in the formula used to compute fuel costs.

---

93 Ibid.

The capacity charge had an inbuilt tax revision factor called "tax incremental charges". Any change in taxes would mean an increment in charges based on a formula. The same was true of insurance too. Clause 16 of the PPA provides for force majeure. It included strikes, lockouts and other industrial actions and disputes.

Enron was very specific about the stiff penal clauses written into the agreement. If the PLF fell below 90 percent, then the penalty would be in the favor of the MSEB. However, in off peak periods the MSEB would have to shut down cheaper power stations and buy from the DPC even though it would be more expensive because it was to be the base load station. This could have been a drain on the resources of the MSEB.

Secrecy in the PPA

The PPA signed between DPC and MSEB was key to the deal. It was believed to protect the promoting company. Since the beginning of privatization in India in 1992, considerable cost padding by the promoting company was expected in order to ensure return on equity. The perception of secrecy surrounding the project costs has enabled the project's costs to be changed considerably.

The general conclusion was that the PPA was often hidden from the public to benefit the promoter.

The PPA consists of the tariff structure and the method by which the price of electricity is computed. The first part of the PPA between the DPC and the MSEB consists of the legal underpinning, while the other schedules contain the various parameters of the contract. Stripped of all the legalese, the first part was meant to protect the promoter (DPC) by providing the legal boundaries of the contract. This showed that Enron had the better bargaining position and that there was very little scope for negotiation on the part of the MSEB.[94]

The second part of the PPA dealt with the tariff structure. This has been described in detail earlier. Briefly, Clauses 9 and 10 of the tariff structure dealt with the manner in which capacity charges and energy payments and therefore tariffs are computed. Changes in the rate of interest, taxation and insurance were all built into the capacity charge component of the tariff. Fuel management fee (paid to Enron Fuels International Inc., an Enron affiliate) along with other payments and

---

[94] Ibid.

fees for energy went into the energy component of the tariff.

The confidentiality clause (Clause 21, page 115) read: *"...both parties shall at all times during the continuance of this agreement and for a period of three years following the termination:"*

"(a) use their reasonable endeavors to keep all information regarding the terms and conditions hereof and any data and information acquired under and pursuant to this agreement confidential and accordingly neither part shall disclose the same to any other person." Showing that the contract was skewed in favor of the private investor.[95]

Critics concluded that the Indian power program based on the American model is not very American since it did not follow the American standards of transparency. In the US, the agreement reached between the private power authority and the government is a public document, and there are, as a matter of course, hearings before the project is cleared to answer the citizen's questions. This was not the case in the PPA between the DPC and the MSEB. More importantly, the PPA violated the "right to know requirements" of Indian citizens.

Enron's Clarification

Due to the criticism from various sources, the DPC issued a clarification in June 1995. In order to bridge the shortage between the demand and supply of power in India, it would take ten to fifteen projects similar to the DPC every year. India realized this discrepancy between supply and demand when it decided to liberalize the past policy and invited bids from various companies. Enron claimed that one such bid was from the Enron, GE and Betchel group and that they were among the first to respond.

Issue of competitive bidding: The initial memorandum of understanding between the companies and the Maharashtra government was signed in June 1992. At the time of signing the MOU, there was no practice of competitive bidding in India. The policy began in India in 1995 and before that over 150 MOUs had been signed without competitive bidding. The Bombay High Court said: "*Tendering may not have been an appropriate mode*" thereby supporting the investors. The process of negotiating is an accepted process in several countries including China, the Philippines, Argentina, the UK and the US. If there was competitive bidding instead of negotiations, the

---

95 Ibid

government would have had to prepare elaborate bids that would have taken two to three years. The DPC be up and running in the same period of time thereby reducing the gap between demand and supply and not be a drain on the resources of the country.

Lack of transparency: Enron claimed that twenty-seven different government agencies looked at the contract before approving it. Therefore there was no room for secrecy. The Bombay High Court confirms this: "*The proposal was deliberated at length for two and a half years. Draft agreements were reviewed from time to time and it was ultimately the eighth draft that was finalized*". This implied that there was transparency at every stage of the negotiations. Enron further claimed that there was no secret clause and there was a standard confidentiality clause meant to protect both the DPC and the MSEB during the negotiations period.

Allegations of cost padding: One of the more serious allegations against the DPC was cost padding. DPC said it would supply power to the MSEB at Rs.2.40 per unit in 1997. In reality, when compared to the price ranging from Rs.2.39 to Rs.2.54, the DPC's cost would actually be cheaper than most private companies and some planned

public companies. Perhaps the most important aspect about cost of electricity was that it would be known so much in advance in the case of the DPC while it is unknown in all other cases.[96]

The Standing Committee on Energy of the government India stated that there would be a nominal increase in the price of electricity in the State of Maharashtra because of the DPC. Enron also said that there were cost overruns of 50-100 percent in all public sector projects and in the case of the DPC any cost overruns it would be at the expense of the company. The Standing Committee on Energy supporting the claim of Enron said: "*the Dhabol project has been criticized on its high capital cost... In actual fact it has been developed at a high level of performance and assumption of considerable risk*".

Environmental Safety: One of the complaints against the DPC was that there would be considerable environmental degradation. The villages surrounding the project are rural areas that are dependent on fishing for their living. They feared that if they were to have the DPC as their neighbors the fish would be killed and they would be deprived of their livelihood. The DPC defended

---

[96] Enron Press Release in June 1994.

its project saying that it would be one of the most environmentally friendly projects as it uses a gas turbine technology that is new to India. This meant that the plant emits less pollutants than a coal based plant. Most of the water used would be from the sea and it would be discharged into the sea as well. Therefore, there would be no effect on the horticulture and that there would be no rise or a very negligible rise in the temperature. The company went further and reassured the fishermen that their livelihood not be harmed. They said that the severe water shortage in the neighboring areas would be solved since the plant would provide clear drinking water through a newly constructed pipeline to all the villages of the vicinity. The DPC also said that it planned to open schools, an industrial training institute and a hospital in that area thereby contributing to the growth of the area.

Based on this it looked like Enron was willing to make some changes to retain the project. One example that they were going to change from using oil distillate as a fuel and using naphtha in its place. This would bring down the cost of producing from Rs.0.10-0.30 per unit of power generated.

The Termination of the Project

A committee set up by the newly elected Maharashtra government, which was politically opposed to the Enron project, was to decide the future of the giant power project on June 7, 1995. However, in light of the fact that extensive investigations had to be made the decision was postponed by a month. Gopinath Munde, the Deputy Chief Minister and Energy Minister of the State of Maharashtra was the head of the committee. He was questioning the MSEB's high-ranking officials about their depositions. It was at that time that the DPC and Enron clarified the accusations that were made about the project.[97]

Simultaneously, the US Department of Energy (DOE) stepped in endorsed the Enron project. The department warned the government of India that if it did not honor the deal made between Enron, Betchel, GE and the MSEB and the government of India it 'will jeopardize not only the Dhabol project but also most, if not all, of the private power projects being proposed for international financing'. The US DOE reiterated that the Dhabol project had sent a positive signal to all future

---

[97] Hattangadi. The Enron Controversy. Frontline. July 1995, 30-42.

investors and that they were doing this at the insistence of most US businesses that had considered the Dhabol project to be a test case of privatization in India.

This warning by the US Department of Energy did more harm than good. It did not help that the US Department of Energy had prefaced the warning with the fact that they strongly supported the efforts of liberalization in India. The interference of the US government gave some the impression that there was something that Enron was trying to cover up something in the Dhabol deal. The British Chancellor of the Exchequer, Kenneth Clarke also put his solidarity behind Enron. All this only worsened the situation with the politicians vowing not to succumb to foreign pressure.[98]

By the end of June there was no official word about the scrapping of the project and Rebecca Mark the CEO of an Enron subsidiary said that she was willing to negotiate with the Government of Maharashtra to make the project 'more meaningful'. However, on June 28, 1995 there was a leak to the press, from a source close to the committee that was reviewing the project, that the committee had decided to scrap the project. Not only had

they decided to scrap the project, but they had also decided to concentrate on the two state projects of Nagathone and Khaparkheda as alternatives to meet the growing electricity needs of the MSEB.

As of July 1995 the recommendations of the committee were submitted to the Chief Minister of Maharashtra. In the first part of August, the public did not know the recommendations, but Rebecca Mark had reiterated that she was willing to renegotiate the deal to make it more suitable for the State. By the end of August, the Munde Commission made public its decision to scrap the Enron project. The report had five major complaints against Enron: the absence of competitive tenders, unusual secrecy and absence of transparency, sanction of exorbitant capital cost of the project, escalatory power tariff, and absence of special care for the environment.

Salient Features of the Munde Committee Report

The following are some of the major objections to the Enron project and the reasons for justification of scrapping the project:

---

98 Ibid.

Presence of cost padding: The committee concluded that the cost was padded by at least 25 percent. It based this view on a study by the US based Advanced Light Water Rector Program (ALWR). The Committee said that Enron overstated the cost of its Teeside project in UK by at least 50 percent to justify the high costs of the DPC. The committee also contended that the cost is greater than that of other fast track projects in India. It cited the example of other projects like Jerupadu and Godavari are in the range of Rs.3.52-3.60 crore per MW. The other two mentioned are also gas-based projects like the DPC project. The report also said that the World Bank had been against the project from its conception, stated that the DPC should use local coal or gas versus imported gas since the state otherwise would not be able to absorb the costs.

Lack of competitive bidding: The report asserted that even though competitive bidding was not available at that time, other companies should have been asked to bid on the Dhabol plant. It maintained that the MSEB did this for its other projects in Nagathone and Kharperkheda. They concluded that such a project would not only be a burden on the MSEB, but would also weaken the credit position on the MSEB in the future. They

reiterated that in an effort to hurry the project, the government clearances were hastened through false declarations to make it look like the DPC had completed all of its obligations.

Possibility of windfall profits: Furthermore, the report also claimed that Enron would stand to make substantial profits if it went public and sold its shares in India. The report stated that Enron would make Rs.2,500 crore by selling shares even before it invested a single dollar in the project. Both the CEA and the World Bank had stated that the original MOU was one-sided in favor of Enron. The Report went further to suggest that the entire PPA was one-sided against the MSEB.[99]

Reaction to the Munde Commission Report

The report was considered by some to be political to undermine the worth of the previously elected Congress Government in Maharashtra. However, the decision to scrap the project received some support from unexpected sources. Columbia University professor of economics Jagdish Bhagwati, an ardent supporter of opening the economy in India and privatization in India, said that

[99] Hattangadi. The Enron Controversy. Frontline. July 1995, 30-42.

the scrapping of the project was a good decision because of the lack of transparency in the deal. He reiterated: "This should be an example for other states not to follow the Maharashtra example." University of Maryland Professor Arvind Panagriya, justified the scrapping on the basis that there was no competitive bidding and that the visit of then US Commerce Secretary Ron Brown would have had an unfair influence on signing of the contract.

Impact of Scrapping of Enron Project on Privatization

In spite of the fact that the decision to scrap the project was supported by some renowned economists, the project would have nonetheless had some impact on the liberalization policy in India. The Munde panel could not establish certain irregularities and corruption in the execution of the deal. The counter guarantee that the government of India signed would therefore stand. As a result, India was looking at compensating the DPC approximately Rs.1,000-1,500 crores.[100]

Scrapping of the project added to an existing impression of instability in the country and therefore substantiating the notion of high risk to involved in loans to infrastructure projects. This would have

---

[100] Hattangadi. The Enron Controversy. Frontline. July 1995, 30-42.

increased the interest rate by as much as a percentage point for at least a year and delay projects that were already approved. Further, the Central and State governments would have to be more cautious about the projects that they approve assuring competitive bidding. The process of competitive bidding could delay projects by as much as two years.

Since cost padding was a big issue in the scrapping of the project, some other scheduled projects like Cogentrix in Nandikur in the state of Karnataka would try to reduce their costs. As it was widely believed that the change in the government had caused the Enron project to be reinvestigated and scrapped, it is likely that future investors would wait at least until after the elections to make any investment decisions.

The PPA was signed willingly by the MSEB making it very difficult for the Maharashtra Government to declare it as void. This was backed by the Bombay High Court as well and DPC asserted that the PPA is still enforceable. The final bill for the Maharashtra government for repudiating the agreement with the DPC was estimated to be anywhere between Rs.900 crores ($300 million) and Rs.1500 crore ($500 million). DPC had merely put the sum

at higher than $300 million meaning that it had kept the size of damages that it will claim open.

Impact on Other Private Power Projects Underway in India

The process of privatization of power in India was a major undertaking that received a lot of attention. It seemed to be reaching an unsuccessful conclusion. The failure to provide reasonably precise guidelines for promoters to follow for project approval had meant that interest had not translated into actual investment. It appeared as if much of the problem that privatization was facing would have been resolved had they: "sought investment proposals through a well-structured and fair system of competitive bidding."[101]

The two projects in the Indian state of Andhra Predesh at Kakinada and Jegurupada have their revised PPA under negotiation. American companies are promoting both these projects. The former is a 208 MW, Rs.3.59 crore/MW project while the latter is a 235 MW, Rs.3.52 crore/MW project. The third one in Vishakapatnam is promoted by the Hinduja/National Power and is a joint venture with UK, German and French firms. The 1,000 MW project that costs Rs.4.80 crores/MW is at the stage where its financing package has to be approved by the CEA. AES

---

101 Ibid

Transpower an American company is promoting the 420 MW, Rs.4.75 crore/MW Ib Valley, Orissa project. This is awaiting approval from the new state government due to the fact that some technical issues have to be sorted out. The PPA of the ST Power/CMS promoted project in Neyveli, Tamil Nadu is under review. This is to be a 250 MW plant in Badravati. It is promoted a joint venture between UK, Germany and France. The PPA of this 1,072 MW Rs.4.82 crore/MW plant is yet to be submitted.

The most popular project besides the Enron one is the Cogentrix project. The cost per MW of this 1000 MW project is not available yet. There have been six clauses that were asked to be dropped from the PPA, after the scrapping of the Enron deal, by the CEA. Ronald Somers, CEO of Cogentrix, India said: "The message is loud and clear. The issue is transparency, and we want to make sure we do this correctly." Cogentrix Vice-President J.E. Freeman Jr. echoed the same sentiment when he said: "It's been a steep learning curve and the other companies are going to take advantage of this."[102]

---

102 Hattangadi. The Enron Controversy. Frontline. July 1995, 30-42.

CHAPTER V

THE NATIONAL THERMAL POWER CORPORATION CASE

The National Thermal Power Corporation is the biggest power generating company in India. The commissioned capacity since its inception in 1975 is 14,000 MW, and its approved capacity is 16,835 MW.[103] This forms 26 percent of the total thermal capacity of the country and 18 percent of the total capacity. The growth of the company has been rapid. This success is reflected in the fact that the company's generation in the year 1992-93 accounted for 29.4 percent of thermal generation and 26 percent of the total generation of the country. In spite of its consistent performance, the NTPC has been overshadowed recently due to the interest generated by the various Independent Power Producers (IPP). These include besides Enron other foreign and domestic companies that are attempting to set up projects in India. Since the NTPC started producing power this has been the first time that it has been overshadowed by other projects.

---

103 Ganguli, B., "Regaining Lost Glory," Business India. May 1995, 72-76.

High Plant Load Factor

NTPC has always shown better performance when compared to State Electricity Boards (SEBs). This is evident from a PLF of 76.5 percent in 1994-'95 as opposed to the national average of 60 percent. The PLF indicates the extent of capacity utilization. Maximum capacity utilization is of utmost importance in India that suffers from acute power shortages. On an average the shortage is 9 percent while it is as high as 20 percent in the peak periods. If all power plants perform around 65 percent there would be no power shortage. The NTPC has a large capacity base the PLF in 1992-'93 was a high 77 percent.

Objectives of NTPC

One of the reasons for the success of NTPC lies in its goals. In 1992-'93 the objectives included

- achieving a plant availability of 85 percent for the company as a whole;
- optimizing the input cost of generation by conserving energy through substantial reduction in auxiliary power consumption, heat rate, specific oil consumption, make up water and other operational and maintenance expenditure; and

- formulating definite program for ash utilization as an integral process of power generation.

The other objective was making significant improvements in the functioning and effectiveness of all the technical systems related to the environment and pollution control.[104]

NTPC took definitive steps in meeting the above mentioned goals. They included maximizing PLF, minimizing the extent of backing down of generation through appropriate reduction in mismatches between grid requirements, schedule of generation and actual generation.[105] NTPC believes that through predictive and preventive measures the availability of NTPC stations can be compared to that of international projects.

Joint Ventures of NTPC

There has been considerable capacity addition by the NTPC during the 1980's. Throughout, NTPC has been reorganizing itself and anticipating the emerging scenario in the energy sector and sought alliances with

---

104 Sashi, M, "The Success of NTPC," Business India, May 1995.

105 Ibid.

private sector companies that have complementary strengths and competency. There was a successful joint venture with Spectrum Technology for setting up a 208 MW station in the state of Andhra Pradesh.

New NTPC Stations and their Financing

The World Bank has given the NTPC a $1.2 billion loan that is to be used to set up three new projects. They include a 1,000 MW coal- fired plant in Vindyachal in Madhya Pradesh state.[106] Another 1,000 MW coal fired plant in Rihand in the state of Uttar Pradesh and a 400 MW gas fired plant in Kayamkulam in Kerala. The World Bank will fund about 45 percent of these projects, while NTPC will contribute 30 percent equity and other borrowings will amount to 25 percent. The final project is awaiting approval. The State of Andhra Pradesh has decided to offer a 1,000 MW thermal project to the NTPC and also the execution of a 650 MW naphtha run plant in the capital city of Hyderabad to the NTPC.[107]

Apart from the World Bank, financing of the above schemes is possible by an internal resource mix, bond

---

106 Ganguli and Singh, Power Projects in India. Business India, June 1995.

107 Ibid.

issue and external commercial borrowing and the Asian Development Bank. The Unchahar plant in the State of Uttar Pradesh to create an additional 420 MW with the Asian Development Bank ADB. Within the next four to five years the capacity of NTPC is poised to increase to 25,000 MW.[108]

---

[108] Ganguli, B., "Regaining Lost Glory," Business India. May 1995, 72-76.

CHAPTER VI

COMPARISON OF ENRON AND NTPC PROJECTS

There are many similarities between Enron and NTPC that makes this an ideal project to compare with the new Enron project in India. NTPC was set up by the government of India to bring some discipline to the entire electric sector in India. For example the SEBs are 100 percent debt financed with no equity whereas NTPC has a debt equity ratio of 70:30. NTPC also maintains a very high PLF. NTPC does not offer any subsidies as it serves high cost loads, namely commercial and industrial.

Table 3 compares and contrasts some of the features of the Enron project versus NTPC in India. The features are discussed in further detail in the chapter below.

Table 3 Features of Enron versus NTPC

Features	Enron	NTPC
Capital Cost	$26.2 million	$25 million
Debt/Equity Ratio	70:30	70:30
Subsidy	No	No
Environmental Factors	Comprehensive environmental management plan	Committed to improving the ecology

Capital costs: Considering the fact that there are so many new projects at various stages it is understandable that there would be higher capital costs and tariffs. The completed project costs for the thermal plants are going to be $25 million. The tariffs are scheduled to be below Rs.2.00 per kWh[109]. The Enron project has been renegotiated since late 1995 when it was threatened to be rejected by the local state government. The new government has approved the renegotiated deal. Capital cost has been reduced from $40.3 million to $26.2 million. The tariff of the Enron project is around Rs.2.00 per kWh and it is expected to fall to Rs.1.86 in the second phase of the project expected to go into operation in 1999.[110]

Debt Equity Ratio: Previously NTPC employed a 50:50 debt equity ratio for financing the projects. Now there is a 70:30 debt equity ratio similar to that of the various IPPs. In the initial deal Enron was supposed to get 90 percent debt and the Maharashtra State Electricity Board (MSEB) was to get only 10 percent. With the new

---

[109] Sashi, M, "The success of NTPC," Business India, May 1995.

[110] Hattangadi. The Enron Controversy. Frontline. July 1995, 30-42.

deal the debt equity ratio is similar to that of the NTPC with a 70:30 ratio.

Environmental Considerations: Charges of environmental degradation have been leveled against the power industry. NTPC has institutionalized a comprehensive plan of environment management. NTPC has tried to use ash effectively and a policy has been put in place to promote use of fly ash and fly ash based products. Agreements have been signed with a few companies to make bricks out of fly ash. The Resettlement and Rehabilitation part of the plan is designed to help the people that are even remotely affected by the acquisition of land.[111] The new deal made by Enron has looked at the environmental issues that it was earlier accused of ignoring. Enron in displaying its commitment to improving the ecology in the area surrounding the project has agreed to pay the monthly cost of air and water surveys by the Maharashtra State Pollution Control Board in the vicinity of the plant. Dhabol Power Company the Indian subsidiary of Enron has agreed to plant mango and cashew trees on a 15 hectare land surrounding the plant. They have also assured that

[111] Sashi, M, "The success of NTPC," Business India, May 1995.

the effluence from the plant does not affect the marine life around the area. Dhabol has agreed to employ at least one family member of the families rendered landless because of the project. In addition, they have agreed to build a park, a 50 bed hospital and ensure that the families get good drinking water from the company's pipeline.[112]

Life Cycle Cost Analysis

The following life cycle analysis will show if it is economical to attract private capital to India to provide for its electricity needs. The comparison is between NTPC and Enron's Dhabol project over the next twenty-five years.

Assumption: This analysis is based on the assumption that the start up expenses associated with the Enron project is not considered in the analysis. The rationale behind this assumption is that irrespective of whether the investment to build a new power plant is domestic or foreign the start up expenses would be incurred. Cost of electricity per unit is the same for both NTPC and Enron. Therefore, it is not included in the analysis either.

---

[112] Hattangadi. The Enron Controversy. Frontline. July 1995, 30-42.

Discount Factor: It is expected that the cost of borrowing for Enron will be lower due to the Government of India's counter guarantee for the project. The counter guarantee lowers the risk of investment in a project for the lenders. This combined with the fact that the investment risk is lower for Enron further lowers the interest rate for Enron by the foreign investors. This study proposes to use the cost of capital (weighted average of the return of debt and the return on equity) as the discount factor. The discount factor to be used for NTPC will the same as the one for Enron. The following table shows the calculation of the discount factor. The after tax discount factor is used in this analysis.

Tables 4 and 5 detail the calculation of the discount factor. The March Value Line was used as a source to find the Long Term Debt (LTD), Common Equity (CE) and Public Stock (PS) values. These are shown in Table 4. Table 5 calculates the discount factor. The After Tax Cost of capital (ATCOC) is 10.2 percent. This figure is adjusted for taxes and the discount factor of 13.2 is obtained.

Table 4 Enron's Stock Value

	Principal	Interest	Rate
LTD	$6.931	$0.550	7.94%
PS	$0.134	$0.014	10.52%
CE	$4.885		
Total	$11.950		

Source: Value Line Publication, March 1998

Table 5 Calculation of the Discount Factor

	Principal	Percent Total	Rate	ATCOC	Tax Factor	BTCOC
LTD	$6.931	58.00%	7.94%	4.60%	1.00	4.60%
PS	$0.134	1.12%	10.52%	0.12%	1.53	0.18%
CE	$4.885	40.88%	13.40%	5.48%	1.53	8.38%
Total	$11.950			10.20%		13.16%

Source: Value Line Publication, March 1998

Inflation and Interest Rate: Over the past five years inflation has ranged between a low of 5 percent and a high of 9.5 percent. Consequently, for the purposes of this analysis, an average inflation rate of 7 percent was used. An interest rate of 10 percent was used.

Components of Enron's Annual Cost: The capital costs in the Enron case include both the principal and the interest. Enron's capital costs are expected to be $26.2 million. The capital costs are amortized over twenty-five years at a 10 percent interest rate. O&M and fuel management are expected to be $714,000 per annum. Start up expenses are projected to be $18 million. G&A

expenses are expected to be due to high consultancy fees and development work in the magnitude of $10 million. The cost is split over twenty-five years and escalated at the inflation rate of 7 percent. The cost per kilowatt-hour that Enron plans to charge is $0.05314.

Components of NTPC's Annual Cost: NTPC's capital costs are $25 million. This cost is amortized over the twenty-five year study period. Since the system that NTPC owns and operates is not new, there will be normal wear and tear and replacements that are required. These are assumed to be 3.3 percent of the capital costs (the entire plant will be replaced in 30 years) or $833,333 per annum. O&M and A&G expenses are expected to be $1 million per annum. Both the system replacement costs and the O&M and A&G expenses are inflated at 7 percent over the twenty-five year study period. The cost of per kilowatt-hour that NTPC charges is $0.05314.

Net Present Values: The net present values over twenty-five years are calculated for both Enron and NTPC options and shown in Tables 6 and 7 respectively. As can be seen from the tables the net present value of the Enron plant is $45.0 million while the net present value of the NTPC plant is 56.3 million.

Table 6 Components of Enron's Net Present Value

Year	Electric Power Purchases	Capital Costs	Start Up Expenses	O&M Expenses	G&A Expenses	Total Annual Cost	Discount Factor	Present Value	Cumulative Present Value
1998	n.a.			$714,000	$400,000				
1999	n.a.	$2,856,955	0	763,980	428,000	$4,048,935	0.90746	$3,674,228	$3,674,228
2000	n.a.	2,856,955	0	817,459	457,960	4,132,374	0.82348	3,402,908	7,077,137
2001	n.a.	2,856,955	0	874,681	490,017	4,221,653	0.74727	3,154,703	10,231,840
2002	n.a.	2,856,955	0	935,908	524,318	4,317,182	0.67811	2,927,532	13,159,372
2003	n.a.	2,856,955	0	1,001,422	561,021	4,419,398	0.61536	2,719,504	15,878,877
2004	n.a.	2,856,955	0	1,071,521	600,292	4,528,769	0.55841	2,528,903	18,407,779
2005	n.a.	2,856,955	0	1,146,528	642,313	4,645,796	0.50673	2,354,168	20,761,947
2006	n.a.	2,856,955	0	1,226,785	687,274	4,771,015	0.45984	2,193,883	22,955,830
2007	n.a.	2,856,955	0	1,312,660	735,384	4,904,999	0.41728	2,046,760	25,002,590
2008	n.a.	2,856,955	0	1,404,546	786,861	5,048,362	0.37866	1,911,630	26,914,219
2009	n.a.	2,856,955	0	1,502,864	841,941	5,201,760	0.34362	1,787,430	28,701,649
2010	n.a.	2,856,955	0	1,608,065	900,877	5,365,897	0.31182	1,673,194	30,374,843
2011	n.a.	2,856,955	0	1,720,629	963,938	5,541,522	0.28296	1,568,045	31,942,888
2012	n.a.	2,856,955	0	1,841,073	1,031,414	5,729,442	0.25678	1,471,184	33,414,072
2013	n.a.	2,856,955	0	1,969,949	1,103,613	5,930,516	0.23301	1,381,887	34,795,958
2014	n.a.	2,856,955	0	2,107,845	1,180,865	6,145,666	0.21145	1,299,494	36,095,452
2015	n.a.	2,856,955	0	2,255,394	1,263,526	6,375,875	0.19188	1,223,406	37,318,858
2016	n.a.	2,856,955	0	2,413,272	1,351,973	6,622,200	0.17412	1,153,077	38,471,934
2017	n.a.	2,856,955	0	2,582,201	1,446,611	6,885,767	0.15801	1,088,012	39,559,946
2018	n.a.	2,856,955	0	2,762,955	1,547,874	7,167,784	0.14339	1,027,760	40,587,706
2019	n.a.	2,856,955	0	2,956,362	1,656,225	7,469,542	0.13012	971,910	41,559,615
2020	n.a.	2,856,955	0	3,163,307	1,772,161	7,792,423	0.11807	920,089	42,479,704
2021	n.a.	2,856,955	0	3,384,738	1,896,212	8,137,905	0.10715	871,957	43,351,662
2022	n.a.	2,856,955	0	3,621,670	2,028,947	8,507,572	0.09723	827,206	44,178,868
2023	n.a.	2,856,955	0	3,875,187	2,170,973	8,903,115	0.08823	785,553	44,964,420

Table 7 Components of NTPC's Net Present Value

Year	Electric Power Purchases	Capital Costs	Upgrades/ Replacement Costs	O&M & A&G Expenses	Total Annual Cost	Discount Factor	Present Value	Cumulative Present Value
1998	n.a.		$833,333	$1,000,000				
1999	n.a.	$2,726,102	891,666	1,070,000	$4,687,769	0.90746	$4,253,941	$4,253,941
2000	n.a.	2,726,102	954,083	1,144,900	4,825,085	0.82348	3,973,339	8,227,281
2001	n.a.	2,726,102	1,020,869	1,225,043	4,972,014	0.74727	3,715,424	11,942,704
2002	n.a.	2,726,102	1,092,330	1,310,796	5,129,228	0.67811	3,478,190	15,420,894
2003	n.a.	2,726,102	1,168,793	1,402,552	5,297,447	0.61536	3,259,817	18,680,711
2004	n.a.	2,726,102	1,250,608	1,500,730	5,477,441	0.55841	3,058,649	21,739,361
2005	n.a.	2,726,102	1,338,151	1,605,781	5,670,034	0.50673	2,873,181	24,612,542
2006	n.a.	2,726,102	1,431,821	1,718,186	5,876,110	0.45984	2,702,045	27,314,587
2007	n.a.	2,726,102	1,532,049	1,838,459	6,096,610	0.41728	2,543,996	29,858,582
2008	n.a.	2,726,102	1,639,292	1,967,151	6,332,546	0.37866	2,397,903	32,256,486
2009	n.a.	2,726,102	1,754,043	2,104,852	6,584,997	0.34362	2,262,738	34,519,223
2010	n.a.	2,726,102	1,876,826	2,252,192	6,855,119	0.31182	2,137,563	36,656,787
2011	n.a.	2,726,102	2,008,203	2,409,845	7,144,151	0.28296	2,021,529	38,678,315
2012	n.a.	2,726,102	2,148,778	2,578,534	7,453,414	0.25678	1,913,859	40,592,174
2013	n.a.	2,726,102	2,299,192	2,759,032	7,784,326	0.23301	1,813,848	42,406,022
2014	n.a.	2,726,102	2,460,135	2,952,164	8,138,401	0.21145	1,720,856	44,126,878
2015	n.a.	2,726,102	2,632,345	3,158,815	8,517,262	0.19188	1,634,296	45,761,174
2016	n.a.	2,726,102	2,816,609	3,379,932	8,922,644	0.17412	1,553,637	47,314,811
2017	n.a.	2,726,102	3,013,772	3,616,528	9,356,402	0.15801	1,478,394	48,793,204
2018	n.a.	2,726,102	3,224,736	3,869,684	9,820,522	0.14339	1,408,125	50,201,329
2019	n.a.	2,726,102	3,450,467	4,140,562	10,317,132	0.13012	1,342,428	51,543,757
2020	n.a.	2,726,102	3,692,000	4,430,402	10,848,504	0.11807	1,280,935	52,824,692
2021	n.a.	2,726,102	3,950,440	4,740,530	11,417,072	0.10715	1,223,312	54,048,005
2022	n.a.	2,726,102	4,226,971	5,072,367	12,025,440	0.09723	1,169,254	55,217,259
2023	n.a.	2,726,102	4,522,859	5,427,433	12,676,394	0.08823	1,118,482	56,335,741

Sensitivity Assessments: Tables 8 to 19 detail the various sensitivity assessments. The sensitivity assessments altered the various assumptions such as the discount factor, interest rate and inflation rate used in this analysis to check the robustness of the analysis. Tables 7 to 10 show different discount factors. When the discount factor is 7 percent Enron is 31.1 percent less expensive than NTPC whereas the difference reduces to 24.0 percent when the discount factor is 13 percent.

The inflation rate was changed to the minimum and maximum it has been over the past few years, namely 5 percent and 9.5 percent. The lower inflation rate makes Enron 21.8 percent less expensive whereas the higher inflation rate makes Enron 30.1 percent less expensive. This is shown in Tables 11 through 14.

In Tables 16 to 19 interest rates were varied from the assumed 10 percent. An 8 percent and a twelve percent rate were used. The former made Enron 28.1 percent less expensive, while the latter made Enron 22.8 percent lower in net present value than NTPC.

Table 8 Enron's Net Present Value with 7 percent Discount Factor

Year	Electric Power Purchases	Capital Costs	Start Up Expenses	O&M Expenses	G&A Expenses	Total Annual Cost	Discount Factor	Present Value	Cumulative Present Value
1998	n.a.			$714,000	$400,000				
1999	n.a.	$2,856,955	0	763,980	428,000	$4,048,935	0.93458	$3,784,052	$3,784,052
2000	n.a.	2,856,955	0	817,459	457,960	4,132,374	0.94045	3,886,289	7,670,341
2001	n.a.	2,856,955	0	874,681	490,017	4,221,653	0.94581	3,992,875	11,663,216
2002	n.a.	2,856,955	0	935,908	524,318	4,317,182	0.95070	4,104,335	15,767,551
2003	n.a.	2,856,955	0	1,001,422	561,021	4,419,398	0.95516	4,221,216	19,988,767
2004	n.a.	2,856,955	0	1,071,521	600,292	4,528,769	0.95922	4,344,088	24,332,856
2005	n.a.	2,856,955	0	1,146,528	642,313	4,645,796	0.96292	4,473,547	28,806,402
2006	n.a.	2,856,955	0	1,226,785	687,274	4,771,015	0.96630	4,610,214	33,416,616
2007	n.a.	2,856,955	0	1,312,660	735,384	4,904,999	0.96937	4,754,745	38,171,361
2008	n.a.	2,856,955	0	1,404,546	786,861	5,048,362	0.97216	4,907,826	43,079,187
2009	n.a.	2,856,955	0	1,502,864	841,941	5,201,760	0.97471	5,070,185	48,149,372
2010	n.a.	2,856,955	0	1,608,065	900,877	5,365,897	0.97702	5,242,584	53,391,956
2011	n.a.	2,856,955	0	1,720,629	963,938	5,541,522	0.97912	5,425,836	58,817,792
2012	n.a.	2,856,955	0	1,841,073	1,031,414	5,729,442	0.98104	5,620,796	64,438,588
2013	n.a.	2,856,955	0	1,969,949	1,103,613	5,930,516	0.98278	5,828,375	70,266,962
2014	n.a.	2,856,955	0	2,107,845	1,180,865	6,145,666	0.98436	6,049,537	76,316,499
2015	n.a.	2,856,955	0	2,255,394	1,263,526	6,375,875	0.98580	6,285,309	82,601,808
2016	n.a.	2,856,955	0	2,413,272	1,351,973	6,622,200	0.98710	6,536,784	89,138,592
2017	n.a.	2,856,955	0	2,582,201	1,446,611	6,885,767	0.98829	6,805,122	95,943,714
2018	n.a.	2,856,955	0	2,762,955	1,547,874	7,167,784	0.98937	7,091,563	103,035,277
2019	n.a.	2,856,955	0	2,956,362	1,656,225	7,469,542	0.99035	7,397,428	110,432,705
2020	n.a.	2,856,955	0	3,163,307	1,772,161	7,792,423	0.99124	7,724,123	118,156,828
2021	n.a.	2,856,955	0	3,384,738	1,896,212	8,137,905	0.99204	8,073,152	126,229,981
2022	n.a.	2,856,955	0	3,621,670	2,028,947	8,507,572	0.99278	8,446,120	134,676,100
2023	n.a.	2,856,955	0	3,875,187	2,170,973	8,903,115	0.99344	8,844,738	143,520,838

Table 9 NTPC's Net Present Value with 7 percent Discount Factor

Year	Electric Power Purchases	Capital Costs	Upgrades/ Replacement Costs	O&M & A&G Expenses	Total Annual Cost	Discount Factor	Present Value	Cumulative Present Value
1998	n.a.		$833,333	$1,000,000				
1999	n.a.	$2,726,102	891,666	1,070,000	$4,687,769	0.93458	$4,381,092	$4,381,092
2000	n.a.	2,726,102	954,083	1,144,900	4,825,085	0.94045	4,537,749	8,918,842
2001	n.a.	2,726,102	1,020,869	1,225,043	4,972,014	0.94581	4,702,573	13,621,414
2002	n.a.	2,726,102	1,092,330	1,310,796	5,129,228	0.95070	4,876,345	18,497,760
2003	n.a.	2,726,102	1,168,793	1,402,552	5,297,447	0.95516	5,059,890	23,557,650
2004	n.a.	2,726,102	1,250,608	1,500,730	5,477,441	0.95922	5,254,074	28,811,724
2005	n.a.	2,726,102	1,338,151	1,605,781	5,670,034	0.96292	5,459,810	34,271,534
2006	n.a.	2,726,102	1,431,821	1,718,186	5,876,110	0.96630	5,678,063	39,949,597
2007	n.a.	2,726,102	1,532,049	1,838,459	6,096,610	0.96937	5,909,854	45,859,451
2008	n.a.	2,726,102	1,639,292	1,967,151	6,332,546	0.97216	6,156,262	52,015,713
2009	n.a.	2,726,102	1,754,043	2,104,852	6,584,997	0.97471	6,418,433	58,434,145
2010	n.a.	2,726,102	1,876,826	2,252,192	6,855,119	0.97702	6,697,584	65,131,729
2011	n.a.	2,726,102	2,008,203	2,409,845	7,144,151	0.97912	6,995,007	72,126,736
2012	n.a.	2,726,102	2,148,778	2,578,534	7,453,414	0.98104	7,312,077	79,438,813
2013	n.a.	2,726,102	2,299,192	2,759,032	7,784,326	0.98278	7,650,256	87,089,069
2014	n.a.	2,726,102	2,460,135	2,952,164	8,138,401	0.98436	8,011,103	95,100,171
2015	n.a.	2,726,102	2,632,345	3,158,815	8,517,262	0.98580	8,396,279	103,496,451
2016	n.a.	2,726,102	2,816,609	3,379,932	8,922,644	0.98710	8,807,555	112,304,006
2017	n.a.	2,726,102	3,013,772	3,616,528	9,356,402	0.98829	9,246,821	121,550,827
2018	n.a.	2,726,102	3,224,736	3,869,684	9,820,522	0.98937	9,716,094	131,266,921
2019	n.a.	2,726,102	3,450,467	4,140,562	10,317,132	0.99035	10,217,526	141,484,447
2020	n.a.	2,726,102	3,692,000	4,430,402	10,848,504	0.99124	10,753,418	152,237,865
2021	n.a.	2,726,102	3,950,440	4,740,530	11,417,072	0.99204	11,326,227	163,564,092
2022	n.a.	2,726,102	4,226,971	5,072,367	12,025,440	0.99278	11,938,577	175,502,669
2023	n.a.	2,726,102	4,522,859	5,427,433	12,676,394	0.99344	12,593,275	188,095,944

Table 10 Enron's Net Present Value with 13 percent Discount Factor

Year	Electric Power Purchases	Capital Costs	Start Up Expenses	O&M Expenses	G&A Expenses	Total Annual Cost	Discount Factor	Present Value	Cumulative Present Value
1998	n.a.			$714,000	$400,000				
1999	n.a.	$2,856,955	0	763,980	428,000	$4,048,935	0.88496	$3,583,128	$3,583,128
2000	n.a.	2,856,955	0	817,459	457,960	4,132,374	0.89502	3,698,565	7,281,694
2001	n.a.	2,856,955	0	874,681	490,017	4,221,653	0.90426	3,817,453	11,099,147
2002	n.a.	2,856,955	0	935,908	524,318	4,317,182	0.91272	3,940,366	15,039,513
2003	n.a.	2,856,955	0	1,001,422	561,021	4,419,398	0.92046	4,067,897	19,107,410
2004	n.a.	2,856,955	0	1,071,521	600,292	4,528,769	0.92755	4,200,664	23,308,075
2005	n.a.	2,856,955	0	1,146,528	642,313	4,645,796	0.93403	4,339,310	27,647,384
2006	n.a.	2,856,955	0	1,226,785	687,274	4,771,015	0.93995	4,484,502	32,131,887
2007	n.a.	2,856,955	0	1,312,660	735,384	4,904,999	0.94535	4,636,941	36,768,827
2008	n.a.	2,856,955	0	1,404,546	786,861	5,048,362	0.95028	4,797,355	41,566,183
2009	n.a.	2,856,955	0	1,502,864	841,941	5,201,760	0.95478	4,966,512	46,532,694
2010	n.a.	2,856,955	0	1,608,065	900,877	5,365,897	0.95887	5,145,214	51,677,909
2011	n.a.	2,856,955	0	1,720,629	963,938	5,541,522	0.96261	5,334,309	57,012,218
2012	n.a.	2,856,955	0	1,841,073	1,031,414	5,729,442	0.96601	5,534,688	62,546,905
2013	n.a.	2,856,955	0	1,969,949	1,103,613	5,930,516	0.96910	5,747,292	68,294,197
2014	n.a.	2,856,955	0	2,107,845	1,180,865	6,145,666	0.97192	5,973,116	74,267,313
2015	n.a.	2,856,955	0	2,255,394	1,263,526	6,375,875	0.97449	6,213,216	80,480,529
2016	n.a.	2,856,955	0	2,413,272	1,351,973	6,622,200	0.97682	6,468,708	86,949,237
2017	n.a.	2,856,955	0	2,582,201	1,446,611	6,885,767	0.97894	6,740,780	93,690,017
2018	n.a.	2,856,955	0	2,762,955	1,547,874	7,167,784	0.98087	7,030,691	100,720,708
2019	n.a.	2,856,955	0	2,956,362	1,656,225	7,469,542	0.98263	7,339,783	108,060,492
2020	n.a.	2,856,955	0	3,163,307	1,772,161	7,792,423	0.98422	7,669,484	115,729,975
2021	n.a.	2,856,955	0	3,384,738	1,896,212	8,137,905	0.98567	8,021,312	123,751,287
2022	n.a.	2,856,955	0	3,621,670	2,028,947	8,507,572	0.98699	8,396,889	132,148,176
2023	n.a.	2,856,955	0	3,875,187	2,170,973	8,903,115	0.98819	8,797,942	140,946,118

Table 11 NTPC's Net Present Value with 13 percent Discount Factor

Year	Electric Power Purchases	Capital Costs	Upgrades/ Replacement Costs	O&M & A&G Expenses	Total Annual Cost	Discount Factor	Present Value	Cumulative Present Value
1998	n.a.		$833,333	$1,000,000				
1999	n.a.	$2,726,102	891,666	1,070,000	$4,687,769	0.88496	$4,148,468	$4,148,468
2000	n.a.	2,726,102	954,083	1,144,900	4,825,085	0.89502	4,318,557	8,467,025
2001	n.a.	2,726,102	1,020,869	1,225,043	4,972,014	0.90426	4,495,971	12,962,996
2002	n.a.	2,726,102	1,092,330	1,310,796	5,129,228	0.91272	4,681,534	17,644,530
2003	n.a.	2,726,102	1,168,793	1,402,552	5,297,447	0.92046	4,876,110	22,520,640
2004	n.a.	2,726,102	1,250,608	1,500,730	5,477,441	0.92755	5,080,606	27,601,246
2005	n.a.	2,726,102	1,338,151	1,605,781	5,670,034	0.93403	5,295,979	32,897,225
2006	n.a.	2,726,102	1,431,821	1,718,186	5,876,110	0.93995	5,523,234	38,420,459
2007	n.a.	2,726,102	1,532,049	1,838,459	6,096,610	0.94535	5,763,431	44,183,889
2008	n.a.	2,726,102	1,639,292	1,967,151	6,332,546	0.95028	6,017,689	50,201,578
2009	n.a.	2,726,102	1,754,043	2,104,852	6,584,997	0.95478	6,287,192	56,488,770
2010	n.a.	2,726,102	1,876,826	2,252,192	6,855,119	0.95887	6,573,190	63,061,960
2011	n.a.	2,726,102	2,008,203	2,409,845	7,144,151	0.96261	6,877,010	69,938,971
2012	n.a.	2,726,102	2,148,778	2,578,534	7,453,414	0.96601	7,200,058	77,139,029
2013	n.a.	2,726,102	2,299,192	2,759,032	7,784,326	0.96910	7,543,827	84,682,856
2014	n.a.	2,726,102	2,460,135	2,952,164	8,138,401	0.97192	7,909,903	92,592,759
2015	n.a.	2,726,102	2,632,345	3,158,815	8,517,262	0.97449	8,299,972	100,892,732
2016	n.a.	2,726,102	2,816,609	3,379,932	8,922,644	0.97682	8,715,832	109,608,563
2017	n.a.	2,726,102	3,013,772	3,616,528	9,356,402	0.97894	9,159,393	118,767,956
2018	n.a.	2,726,102	3,224,736	3,869,684	9,820,522	0.98087	9,632,693	128,400,649
2019	n.a.	2,726,102	3,450,467	4,140,562	10,317,132	0.98263	10,137,906	138,538,556
2020	n.a.	2,726,102	3,692,000	4,430,402	10,848,504	0.98422	10,677,350	149,215,905
2021	n.a.	2,726,102	3,950,440	4,740,530	11,417,072	0.98567	11,253,497	160,469,403
2022	n.a.	2,726,102	4,226,971	5,072,367	12,025,440	0.98699	11,868,989	172,338,392
2023	n.a.	2,726,102	4,522,859	5,427,433	12,676,394	0.98819	12,526,646	184,865,038

Table 13 NTPC's Net Present Value with 5 percent Inflation Rate

Year	Electric Power Purchases	Capital Costs	Upgrades/ Replacement Costs	O&M & A&G Expenses	Total Annual Cost	Discount Factor	Present Value	Cumulative Present Value
1998	n.a.		$833,333	$1,000,000				
1999	n.a.	$2,726,102	875,000	1,050,000	$4,651,102	0.90746	$4,220,668	$4,220,668
2000	n.a.	2,726,102	918,750	1,102,500	4,747,352	0.82348	3,909,328	8,129,996
2001	n.a.	2,726,102	964,687	1,157,625	4,848,414	0.74727	3,623,062	11,753,057
2002	n.a.	2,726,102	1,012,921	1,215,506	4,954,530	0.67811	3,359,725	15,112,783
2003	n.a.	2,726,102	1,063,568	1,276,282	5,065,951	0.61536	3,117,365	18,230,148
2004	n.a.	2,726,102	1,116,746	1,340,096	5,182,944	0.55841	2,894,200	21,124,347
2005	n.a.	2,726,102	1,172,583	1,407,100	5,305,786	0.50673	2,688,605	23,812,953
2006	n.a.	2,726,102	1,231,212	1,477,455	5,434,770	0.45984	2,499,101	26,312,054
2007	n.a.	2,726,102	1,292,773	1,551,328	5,570,203	0.41728	2,324,337	28,636,390
2008	n.a.	2,726,102	1,357,412	1,628,895	5,712,409	0.37866	2,163,080	30,799,470
2009	n.a.	2,726,102	1,425,282	1,710,339	5,861,724	0.34362	2,014,207	32,813,677
2010	n.a.	2,726,102	1,496,546	1,795,856	6,018,505	0.31182	1,876,690	34,690,367
2011	n.a.	2,726,102	1,571,374	1,885,649	6,183,125	0.28296	1,749,594	36,439,961
2012	n.a.	2,726,102	1,649,942	1,979,932	6,355,976	0.25678	1,632,063	38,072,024
2013	n.a.	2,726,102	1,732,439	2,078,928	6,537,470	0.23301	1,523,315	39,595,339
2014	n.a.	2,726,102	1,819,061	2,182,875	6,728,038	0.21145	1,422,636	41,017,975
2015	n.a.	2,726,102	1,910,015	2,292,018	6,928,135	0.19188	1,329,373	42,347,348
2016	n.a.	2,726,102	2,005,515	2,406,619	7,138,237	0.17412	1,242,931	43,590,279
2017	n.a.	2,726,102	2,105,791	2,526,950	7,358,843	0.15801	1,162,762	44,753,041
2018	n.a.	2,726,102	2,211,081	2,653,298	7,590,480	0.14339	1,088,368	45,841,409
2019	n.a.	2,726,102	2,321,635	2,785,963	7,833,699	0.13012	1,019,293	46,860,702
2020	n.a.	2,726,102	2,437,716	2,925,261	8,089,079	0.11807	955,117	47,815,818
2021	n.a.	2,726,102	2,559,602	3,071,524	8,357,228	0.10715	895,457	48,711,276
2022	n.a.	2,726,102	2,687,582	3,225,100	8,638,784	0.09723	839,964	49,551,240
2023	n.a.	2,726,102	2,821,961	3,386,355	8,934,418	0.08823	788,315	50,339,554

Table 14 Enron's Net Present Value with 9.5 percent Inflation Rate

Year	Electric Power Purchases	Capital Costs	Start Up Expenses	O&M Expenses	G&A Expenses	Total Annual Cost	Discount Factor	Present Value	Cumulative Present Value
1998	n.a.			$714,000	$400,000				
1999	n.a.	$2,856,955	0	781,830	438,000	$4,076,785	0.90746	$3,699,501	$3,699,501
2000	n.a.	2,856,955	0	856,104	479,610	4,192,669	0.82348	3,452,560	7,152,061
2001	n.a.	2,856,955	0	937,434	525,173	4,319,562	0.74727	3,227,867	10,379,928
2002	n.a.	2,856,955	0	1,026,490	575,064	4,458,509	0.67811	3,023,368	13,403,297
2003	n.a.	2,856,955	0	1,124,006	629,695	4,610,657	0.61536	2,837,197	16,240,493
2004	n.a.	2,856,955	0	1,230,787	689,517	4,777,259	0.55841	2,667,662	18,908,155
2005	n.a.	2,856,955	0	1,347,712	755,021	4,959,688	0.50673	2,513,227	21,421,382
2006	n.a.	2,856,955	0	1,475,744	826,748	5,159,447	0.45984	2,372,498	23,793,880
2007	n.a.	2,856,955	0	1,615,940	905,289	5,378,184	0.41728	2,244,211	26,038,090
2008	n.a.	2,856,955	0	1,769,455	991,291	5,617,701	0.37866	2,127,218	28,165,308
2009	n.a.	2,856,955	0	1,937,553	1,085,464	5,879,972	0.34362	2,020,477	30,185,785
2010	n.a.	2,856,955	0	2,121,620	1,188,583	6,167,158	0.31182	1,923,043	32,108,828
2011	n.a.	2,856,955	0	2,323,174	1,301,498	6,481,627	0.28296	1,834,059	33,942,887
2012	n.a.	2,856,955	0	2,543,876	1,425,140	6,825,971	0.25678	1,752,746	35,695,634
2013	n.a.	2,856,955	0	2,785,544	1,560,529	7,203,028	0.23301	1,678,398	37,374,032
2014	n.a.	2,856,955	0	3,050,171	1,708,779	7,615,905	0.21145	1,610,374	38,984,406
2015	n.a.	2,856,955	0	3,339,937	1,871,113	8,068,005	0.19188	1,548,092	40,532,498
2016	n.a.	2,856,955	0	3,657,231	2,048,869	8,563,055	0.17412	1,491,024	42,023,522
2017	n.a.	2,856,955	0	4,004,668	2,243,511	9,105,134	0.15801	1,438,691	43,462,214
2018	n.a.	2,856,955	0	4,385,111	2,456,645	9,698,711	0.14339	1,390,659	44,852,873
2019	n.a.	2,856,955	0	4,801,697	2,690,026	10,348,678	0.13012	1,346,532	46,199,405
2020	n.a.	2,856,955	0	5,257,858	2,945,579	11,060,391	0.11807	1,305,954	47,505,359
2021	n.a.	2,856,955	0	5,757,354	3,225,409	11,839,718	0.10715	1,268,598	48,773,957
2022	n.a.	2,856,955	0	6,304,303	3,531,822	12,693,080	0.09723	1,234,170	50,008,127
2023	n.a.	2,856,955	0	6,903,212	3,867,345	13,627,512	0.08823	1,202,402	51,210,529

Table 14 Enron's Net Present Value with 9.5 percent Inflation Rate

Year	Electric Power Purchases	Capital Costs	Start Up Expenses	O&M Expenses	G&A Expenses	Total Annual Cost	Discount Factor	Present Value	Cumulative Present Value
1998	n.a.			$714,000	$400,000				
1999	n.a.	$2,856,955	0	781,830	438,000	$4,076,785	0.90746	$3,699,501	$3,699,501
2000	n.a.	2,856,955	0	856,104	479,610	4,192,669	0.82348	3,452,560	7,152,061
2001	n.a.	2,856,955	0	937,434	525,173	4,319,562	0.74727	3,227,867	10,379,928
2002	n.a.	2,856,955	0	1,026,490	575,064	4,458,509	0.67811	3,023,368	13,403,297
2003	n.a.	2,856,955	0	1,124,006	629,695	4,610,657	0.61536	2,837,197	16,240,493
2004	n.a.	2,856,955	0	1,230,787	689,517	4,777,259	0.55841	2,667,662	18,908,155
2005	n.a.	2,856,955	0	1,347,712	755,021	4,959,688	0.50673	2,513,227	21,421,382
2006	n.a.	2,856,955	0	1,475,744	826,748	5,159,447	0.45984	2,372,498	23,793,880
2007	n.a.	2,856,955	0	1,615,940	905,289	5,378,184	0.41728	2,244,211	26,038,090
2008	n.a.	2,856,955	0	1,769,455	991,291	5,617,701	0.37866	2,127,218	28,165,308
2009	n.a.	2,856,955	0	1,937,553	1,085,464	5,879,972	0.34362	2,020,477	30,185,785
2010	n.a.	2,856,955	0	2,121,620	1,188,583	6,167,158	0.31182	1,923,043	32,108,828
2011	n.a.	2,856,955	0	2,323,174	1,301,498	6,481,627	0.28296	1,834,059	33,942,887
2012	n.a.	2,856,955	0	2,543,876	1,425,140	6,825,971	0.25678	1,752,746	35,695,634
2013	n.a.	2,856,955	0	2,785,544	1,560,529	7,203,028	0.23301	1,678,398	37,374,032
2014	n.a.	2,856,955	0	3,050,171	1,708,779	7,615,905	0.21145	1,610,374	38,984,406
2015	n.a.	2,856,955	0	3,339,937	1,871,113	8,068,005	0.19188	1,548,092	40,532,498
2016	n.a.	2,856,955	0	3,657,231	2,048,869	8,563,055	0.17412	1,491,024	42,023,522
2017	n.a.	2,856,955	0	4,004,668	2,243,511	9,105,134	0.15801	1,438,691	43,462,214
2018	n.a.	2,856,955	0	4,385,111	2,456,645	9,698,711	0.14339	1,390,659	44,852,873
2019	n.a.	2,856,955	0	4,801,697	2,690,026	10,348,678	0.13012	1,346,532	46,199,405
2020	n.a.	2,856,955	0	5,257,858	2,945,579	11,060,391	0.11807	1,305,954	47,505,359
2021	n.a.	2,856,955	0	5,757,354	3,225,409	11,839,718	0.10715	1,268,598	48,773,957
2022	n.a.	2,856,955	0	6,304,303	3,531,822	12,693,080	0.09723	1,234,170	50,008,127
2023	n.a.	2,856,955	0	6,903,212	3,867,345	13,627,512	0.08823	1,202,402	51,210,529

Table 15 NTPC's Net Present Value with 9.5 percent Inflation Rate

Year	Electric Power Purchases	Capital Costs	Upgrades/ Replacement Costs	O&M & A&G Expenses	Total Annual Cost	Discount Factor	Present Value	Cumulative Present Value
1998	n.a.		$833,333	$1,000,000				
1999	n.a.	$2,726,102	912,500	1,095,000	$4,733,602	0.90746	$4,295,533	$4,295,533
2000	n.a.	2,726,102	999,187	1,199,025	4,924,314	0.82348	4,055,052	8,350,585
2001	n.a.	2,726,102	1,094,110	1,312,932	5,133,144	0.74727	3,835,831	12,186,416
2002	n.a.	2,726,102	1,198,050	1,437,661	5,361,814	0.67811	3,635,909	15,822,325
2003	n.a.	2,726,102	1,311,865	1,574,239	5,612,206	0.61536	3,453,506	19,275,832
2004	n.a.	2,726,102	1,436,492	1,723,791	5,886,386	0.55841	3,287,008	22,562,839
2005	n.a.	2,726,102	1,572,959	1,887,552	6,186,613	0.50673	3,134,947	25,697,787
2006	n.a.	2,726,102	1,722,390	2,066,869	6,515,361	0.45984	2,995,996	28,693,782
2007	n.a.	2,726,102	1,886,017	2,263,222	6,875,341	0.41728	2,868,945	31,562,727
2008	n.a.	2,726,102	2,065,189	2,478,228	7,269,519	0.37866	2,752,701	34,315,428
2009	n.a.	2,726,102	2,261,382	2,713,659	7,701,143	0.34362	2,646,268	36,961,696
2010	n.a.	2,726,102	2,476,213	2,971,457	8,173,772	0.31182	2,548,746	39,510,442
2011	n.a.	2,726,102	2,711,453	3,253,745	8,691,301	0.28296	2,459,315	41,969,756
2012	n.a.	2,726,102	2,969,041	3,562,851	9,257,995	0.25678	2,377,232	44,346,988
2013	n.a.	2,726,102	3,251,100	3,901,322	9,878,524	0.23301	2,301,824	46,648,812
2014	n.a.	2,726,102	3,559,955	4,271,948	10,558,005	0.21145	2,232,478	48,881,290
2015	n.a.	2,726,102	3,898,151	4,677,783	11,302,035	0.19188	2,168,639	51,049,929
2016	n.a.	2,726,102	4,268,475	5,122,172	12,116,749	0.17412	2,109,804	53,159,733
2017	n.a.	2,726,102	4,673,980	5,608,778	13,008,860	0.15801	2,055,514	55,215,247
2018	n.a.	2,726,102	5,118,008	6,141,612	13,985,722	0.14339	2,005,356	57,220,603
2019	n.a.	2,726,102	5,604,219	6,725,065	15,055,386	0.13012	1,958,952	59,179,556
2020	n.a.	2,726,102	6,136,620	7,363,946	16,226,668	0.11807	1,915,961	61,095,516
2021	n.a.	2,726,102	6,719,598	8,063,521	17,509,222	0.10715	1,876,072	62,971,588
2022	n.a.	2,726,102	7,357,960	8,829,556	18,913,618	0.09723	1,839,004	64,810,592
2023	n.a.	2,726,102	8,056,967	9,668,364	20,451,432	0.08823	1,804,501	66,615,092

Table 16 Enron's Net Present Value with 8 percent Interest Rate

Year	Electric Power Purchases	Capital Costs	Start Up Expenses	O&M Expenses	G&A Expenses	Total Annual Cost	Discount Factor	Present Value	Cumulative Present Value
1998	n.a.			$714,000	$400,000				
1999	n.a.	$2,426,590	0	763,980	428,000	$3,618,570	0.90746	$3,283,691	$3,283,691
2000	n.a.	2,426,590	0	817,459	457,960	3,702,009	0.82348	3,048,513	6,332,205
2001	n.a.	2,426,590	0	874,681	490,017	3,791,288	0.74727	2,833,106	9,165,310
2002	n.a.	2,426,590	0	935,908	524,318	3,886,817	0.67811	2,635,697	11,801,007
2003	n.a.	2,426,590	0	1,001,422	561,021	3,989,033	0.61536	2,454,677	14,255,684
2004	n.a.	2,426,590	0	1,071,521	600,292	4,098,404	0.55841	2,288,583	16,544,267
2005	n.a.	2,426,590	0	1,146,528	642,313	4,215,431	0.50673	2,136,089	18,680,356
2006	n.a.	2,426,590	0	1,226,785	687,274	4,340,650	0.45984	1,995,985	20,676,341
2007	n.a.	2,426,590	0	1,312,660	735,384	4,474,634	0.41728	1,867,177	22,543,518
2008	n.a.	2,426,590	0	1,404,546	786,861	4,617,997	0.37866	1,748,666	24,292,184
2009	n.a.	2,426,590	0	1,502,864	841,941	4,771,395	0.34362	1,639,548	25,931,732
2010	n.a.	2,426,590	0	1,608,065	900,877	4,935,532	0.31182	1,538,997	27,470,729
2011	n.a.	2,426,590	0	1,720,629	963,938	5,111,158	0.28296	1,446,267	28,916,997
2012	n.a.	2,426,590	0	1,841,073	1,031,414	5,299,077	0.25678	1,360,677	30,277,673
2013	n.a.	2,426,590	0	1,969,949	1,103,613	5,500,151	0.23301	1,281,606	31,559,279
2014	n.a.	2,426,590	0	2,107,845	1,180,865	5,715,301	0.21145	1,208,494	32,767,773
2015	n.a.	2,426,590	0	2,255,394	1,263,526	5,945,510	0.19188	1,140,827	33,908,600
2016	n.a.	2,426,590	0	2,413,272	1,351,973	6,191,835	0.17412	1,078,140	34,986,740
2017	n.a.	2,426,590	0	2,582,201	1,446,611	6,455,402	0.15801	1,020,010	36,006,751
2018	n.a.	2,426,590	0	2,762,955	1,547,874	6,737,419	0.14339	966,051	36,972,802
2019	n.a.	2,426,590	0	2,956,362	1,656,225	7,039,177	0.13012	915,912	37,888,714
2020	n.a.	2,426,590	0	3,163,307	1,772,161	7,362,058	0.11807	869,274	38,757,988
2021	n.a.	2,426,590	0	3,384,738	1,896,212	7,707,540	0.10715	825,845	39,583,833
2022	n.a.	2,426,590	0	3,621,670	2,028,947	8,077,207	0.09723	785,361	40,369,193
2023	n.a.	2,426,590	0	3,875,187	2,170,973	8,472,750	0.08823	747,580	41,116,773

Table 17 NTPC's Net Present Value with 8 percent Interest Rate

Year	Electric Power Purchases	Capital Costs	Upgrades/ Replacement Costs	O&M & A&G Expenses	Total Annual Cost	Discount Factor	Present Value	Cumulative Present Value
1998	n.a.		$833,333	$1,000,000				
1999	n.a.	$2,315,449	891,666	1,070,000	$4,277,115	0.90746	$3,881,291	$3,881,291
2000	n.a.	2,315,449	954,083	1,144,900	4,414,432	0.82348	3,635,176	7,516,468
2001	n.a.	2,315,449	1,020,869	1,225,043	4,561,360	0.74727	3,408,556	10,925,023
2002	n.a.	2,315,449	1,092,330	1,310,796	4,718,574	0.67811	3,199,721	14,124,744
2003	n.a.	2,315,449	1,168,793	1,402,552	4,886,793	0.61536	3,007,119	17,131,863
2004	n.a.	2,315,449	1,250,608	1,500,730	5,066,787	0.55841	2,829,337	19,961,200
2005	n.a.	2,315,449	1,338,151	1,605,781	5,259,381	0.50673	2,665,090	22,626,290
2006	n.a.	2,315,449	1,431,821	1,718,186	5,465,456	0.45984	2,513,212	25,139,502
2007	n.a.	2,315,449	1,532,049	1,838,459	5,685,957	0.41728	2,372,638	27,512,140
2008	n.a.	2,315,449	1,639,292	1,967,151	5,921,892	0.37866	2,242,404	29,754,544
2009	n.a.	2,315,449	1,754,043	2,104,852	6,174,343	0.34362	2,121,629	31,876,173
2010	n.a.	2,315,449	1,876,826	2,252,192	6,444,466	0.31182	2,009,513	33,885,686
2011	n.a.	2,315,449	2,008,203	2,409,845	6,733,497	0.28296	1,905,329	35,791,015
2012	n.a.	2,315,449	2,148,778	2,578,534	7,042,760	0.25678	1,808,413	37,599,428
2013	n.a.	2,315,449	2,299,192	2,759,032	7,373,672	0.23301	1,718,161	39,317,588
2014	n.a.	2,315,449	2,460,135	2,952,164	7,727,748	0.21145	1,634,023	40,951,612
2015	n.a.	2,315,449	2,632,345	3,158,815	8,106,609	0.19188	1,555,499	42,507,111
2016	n.a.	2,315,449	2,816,609	3,379,932	8,511,990	0.17412	1,482,133	43,989,244
2017	n.a.	2,315,449	3,013,772	3,616,528	8,945,748	0.15801	1,413,507	45,402,751
2018	n.a.	2,315,449	3,224,736	3,869,684	9,409,869	0.14339	1,349,243	46,751,994
2019	n.a.	2,315,449	3,450,467	4,140,562	9,906,478	0.13012	1,288,995	48,040,989
2020	n.a.	2,315,449	3,692,000	4,430,402	10,437,850	0.11807	1,232,447	49,273,436
2021	n.a.	2,315,449	3,950,440	4,740,530	11,006,418	0.10715	1,179,312	50,452,748
2022	n.a.	2,315,449	4,226,971	5,072,367	11,614,786	0.09723	1,129,326	51,582,073
2023	n.a.	2,315,449	4,522,859	5,427,433	12,265,740	0.08823	1,082,249	52,664,322

Table 18 Enron's Net Present Value with 12 percent Interest Rate

Year	Electric Power Purchases	Capital Costs	Start Up Expenses	O&M Expenses	G&A Expenses	Total Annual Cost	Discount Factor	Present Value	Cumulative Present Value
1998	n.a.			$714,000	$400,000				
1999	n.a.	$3,311,337	0	763,980	428,000	$4,503,317	0.90746	$4,086,559	$4,086,559
2000	n.a.	3,311,337	0	817,459	457,960	4,586,755	0.82348	3,777,080	7,863,640
2001	n.a.	3,311,337	0	874,681	490,017	4,676,035	0.74727	3,494,248	11,357,888
2002	n.a.	3,311,337	0	935,908	524,318	4,771,563	0.67811	3,235,654	14,593,541
2003	n.a.	3,311,337	0	1,001,422	561,021	4,873,779	0.61536	2,999,111	17,592,652
2004	n.a.	3,311,337	0	1,071,521	600,292	4,983,150	0.55841	2,782,633	20,375,286
2005	n.a.	3,311,337	0	1,146,528	642,313	5,100,177	0.50673	2,584,417	22,959,703
2006	n.a.	3,311,337	0	1,226,785	687,274	5,225,396	0.45984	2,402,823	25,362,526
2007	n.a.	3,311,337	0	1,312,660	735,384	5,359,380	0.41728	2,236,364	27,598,890
2008	n.a.	3,311,337	0	1,404,546	786,861	5,502,743	0.37866	2,083,687	29,682,578
2009	n.a.	3,311,337	0	1,502,864	841,941	5,656,142	0.34362	1,943,564	31,626,142
2010	n.a.	3,311,337	0	1,608,065	900,877	5,820,278	0.31182	1,814,879	33,441,021
2011	n.a.	3,311,337	0	1,720,629	963,938	5,995,904	0.28296	1,696,618	35,137,639
2012	n.a.	3,311,337	0	1,841,073	1,031,414	6,183,824	0.25678	1,587,858	36,725,497
2013	n.a.	3,311,337	0	1,969,949	1,103,613	6,384,898	0.23301	1,487,764	38,213,261
2014	n.a.	3,311,337	0	2,107,845	1,180,865	6,600,047	0.21145	1,395,572	39,608,833
2015	n.a.	3,311,337	0	2,255,394	1,263,526	6,830,257	0.19188	1,310,592	40,919,425
2016	n.a.	3,311,337	0	2,413,272	1,351,973	7,076,581	0.17412	1,232,195	42,151,621
2017	n.a.	3,311,337	0	2,582,201	1,446,611	7,340,148	0.15801	1,159,808	43,311,429
2018	n.a.	3,311,337	0	2,762,955	1,547,874	7,622,165	0.14339	1,092,911	44,404,340
2019	n.a.	3,311,337	0	2,956,362	1,656,225	7,923,923	0.13012	1,031,032	45,435,372
2020	n.a.	3,311,337	0	3,163,307	1,772,161	8,246,804	0.11807	973,740	46,409,112
2021	n.a.	3,311,337	0	3,384,738	1,896,212	8,592,287	0.10715	920,643	47,329,755
2022	n.a.	3,311,337	0	3,621,670	2,028,947	8,961,953	0.09723	871,386	48,201,141
2023	n.a.	3,311,337	0	3,875,187	2,170,973	9,357,497	0.08823	825,644	49,026,786

Table 19 NTPC's Net Present Value with 12 percent Interest Rate

Year	Electric Power Purchases	Capital Costs	Upgrades/ Replacement Costs	O&M & A&G Expenses	Total Annual Cost	Discount Factor	Present Value	Cumulative Present Value
1998	n.a.		$833,333	$1,000,000				
1999	n.a.	$3,159,672	891,666	1,070,000	$5,121,339	0.90746	$4,647,387	$4,647,387
2000	n.a.	3,159,672	954,083	1,144,900	5,258,655	0.82348	4,330,374	8,977,761
2001	n.a.	3,159,672	1,020,869	1,225,043	5,405,584	0.74727	4,039,416	13,017,177
2002	n.a.	3,159,672	1,092,330	1,310,796	5,562,798	0.67811	3,772,199	16,789,376
2003	n.a.	3,159,672	1,168,793	1,402,552	5,731,017	0.61536	3,526,617	20,315,994
2004	n.a.	3,159,672	1,250,608	1,500,730	5,911,011	0.55841	3,300,758	23,616,752
2005	n.a.	3,159,672	1,338,151	1,605,781	6,103,605	0.50673	3,092,885	26,709,637
2006	n.a.	3,159,672	1,431,821	1,718,186	6,309,680	0.45984	2,901,416	29,611,052
2007	n.a.	3,159,672	1,532,049	1,838,459	6,530,180	0.41728	2,724,916	32,335,969
2008	n.a.	3,159,672	1,639,292	1,967,151	6,766,116	0.37866	2,562,080	34,898,049
2009	n.a.	3,159,672	1,754,043	2,104,852	7,018,567	0.34362	2,411,721	37,309,770
2010	n.a.	3,159,672	1,876,826	2,252,192	7,288,690	0.31182	2,272,759	39,582,529
2011	n.a.	3,159,672	2,008,203	2,409,845	7,577,721	0.28296	2,144,213	41,726,742
2012	n.a.	3,159,672	2,148,778	2,578,534	7,886,984	0.25678	2,025,189	43,751,931
2013	n.a.	3,159,672	2,299,192	2,759,032	8,217,896	0.23301	1,914,876	45,666,807
2014	n.a.	3,159,672	2,460,135	2,952,164	8,571,972	0.21145	1,812,533	47,479,341
2015	n.a.	3,159,672	2,632,345	3,158,815	8,950,833	0.19188	1,717,489	49,196,830
2016	n.a.	3,159,672	2,816,609	3,379,932	9,356,214	0.17412	1,629,131	50,825,961
2017	n.a.	3,159,672	3,013,772	3,616,528	9,789,972	0.15801	1,546,902	52,372,863
2018	n.a.	3,159,672	3,224,736	3,869,684	10,254,093	0.14339	1,470,293	53,843,156
2019	n.a.	3,159,672	3,450,467	4,140,562	10,750,702	0.13012	1,398,842	55,241,998
2020	n.a.	3,159,672	3,692,000	4,430,402	11,282,074	0.11807	1,332,129	56,574,127
2021	n.a.	3,159,672	3,950,440	4,740,530	11,850,642	0.10715	1,269,768	57,843,896
2022	n.a.	3,159,672	4,226,971	5,072,367	12,459,010	0.09723	1,211,411	59,055,306
2023	n.a.	3,159,672	4,522,859	5,427,433	13,109,964	0.08823	1,156,737	60,212,044

CHAPTER VII

CONCLUSIONS AND RECOMMENDATIONS

India is a developing country that has thus far adopted the approach of planned development. This notion has been the basis of the various five year plans. While substantial funds were allocated to the electric sector, it was not given any special treatment. The five year plans, all based on the strategy of balanced growth, however, have failed. From a policy stand point, it may also be time for India to think in terms of Hirschman's theory of unbalanced growth. This theory isolates the sectors that have maximum linkages and concentrate on developing these sectors. Electricity is an ideal sector to target as it has maximum linkages.

All electricity in India has thus far been state owned and operated. The SEBs have been criticized for not generating the required power. Coupled with that their credit rating with international lending institutions like the World Bank and the IMF are poor. These institutions will no longer lend to the SEBs. The domestic financial market does not have the depth of

investor confidence either. Internally generated capital will not meet the required level of investment in the electric sector. Therefore foreign capital is probably the only viable alternative.

The review of the literature shows that privatizations have been successful in the United Kingdom. This is of particular significance to India because India follows the United Kingdom in all of its practices. India used to be a colony of the British and has several similarities in functioning to the United Kingdom. The fact that privatization was successful in the UK bears well for the success of privatization in India. Another advantage is that privatizations have been successful in LDS like Nigeria and Malaysia.

In recent years there has been an increase in direct private investment in developing countries by multinational corporations headquartered in developed countries. Investment by such companies in developing countries involves the transfer of funds, physical capital, techniques of production and reinvestment of profits.

Enron is the first major private entity to initiate the construction of a power generation plant located in Dhabol, Maharashtra, India. The Enron project however, faced severe criticism initially for being very expensive. This analysis therefore compared the Enron project to a government owned and operated electric utility in India namely, NTPC. NTPC is a state owned generation agency that is run very efficiently. It is very similar to the Enron project in that it serves high load customers and does not offer any subsidies. From the comparison between the Enron and NTPC projects it can be seen in Tables 6 and 7 that the capital and operating cost of the Enron project over the next 25 years is $11.4 million or 25.3 percent less than that of the NTPC. The sensitivity assessments detailed in Tables 8 through 19 show that Enron is always less expensive than NTPC and the difference ranges between a low of 21.8 percent and a high of 31.1 percent. This confirms that the assumptions are robust. The difference is always within the 20 t0 30 percent range. Therefore, it costs less to have Enron build a plant compared with NTPC.

The Enron project is the first of its kind in India. It is understandable therefore that it faced several

criticisms. The main criticisms against Enron were the lack of transparency and cost padding. The lack of transparency was taken care of by renegotiating the project and lowering the costs. The cost padding was also reduced and this treatise proves that the project is less expensive than an existing plant in India.

Since electricity is a sector that provides maximum linkages to other sectors of the economy it is sound developmental policy to expand this sector in India. The expansion of the private sector in generation will create the much needed resources, and this analysis has proven that this is economically viable. The privatization of the electric power sector in India will be the first step the country would take toward becoming a developed nation.

BIBLIOGRAPHY

Center for Monitoring Indian Economy. Basic statistics relating to Indian Economy. Bombay, 1993.

Central Electric Authority. Ninth Annual Electric Power Survey of India Delhi: Government of India Press, 1975.

Central Electric Authority. Electric Power Survey, Delhi: Government of India Press, 1993.

Council of Power Utilities. Profile of Power Utilities in India. 1993.

Cowan, Gary. Privatization in the Developing World. Greenwood Publishing Corporation, 1990.

Joel Darmstadter, Perry D. Teitelbaum and Jaroslav G. Polach, Energy In The World Economy: A Statistical Review Of Trends In Output, Trade And Consumption Since 1925. Baltimore: Johns Hopkins Press- R.F.F., 1971.

Desai, P.B. Planning in India. Ghaziabad: Vikas House, 1979.

Duncan,E. "They Can't Let Go," The Economist. January 1995. 20-23.

Dutt, E. "Power Sector Reform Is Only A Cure," India Abroad, July 1994, 21.

Editorial. Power And The Private Sector. The Hindu. September 1994, 12.

James Foreman-Peck and Robert Millward. Public and Private Ownership in British Industry. Clarendon Press, 1994.

Ganguli, B., "Regaining Lost Glory," Business India. May 1995, 72-76.

Ganguli and Singh, "Power Projects in India". Business India, June 1995.

Ghosh, Arun. Indian Economy Its Nature And Problems. Calcutta: NBS, 1994.

Ghosh, Arun. Planning in India. New Delhi: Sage Publications, 1992.

Ghosh, Pradip K. Energy Policy and Third World Development. Westport, Connecticut: Greenwood Press, 1984.

Government of India, First Five Year Plan, Delhi: Government of India Publications Branch, 1953.

Government of India, Planning Commission, Third Five Year Plan Summary Delhi: Government of India 1956.

Government of India, Planning Commission, Third Five Year Plan Summary Delhi: Government of India Publications Division 1962.

Government of India, Planning Commission, Fourth Five Year Plan 1969-'74. Delhi: Government of India Publications Branch, 1970.

Government of India, Planning Commission, Draft Fifth Five Year Plan 1974-'79, 2 vols. New Delhi: Government of India Press, Volume 1-1973, Volume II-1974.

Government of India, Fuel Policy Committee, 1992.

Government of India. Fuel Policy Committee Report, 1993.

Hattangadi. The Enron Controversy. Frontline. July 1995, 30-42.

Henderson, P.D. India The Energy Sector. Published for the World Bank: Oxford University Press, 1975.

Hirschman, A. A Strategy of Economic Development. Yale University Press, 1958.

Hurl, Bryan. Privatization and the Public Sector (Studies in the UK Economy). Heineman, 1988.

June 1994 address by Mr. G.V. Ramakrishna, Member Planning Commission encouraging privatization.

Michaels, J. "The Elephant Stirs," Forbes. April 1995, 158-163.

Mitra, N., "Private Projects are Cheaper," India Abroad. February 1994, 28.

Nadkarni, Seetharamu & Aziz. India the Emerging Challenges. New Delhi: Sage, 1991.

Nafziger, Wayne. The Economics of Developing Countries. Prentice Hall, 1996.

Nayar, K.S., "Prime Minister Woos Investors," India Abroad. June 1994, 28.

Published studies illustrate (Levine, Gadgil, Meyers, Sathaye, Stafurik & Wilbanks, 1991) energy efficiency, developing nations and Eastern Europe.

Published studies illustrate the privatization process (Tenenbaum, Lock & Barker, 1992) bearing in mind the competitive and regulatory process already in place in the country in question.

Rao, V.K.R.V. India's National Income 1950-1980. An Analysis Of Economic Growth And Change. New Delhi: Sage, 1983.

Saggitarius and others. Survey of Indian Industry. Madras: Hindu, 1994.

Sashi, M, "The Success Of NTPC," Business India, May 1995.

Sathaye & Gadgil, "Aggressive Cost-Effective Electricity Conservation,"_____,_____.

Special Correspondent. Power Sector: PM For Private Investment. The Hindu. September 1994, 4.

Streeten, Paul and Michael Lipton, The Crisis in Indian Planning. Bombay: Oxford University Press, 1968.

The World Bank. Electric Power In Developing Countries: Status, Problems And Prospects.(Energy Development Division). Washington D.C.,1990.

The World Bank, India Long Term Issues In The Power Sector, 1991.

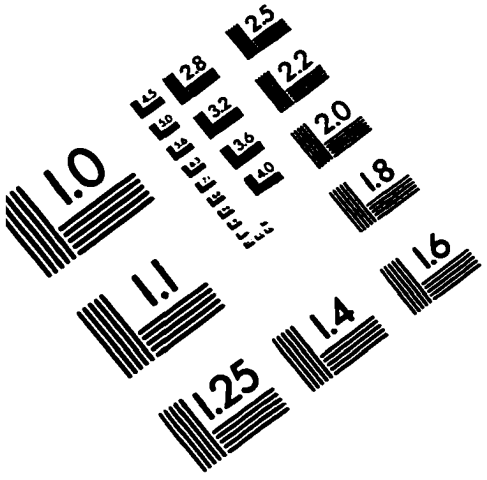
Thirlwall, A.P. The Economics of Growth and Development. Edward Elgar Publishing, 1995.

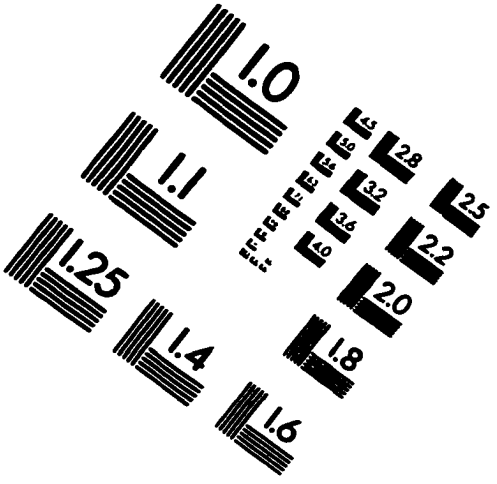
Todaro, Michael. Economic Development. Addison Wesley Publishing Company, 1994.

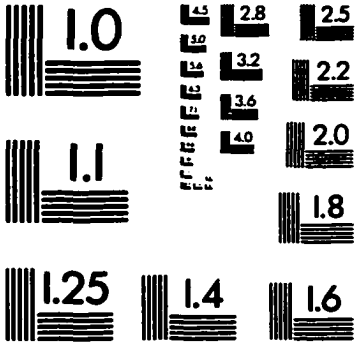
Tyner, Wallace. Energy Resources and Economic Development in India. Martinus Nijhoff Social Sciences Division, Leiden/Boston, 1978.

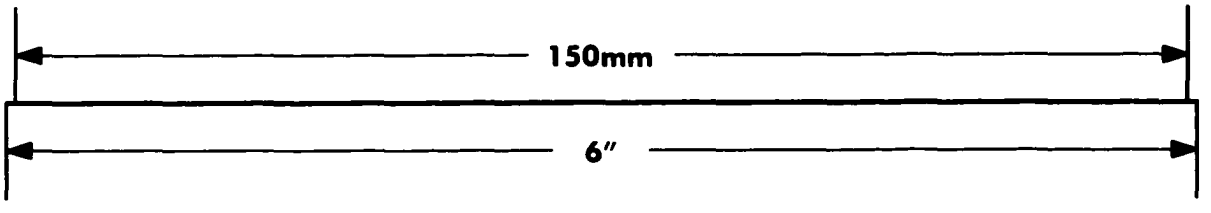
John Vickers and George Yarrow. Privatization: An Economic Analysis. MIT Press, 1996.

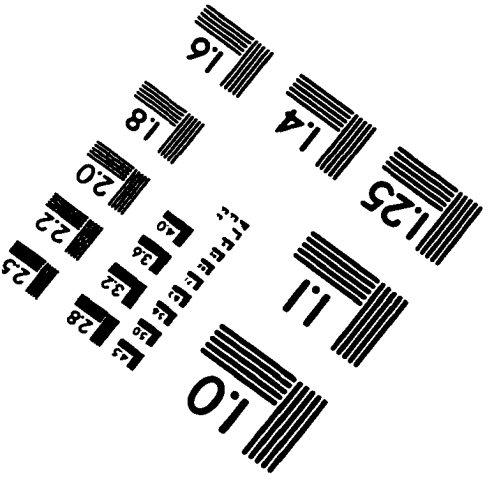
IMAGE EVALUATION
TEST TARGET (QA-3)











APPLIED IMAGE, Inc
1653 East Main Street
Rochester, NY 14609 USA
Phone: 716/482-0300
Fax: 716/288-5989