

# Privatisation of Electricity in Delhi

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## General Overview of the Power Sector in India

### Principal Acts in the Indian Power Sector

In India, the power sector is the joint responsibility of state and central government and it is currently governed by three principal Acts:

- The Indian Electricity Act, 1910
- The Electricity (Supply) Act, 1948
- The Electricity Regulatory Commission Act (ERCA), 1998
- But in the near future these three Acts will be replaced by the Electricity Bill, 2001.

- **The Indian Electricity Act, 1910**

The first Indian Electricity Act came into force in 1903 and was an attempt to introduce some rules in the electricity sector. The Indian Electricity Act, 1910, which made numerous amendments replaced this Act. The main goal of it was to regulate the relations between the consumers and the licensees which supplied power to consumers or other licensees. The Act provided for the issue of licenses to other persons for generation, distribution and supply of electrical energy, determined their powers and obligations, and provided a framework for the taking over of their undertakings by the State Electricity Boards (SEBs), the state government or by a local authority. This Act also introduced a basic concept of policy-based tariffs. The aim was to ensure that customers are fairly treated and that electricity agents get reasonable returns on their equity.

- **The Electricity (Supply) Act, 1948**

The goal of the Electricity (Supply) Act, 1948 was to promote the rationalisation of the production and supply of electricity and generally to take measures which are useful for electrical development. It prescribes that most electricity generation and distribution has to be undertaken by State Electricity Boards, which have been constituted under this Act. So the main part of it deals with the constitution of the Central Electricity Authority (CEA), State Electricity Boards, generating companies, Consultative Councils and local Advisory Committees, their statutory powers and functions. It also prescribes detailed manners in which tariffs have to be fixed, e.g., electricity boards should be managed in a manner that a surplus of a minimum of three percent of the value of fixed assets of the board at the beginning of the year is earned. Further the Supply Act authorises the state to make rules concerning the management and accounts of the State Electricity Boards. To maintain and secure the equitable distribution of energy, the state is additionally allowed to give directions to licensees for regulating the supply, distribution, consumption or use of electrical power.

According to the Indian Electricity Act, 1910, the electricity agents were mostly in private hands. The Electricity (Supply) Act, 1948 changed this situation slightly and more and more agents have been taken over by the SEBs when their license expired.

- **The Electricity Regulatory Commission Act, 1998**

The Electricity Regulatory Commission Act constitutes the Electricity Regulatory Commissions (ERCs) on central and state level. These ERCs are responsible for regulating the functioning of private licensees as well as SEBs.

- **The Electricity Bill, 2001**

The Electricity Bill, 2001 replaces the above mentioned three principal electricity acts. The aim of this bill is to increase competition in the energy sector. It facilitates open access to transmission and distribution grid, power trading and also allows setting up of captive power plants without any restriction.

The most important features of the Electricity Bill, 2001 are:

- For generating electricity, no license and no clearance from the CEA will be required.
- Any industry can be set up by captive generation and can use transmission lines of others to transport electricity to its plant.
- Tariffs for distribution agencies will be regulated until competition is established. Afterwards only wheeling charges are going to be fixed.
- Open access will have to be provided by transmission and distribution companies for wheeling by trading companies.
- Cross subsidies will be removed progressively and will be replaced by explicit subsidies for any class of consumer.

One objective of this bill is to convert electricity into a commodity that can be traded freely. This should introduce competition in generation and so lead to a reduction in electricity prices. Further, the privatisation of the state-run electricity will lead to more efficiency in the sector and this will also end in a reduction of electricity rates in the long run.

Critics like the Delhi Science Forum argue that this bill is an attempt to change the basic objectives of the sector. The objective of the Electricity (Supply) Act, 1948 was to ensure electricity at reasonable prices. Now “for the first time, the electricity sector is being recast to strip away all social objectives that had been built into the sector. Instead, what is being attempted is a sector that will function on ‘commercial lines,’ i.e., generate enough profits to fund its own expansion. The state’s role will be limited to regulating the sector and providing explicit subsidies to any group of consumers that it considers economically vulnerable and requiring such subsidies.”

I believe that the objective criticised by the Delhi Science Forum is one of the most important and desirable changes in the power sector. The state should withdraw its power in this sector and only concentrate on subsidising economically vulnerable consumers. I will deal with this issue in more detail later in this paper.

## Institutions in the Indian Power Sector

### **CEA (Central Electricity Authority)**

The CEA is an agency of the central government, which was created under the Electricity (Supply) Act in 1948. It is responsible for regulating investments in the power sector. So for example, till 1991 any scheme involving capital expenditure above Rs 250 million, required approval from CEA for technical as well as economical aspects.

### **SEBs (State Electricity Boards)**

The SEBs are state government owned integrated monopoly utilities which were established under the Indian Electricity (Supply) Act. SEBs have the monopoly over generation, transmission and distribution of power within the state. Except for cities like Mumbai, Kolkata and Ahmedabad, the entire distribution lies in the hands of these agencies.

### **CERC (Central Electricity Regulatory Commission)**

The CERC was established by the Electricity Regulatory Commission Act, 1998. It consists of four members appointed by the central government. According to the ERCA, 1998 the Central Commission shall be guided by such directions in matters of policy involving public interest as the central government may give to it in writing. The CERC's aim is to promote competition, efficiency and economy in the electricity industry, encourage investment and safeguard the consumer interest.

The tasks of the CERC are:

- Regulation of tariffs of central generating stations;
- Regulation of tariffs of electric power generated and sold across states in a composite package;
- Regulation of inter-state transmission tariffs;
- Regulation of inter-state transmission;
- In addition, the Act also gives the CERC an advisory role concerning power and the environment, to advise government on issues relating to electricity, to prepare and publish guidelines, and arbitrate on certain issues.

### **SERCs (State Electricity Regulatory Commissions)**

The State Electricity Regulatory Commissions also are established under the Electricity Regulatory Commissions Act, 1998. The SERCs consist of at most three members appointed by the state government.

The tasks of the SERCs are:

- Determination of the tariff for electricity, wholesale, bulk, grid or retail;
- Determination of the tariff payable for the use of transmission;
- Regulation of power purchase and procurement process of the transmission utilities and distribution utilities;
- Promotion of competition, efficiency and economy in the activities of the electricity industry.

## Power Corporations

In the late 1970s, the central government established corporations like the National Thermal Power Corporation (NTPC), the Bharat Heavy Electricals Limited (BHEL) and the Power Grid Corporation of India (PGCIL). NTPC generates power from large pithead coal thermal stations and sells it to various state utilities like the SEBs. So it satisfies about 25 percent of the demand for energy in India. BHEL and PGCIL on the one hand are responsible for manufacturing of electrical equipment like turbines, boilers or transformers and on the other hand for erection and maintenance of interstate transmission lines.

## Independent Power Producers (IPPs)

Till 1991 more than 95 percent of distribution and about 98 percent of generation was under the government ownership. After 1991, because of severe foreign exchange crisis and a lack of capital for expanding power generation capacity, the Indian government allowed private foreign and Indian investments.

To attract investors, the government offered concessions such as 100 percent foreign ownership, long-term purchase agreements and assured profits. In the first three-year period, state governments and SEBs concluded about 240 contracts. The formation of contracts happened without competitive bidding and the states and SEBs did not care much about elementary norms of power planning, proper demand forecasts and evolution of least cost plans based on comparative costing of different options for sites and fuels. The result was that only a fraction of these contracts contributed to increased power capacity. On account of this fact, central government enforced a competitive bidding route for acquiring new capacity.

### Start of Privatisation

The first state which started to restructure and privatise the power sector was Orissa in the mid 1990s. Supported by the World Bank they started a) un-bundling the integrated utility into three separate sectors of generation, transmission and distribution, b) privatisation of generation and distribution companies, and c) to establish independent regulatory commissions to regulate these utilities. Soon afterwards, several other states like Haryana, Uttar Pradesh and Andhra Pradesh followed.

### The Power Sector in Delhi before Privatisation

#### Structure of the Energy Sector

##### *Principal Acts*

As already described, the Constitution of India defines that central government as well as state government can set up guidelines relating to the power sector. So the basis for the electricity sector in Delhi are also the three principal acts namely the Indian Electricity Act, 1910; the Electricity (Supply) Act, 1948; and the Electricity Regulatory Commission Act, 1998. Additionally there exists the DECO (Delhi Electricity Control Order, 1959) and the Delhi Vidyut Board Control Regulations, 1998.

The aim of DECO is to regulate transmission, distribution, utilisation of electricity; to maintain supply, and secure equitable distribution of energy by all concerned in the Union Territory of Delhi. These goals shall be achieved by restrictions on the use of energy and by binding any change in energy supply to the permission of the state government.

As this order did not have the expected consequences, a committee was founded in 1998 to examine each provision of the DECO, 1959. The results of this committee and other considerations led to the Delhi Vidyut Board Control Regulations, 1998 which completely replaced the DECO, 1959.

##### *Institutions*

- The Delhi Vidyut Board (DVB) is the State Electricity Board of Delhi. It was founded in 1997 and is the successor of the Delhi Electric Supply Undertaking (DESU). The DESU was a part of the Municipal Corporation in Delhi. DVB is now placed under the Government of Delhi. According to the Electricity Supply Act, 1948 it controls the electricity generation, transmission and distribution in Delhi.
- The Delhi Electricity Regulatory Commission is another important agency in the Delhi Electricity Sector. Its duties and responsibilities are described in the section "State Electricity Regulatory Commission."

### Problems in the Electricity Sector in Delhi

In recent years, the performance of the power sector in Delhi has deteriorated dramatically due to various reasons:

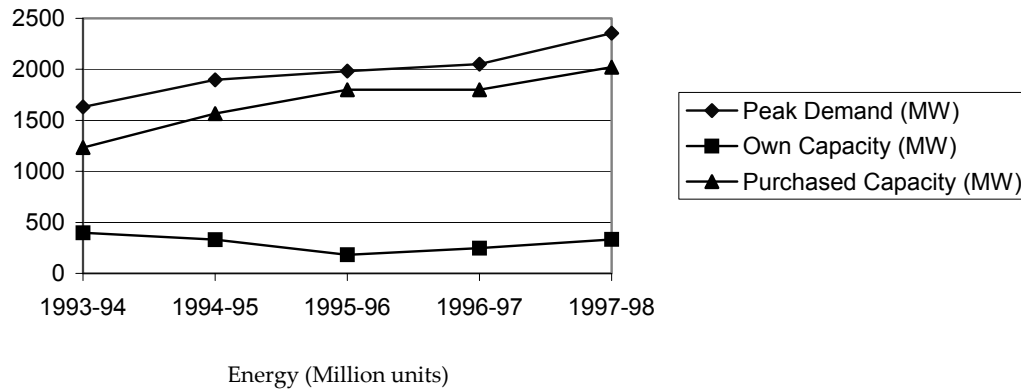
- In spite of increasing demand, no new capacity has been added.
- T&D losses (Transmission and Distribution losses) have increased from 7 percent in 1953 to 23 percent in 1989 and have now reached a level of over 50 percent. About 18 percent are transmission losses and 32 percent are lost due to power theft.
- Maintenance has been neglected which has led to inefficient working equipment.
- Commercial losses of DVB have increased sharply in the recent years. (From Rs 207 crore in 1993 to Rs 1,103 crore in 2000)

The problems of the electricity sector in Delhi can be divided into three sections:

- Demand-Supply Imbalance
- Transmission and Distribution losses
- Financial Position

### Demand-Supply Imbalance

The figures below compare the development of the demand of electricity with the capacity provided by DVB owned power plants.



Source: DVB Webpage

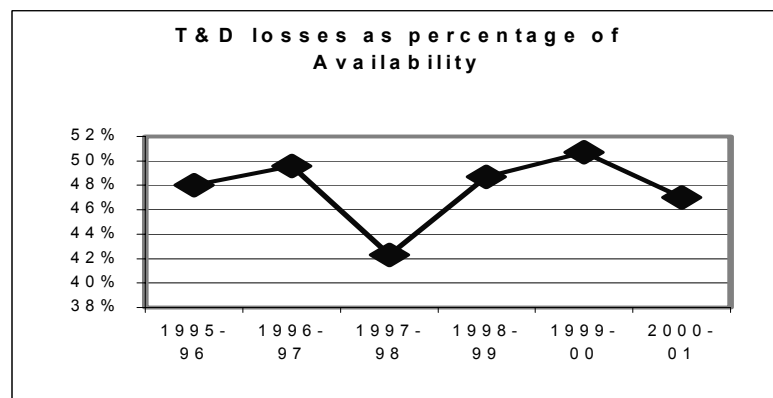
It impressively shows the growing peak demand of energy over recent years on one hand, and the stagnant power supply of their own power plants on the other. With compelling logic, this leads to an increased purchase capacity.

In spite of an own installed capacity of around 700 MW, DVB’s generation companies cannot provide more than 300-350 MW. Adequate reason may be found in the Indraprastha Power Station, which provides 125 MW and is 30 years old and the Gas Turbine Stations which provide about 250 MW and are more than ten years old and have a delay of over two years in the overhauling. All this leads to very high production costs due to the minor operating rate and the high consumption of fuel brought about by the age of the plants.

To solve this problem, between 1994 and 1995, three new projects with private sector participation have been identified. But for various reasons, little progress has been made in implementing these projects. To close the demand-supply gap, new investments must be made. But as the budget of the Delhi’s Government is completely stretched, taking these important steps is very difficult.

### Transmission and Distribution Losses

Another major problem of Delhi’s power system is the high levels of T&D losses. The figures below show the development of T&D losses from 1995 to 1998.



T&D Losses

1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
48.00%	49.60%	42.30%	48.70%	50.70%	47.00%

Source: Annual Report (2002-02) on the Working of SEBs

In the "Strategy Paper on Power Sector in Delhi" DVB identifies various reasons for this upsurge in T&D losses:

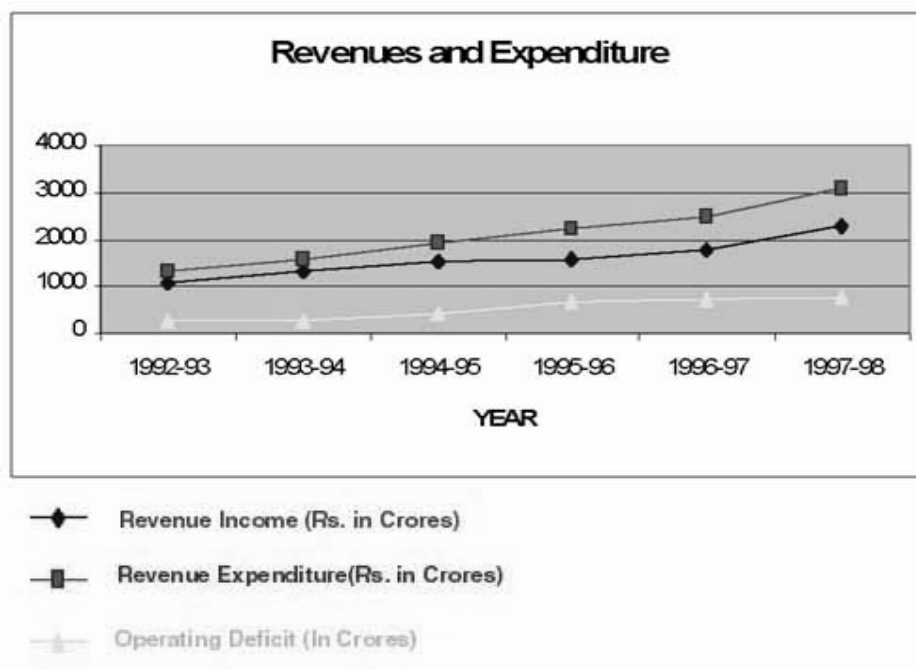
- Many consumers who are on metered supply still abstract illegally energy. This habit exists in all categories of consumers, also in industries and commercial establishments.
- Other consumers who live in electrified colonies do not take legal connections because they just do not want to.
- Under the present legal framework it is not possible to provide consumers who live in unauthorised colonies with a legal connection. This leads to illegal direct tapping of power from the mains.
- Some industries and commercial establishments in non-conforming areas and urbanised villages resort to misuse or theft due to prevalent conditions of supply.

In addition, many users load more than the agreed limit, or tamper with the meters.

According to the Delhi Power Minister, Ajay Maken, when asked about the failure to check theft of power, he attributed the "soft approach" of successive governments and the limitations of a democratic set-up and compulsions of electoral politics.

Financial Position

The financial position of DVB is alarming. The following table shows the development of revenue income, revenue expenditure and the resulting operating deficit out of it. This of course also leads to an increase of commercial deficit from Rs 342.22 crore in 1994 to Rs 694.67 crore in 1998.



The reasons for this, given by the DVB are:

- The billing system does not work efficiently. So for example only 57.3 percent of energy released in 1998 was billed and only around 88 percent of the amount billed was received as a revenue.
- Because of continuous losses, outstanding accounts reached a level of Rs 6,500 crore in the last year and on the other hand, DVB itself owes over Rs 1,000 crore from various organisations.

According to DVB's "Strategy Paper on Power Sector in Delhi," these facts point to a non-commercial environment in which an essentially commercial operation like power supply is functioning in Delhi. At the moment, investments in the power sector account to around Rs 400 crore a year. But the annual amount required is at least four to five times higher. But as it is very hard to get money from the government, investments in the power sector lack behind.

Another point is that the 25,000 employees of DVB need extended vocational training. But according to the Strategy Paper on Power Sector, Delhi, 1999 this is only possible, if the organisation is structured to run on professional lines with commercial orientation.

To sum it up, "the power situation in the nation's capital has assumed crisis proportions. Power cuts have become a regular feature. Demand continues to rise sharply but new investments to meet this demand are not on the horizon. Thefts of power are alarmingly high and are at levels unmatched in any other part of the country or even the world. The financial position of the Delhi Vidyut Board (DVB) is extremely precarious and this is coming in the way of modernising the power system. The haphazard pattern of urbanisation is putting enormous pressure on the ability of DVB to supply power on a reliable basis. The peculiar load curve of the capital is adding to frequency dips and irregular supplies. When DVB was formed in 1997, no efforts were made to change the work culture of the organisation and structure it to run on commercial and professional lines. The work culture and management practices of DVB have also been responsible for the present dismal state of affairs."<sup>1</sup>

## Privatisation of the Energy Sector in Delhi

### Steps towards a Private Power Sector

The privatisation process started in February 1999 when a Strategy Paper was issued by the Government of National Capital Territory of Delhi (GNCTD). This Strategy Paper identified the problems of the power sector in Delhi which are described in the previous section, and emphasised the importance of the restructuring of the DVB. It argues that huge financial inputs are required to improve the situation in Delhi's power sector, but that this is not possible in the present organisational, financial, legal and regulatory environment of the DVB.

To improve this situation the Strategy Paper suggests several measures which should be taken:

- Setting up a Delhi Power Generation and Transmission Company which should be in charge of the existing and planned generation stations and the transmission network, including all sub-stations;
- Encouraging new generation in the private sector as well as in joint ventures;
- Setting up new power distribution companies. Their tasks should include maintaining the transmission and distribution network from 66 KV to 400 volts, supplying power to consumers, metering, and collecting revenue. It should also be possible to organise these companies as joint ventures.
- Establishing an independent statutory Delhi Electric Regulatory Commission which should be responsible for undertaking licensing of new capacity, prescribing performance standards and fixing tariffs;

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<sup>1</sup> Accessed at [http://www.delhividyt.com/strategy\\_paper.htm](http://www.delhividyt.com/strategy_paper.htm)

- Establishing a new working culture in the company.

The next steps in the privatisation process were the establishment of the Delhi Electricity Regulatory Commission in December 1999, as suggested in the Strategy Paper, the promulgation of the Delhi Electricity Reform Ordinance in October 2000 and its replacement by the Delhi Electricity Reform Act, 2000. The Delhi Electricity Reform Act, 2000 and policy directions by Government of National Capital Territory of Delhi provide the legal framework for the reorganisation and privatisation of the energy sector. It should back up the rationalisation of generation, transmission, distribution and supply of electricity and increase private sector participation in the electricity sector.

By the end of October 2000, a tripartite agreement was executed between the Government of Delhi, DVB and representatives of DVB employees. The three parties agreed on a concept, which intends for a smooth implementation of the policy for reorganisation and restructuring of DVB. The cornerstones of this concept are:

- non-retrenchment of employees;
- continuance of service in the successor companies without any change of terms and conditions;
- taking over liability for retirement benefits of the existing employees and retirees of the Board by establishing a Pension Trust Fund to which the government has to contribute Rs 860 crore.

In January 2001, the Council of Ministers, GNCTD approved the unbundling of DVB into six successor entities; one holding company, one generation company (GENCO), one transmission company (TRANSCO) and three distribution companies (DISCOMs). To inform prospective investors on the new opportunities for investment in the power sector in Delhi, an investors' conference was organised by the Government of Delhi and by the Power Finance Corporation Ltd. For the same purpose also several advertisements were published in leading national and international newspapers and journals. Through these advertisements, companies were invited to hand in a Statement of Qualification. In July the final report of restructuring was received and in October the Council of Ministers approved the restructuring model.

After the policy directions—which inter alia prescribe a certain loss reduction target—have been issued to the Delhi Electricity Regulatory Commission, a Request For Proposal (RFP) was sent to the pre-qualified bidders on 22 November 2001 inviting them to submit their Statement of Proposals (SOPs) by 10 April 2002. Bidders have to bid on the reduction of Aggregate Technical and Commercial Loss (AT&CL) for the next five years. This means that the company which can offer the highest AT&CL reduction becomes the highest bidder. AT&C losses are the difference between energy supplied and energy for which payment has actually been recovered.

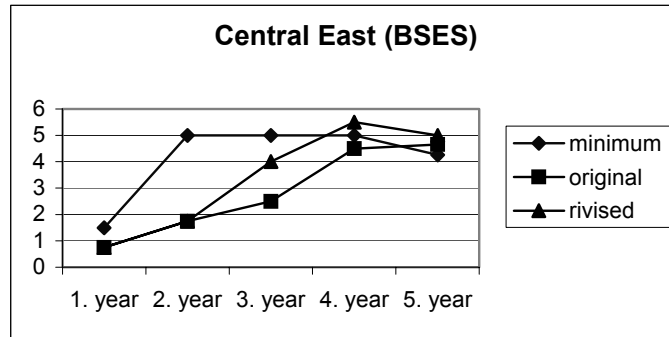
The opening losses were fixed as follows:

CEDEDCL (Central-East Delhi Electricity Distribution Company Ltd)	57.2
NNWDDCL (North-Northwest Delhi Distribution Company Ltd)	48.1
<u>SWDEDCL (South-West Delhi Electricity Distribution Company Ltd)</u>	<u>48.1</u>
Average of all DISCOMs	50.7

Source: Accessed at <http://www.delhividyt.com/bulletinboard/presshandout.htm>

Out of six pre-qualified bidders, only two bids were received on the date of opening. One from BSES Ltd, bidding for all three companies and the other from Tata Power Company Ltd which bid only for North-Northwest and South-West companies.





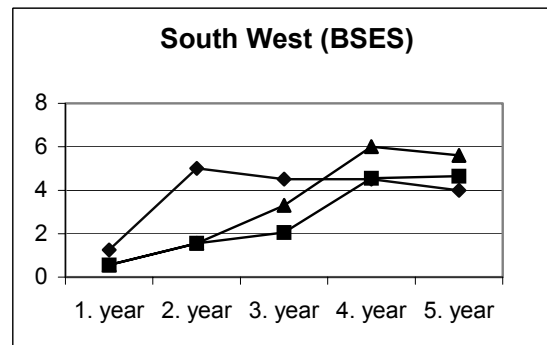
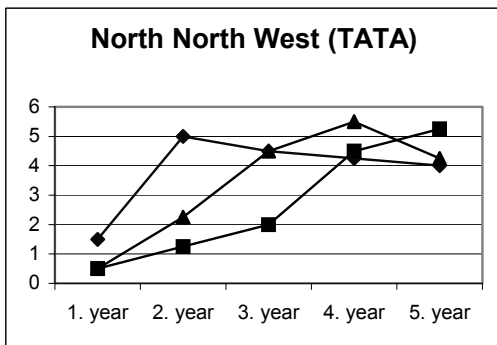
As the bids received were not acceptable because loss reductions offered by the bidders were below the prescribed targets, the involved parties entered into negotiations. After six weeks bargaining they agreed on modified loss reduction targets and some other adjustments. Tata Power acquired a share of 51 percent of the North-Northwest Delhi Distribution Company Ltd and BSES Ltd obtained controlling interest of South-West Delhi Electricity Distribution Company Ltd and Central-East Delhi Electricity Distribution Company Ltd.

## The Final Package

### Valuation of Assets

Before selling the distribution facilities to TATA Power and BSES Ltd, the value of these units had to be determined. The problem was that the accounts of the DVB were not audited and that no Fixed Assets Registers, which could have given all the necessary details, existed. So it was decided to use the business valuation method. According to this, the value of assets is reflected in future tariffs. The use of the business valuation method was found to be appropriate because the licensee can only use all these assets together and is not able to strip them.

In accordance with this method, the value of the DVB is Rs 3,160 crore, what is close to the book value of the unaudited accounts (Rs 3,024 crore). But finally assets have been sold for Rs 2,360 crore to the new owners. How this could happen, I will describe in a later section of this paper.



### Policy Directions

The policy directions are issued under the Delhi Electricity Reforms Act, 2001 and they describe the main features of the electricity reform in Delhi. The key issue of the reform package is to reduce the losses of DVB. This will take some time since it is not possible to pass all the costs to the consumer overnight. So the whole structure has to be changed and companies have to be supported to be able to bridge the time while they are making losses. The following policy issues try to keep this in mind.

According to the transfer scheme, a specified loss reduction target (to bring AT&D losses down to 34 percent within five years) has to be achieved. The graphic below shows the original loss reduction prescribed by the government, the offered target of the DISCOMs in their first bid and finally the agreed loss reduction target. Numbers are given in percent per year.

If the AT&C loss reduction of a DISCOM is better than the minimum stipulated by the government, 50 percent of the additional revenue which arises out of the better performance, goes to the DISCOM, the other half will be used for the purpose of tariff fixation. If the actual AT&C loss reduction of a DISCOM is worse than that quoted in the bid, the whole shortfall has to be borne by the DISCOM. In the case that the actual AT&C losses of a DISCOM are worse than the minimum AT&C loss reduction level stipulated by the government, but better than the loss reduction level quoted in the bid, the entire additional revenue from this better performance will be used for the purpose of tariff fixation.

DISCOMs will receive 16 percent guaranteed revenues on their assets till 2007. Precondition for this is that they achieve their AT&C loss reduction target and that their investments are approved by the Regulatory Commission. Liabilities and past losses of DVB are not going to be passed on to successor companies. All of them will start with a clean opening balance-sheet.

To keep electricity prices down and to avoid a tariff shock, a loan of Rs 2,600 crore or of maximum Rs 3,450 crore is granted to the transmission company. As the losses of DISCOMs decrease every year, they will slowly be able to charge consumers the full price of supply and so the money needed to fill the gap between actual electricity supply costs and the money charged for this service will also decrease. The loan has to be repaid by GENCO, TRANSCO and the three distribution companies within 13 years to the holding company. For the first four years, DISCOMs enjoy a moratorium on repayment and a waiver on interest. If necessary, this can be extended to the fifth year.

Finally the three DISCOMs have been privatised in May 2002, and the Transfer Scheme has been effective since the end of June 2002.

### **Critics of DVB Privatisation Scheme**

The privatisation scheme described above has been criticised by various people. One of the most vehement opponents has been Gajendra Haldea, Chief Advisor at the National Council of Applied Economic Research. He declares himself as a supporter of the privatisation process but he is against the current privatisation scheme of DVB. I want to summarise his objections now.

According to him, DVB privatisation is a negotiated bilateral deal and not a competitive bid. Too many large concessions were granted to favoured bidders and all of them have to be paid by consumers and taxpayers. It starts with a guaranteed return on equity, continues with the mechanism of reducing T&D losses, goes over to the way how tariffs are calculated and ends up in creating private monopolies, to name only a few weak points.

Private DISCOMs are offered a Return on Equity (RoE) of 16 percent post-tax. This means that consumers have to pay 22 percent RoE. Further DISCOMs get a three year debt service moratorium which converts into a long term interest free loan of Rs 300 crore. This again increases the RoE to approximately 27 percent. Mentioned in passing, paying back this loan will approximately cost the customer another rupee per unit. Also interesting to mention is that if DISCOMs invest in measures which bring down AT&D losses and so automatically increase their profits, also qualify for RoE. In fact this means that the consumer has to pay twice for the profits of DISCOMs. Further the regulation, which grants half of the money saved by recovering stolen units, could lead to excess billing.

According to Gajendra Haldea, the loss reduction target of 34 percent within five years is not ambitious enough. It is easy for DISCOMs to achieve a much higher reduction. As mentioned above,

DISCOMs get to have the money saved by extra T&D loss reduction which exceeds the agreed percentage. He claims that this reduction target is a further concession to the DISCOMs which enables high wind fall profits at the consumer's expense. He argues that it should not be a problem to reduce T&D losses to ten percent within this period because this was also possible in other states.

Another detail of this privatisation scheme is that tariffs include an annual depreciation charge of 6.83 percent which has to be paid by the consumers. This fact alone is not strange at all because every company includes its depreciation in its prices. Unusual is only that the tariffs are calculated on the basis of total equity and not of net equity like in Mumbai, Kolkata, Surat, Orissa or Ahmedabad. That means consumer's pay for assets losing their value but tariffs still are calculated on the much higher cost price base.

A major point, criticised by Gajendra Haldea is the valuation of assets. The valuation of assets is important in two ways. First this determines the purchase price which has to be paid by the DISCOMs and second, it is a basis for the tariff calculation.

"The Commission had, after a public hearing, determined the gross fixed assets of DVB at Rs 3,841 crore in its order of May 23, 2001. In addition, capitalised works were valued at Rs 484 crore while works in progress were valued at Rs 1,078 crore. This added up to Rs 5,303 crore as the closing balance on March 31, 2002. Assuming that a modest Rs 100 crore would have been incurred as capital expenditure in the three months that followed, the total gross fixed assets would be Rs 5,403 crore as on July 1—when DVB was restructured and split into five companies."<sup>2</sup>

But according to Delhi government, gross fixed assets including transmission and generation companies account to only Rs 4,263 crore. So there is a gap of Rs 1,140 crore.

*(All figures are in Rs crore)*

<b>Valuation of transmission companies</b>	
Gross fixed assets of DVB	3841
+ Capitalised works	484
+ Works in progress	1078
	<b>5403</b>
<i>Amount missing</i>	<i>-1140</i>
Gross fixed assets by GNCTD	4263
- Transmission companies	-650
- Generation companies	-510
Subtotal	3103
- Depreciation	-743
<b>Total value of transmission companies</b>	<b>2360</b>

DVB argues that it followed the business valuation process, but this still can not explain the missing Rs 1,140 crore.

Also interesting is that the value of assets was reduced by another Rs 743 crore as depreciation because of the poor performance of the utilities. So the value of DISCOMs shrank again to Rs 2,360 crore. But use of the concept of the business valuation process and the reduction by accumulated depreciation at the same time is inconsistent. Whereas the business valuation process determines the value of a company by anticipating future cash flows which then are discounted to the present at an

<sup>2</sup> Haldea, Gajendra, "Missing assets and the power game," *The Indian Express*, 2 July, 2002.

appropriate discount rate, accumulated depreciation is based on the past. But the value of a business based on expected earnings cannot be reduced by losses in the past. Further all new DISCOMs start with clean opening balance sheets and receive guaranteed RoE. So there is no need at all for reducing the value of the assets by depreciation because of poor performance. Not enough, the basis for the calculation of tariffs is the amount of Rs 3,103 crore and not the amount reduced by the depreciation.

Another remarkable point is that bulk supply tariffs are fixed twice. Once for GENCOMs and once for TRANSCOMs. Usually tariffs are only fixed for GENCOMs and TRANSCOMs receive a fixed wheeling charge. In Delhi, GENCOMs are allowed to charge about Rs 2.50 per unit from TRANSCOMs. TRANSCOMs then sell the power for Rs 1.47 to DISCOMs. This means, TRANSCOMs have to sell electricity below the purchasing price. The loss is to be borne by the government and so automatically by the taxpayers. In the first year it is estimated to be Rs 1,400 crore. The reason for this measure is to assure that DISCOMs make profits. So they are allowed to sell electricity at an average tariff of Rs 4.16 to the consumers. Bulk consumers will even have to pay more. In the article "Dabhol revisited,"<sup>3</sup> Haldea argues that "the new rules make sure that Delhi Metro will have no options but to buy from these private monopolies, which means that commuters will subsidise private DISCOMs by about Rs 75 crore a year. Similarly, the government's own Jal Board will pay Rs 6.50 while the municipal corporation will shell out Rs 6.95 for street lighting to private discoms." At least the fears that Delhi Metro Rail will have to pay Rs 4.80 per unit seem to be unfounded because recent newspaper articles indicate that Delhi Metro Rail will get the status of a DISCOM and so be able to buy direct from TRANSCOMs. But as DISCOMs still have to get at least 16 percent RoE post tax on investments, these profits will have to be paid by someone else and again this will be the consumer.

The bidding process itself was also quite questionable, bearing in mind that only three bidders were bidding for three DISCOMs and additionally it was only allowed to bid for a maximum of two DISCOMs. It is obvious that in such a situation bids will rather be conservative than ambitious. This was also expressed in the final bids handed in by the bidders. None of them met the criteria fixed by the DERC and all of them had to be renegotiated. Not enough, some of the substantial benefits, mentioned above, have been offered to the bidders, after they became short-listed which vitiates the entire bidding process.

Further, instead of creating competition between DISCOMs, the privatisation process led to the creation of private monopolies. These monopolies were created in spite of a study carried out through an expert group, headed by Montek Singh Ahluwalia, on behalf of the government, which concluded, that the only way to lower prices is to introduce competition. The reason for the low energy prices in Mumbai is, according to the panel, that both BSES and TEC supply power to parts of the same market. Another example, where introduction of competition has led to a sharp decrease in consumer prices is the telecom market, where different companies try to win new consumers. Haldea argues that neither the Constitution nor the Electricity Act, 1910 allows private monopolies. The Electricity Act, 1910 for example declares that the grant of a licence "shall not in any way hinder or restrict the grant of a licence to another person within the same area of supply for a like purpose."

Last but not the least, generators can sell their electricity only to the nearly bankrupt state owned transmission company and are not allowed to set up direct contracts with consumers. The consequence is that this gives no incentive for potential investors to build a new power plant and sell power to Delhi because it is insecure if the power really can be sold. According to Haldea, we need a reform strategy that allows open access to the network on payment of a regulated charge while generation and supply face competition. Further he argues, if competing producers are able to access consumers, they will take the market risk and invest in new capacity and deliver price and efficiency gains too. Usually, if such facts leak out, this is a big scandal in the public. Not so in Delhi. Though all

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<sup>3</sup> Haldea, Gajendra, "Dabhol Revisited," *The Hindustan Times*, 2 July, 2002.

these criticisms have been published in various newspapers, no one has taken it up as a crusade. Not even the BJP has picked this up as a relevant topic.

According to Sunil Jain, a columnist at the *Financial Express* "the answer's simple, and made obvious some months ago, when Haldea first made this argument in the studio of a TV channel. Kaun chori nahi karta, privatisation hone to do,"<sup>4</sup> (who does not steal, but let privatisation happen), was the response of an audience so fed up of DVB that they did not give a damn if the new owners paid several hundred crore less to buy controlling stakes in DVB's three DISCOMs.

Another reason for public ignorance of these matters is that the extraordinary depreciation of Rs 743 crore is not even half the amount of the annual loan which the government grants to DVB without the chance of getting it back. So, valuing the three DISCOMs Rs 743 crore less is still better, than keeping it for another year and losing another Rs 1,368 crore. From that Sunil Jain concludes that it seems to be the dominant public mood today that no price is too high to get the government out of the people's lives.

### Expected Problems in the Privatised Power Sector

Unlike a public electricity sector, a privatised electricity sector is exposed to market forces and follows different rules. Where the main goal of public actors is to serve public needs without regard to loss or profit, the private actors' goal is profit maximisation. These changed conditions involve several chances for consumers and actors in the electricity system but also considerable threats. In this section I want to list problems which often are mentioned while talking about a privatised electricity sector.

### Social Impacts arising from a Free Market

As private companies try to maximise their profits, they base their decisions on costs and benefits. So externalities like social costs do not influence their behaviour.

This has impact on:

- Investments: If investments do not promise proper earnings, they will be postponed or even cancelled. In most cases these cancelled investments will affect non-profit yielding customers like poor people or people in rural areas.
- Empowerment of consumer: Companies would not put much effort in simplifying the way of how to switch between different suppliers.
- Number of people connected to electricity grid: As the improvement of the billing mechanism is of utmost importance for the companies, they will soon start disconnecting households and companies who can not pay their bill. This of course results in considerable social costs. So for example in Georgia, USA after electricity privatisation, AES has been disconnecting 1,000 users a month. Even electricity supply to army and security has been interrupted temporarily.

### Environmental Impacts of a Privatised Electricity Sector

Again because of profit maximisation, companies do not include externalities, like environmental impacts in their considerations. The reason is very simple, to produce environmental friendly energy is not as efficient as the conventional way of producing energy and much more expensive compared to conventional energy as produced today, but companies do not bear, for example, the cost of air pollution since air is a common resource. If they had to pay a price for air pollution, the cost benefit equation would change. So at the moment, there is no incentive for electricity companies to invest in end-user efficient devices or to exploit renewable sources.

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<sup>4</sup> Jain, Sunil, "Gajendra Haldea's Dilemma," *Financial Express*, 8 August, 2002.

If external benefits like a cleaner environment were taken into account, maybe the production of environmental friendly energy would even increase efficiency, as people have to pay more for each unit of electricity.

### Threats arising out of an Insufficient Implementation Process

It is not possible to convert a public electricity sector into a private sector overnight. In fact it is exactly the opposite. Privatisation is a very long process because setting up private companies and ensuring competition and that interests of consumers are taken into consideration takes time. Success or failure of the whole future electricity sector depends on how carefully the implementation process is carried out and which regulations and laws walk along.

### The Unbundling Process

One requirement for privatisation is the unbundling of the integrated system into generation, transmission, and distribution. Because of the unique character of electricity, it is very important that these three sectors work together properly. If this system now is unbundled into different privately owned profit driven companies which only follow their own interests, the cohesion of the whole system could be in danger.

The unique characteristics of the electricity sector are that energy can not be stored economically and that demand varies hourly, daily and seasonally. Thus, a permanent supply-demand matching is of utmost importance. Further demand for electricity is price-inelastic and it is very easy to control as it is very easy to interrupt supply.

“Whereas a vertically integrated system has to cope with sudden peaks in demand with reserve (capacity) margins of 15-20 percent, an unbundled system involving a large number of wholesale generators may have no incentive to maintain such reserves. In fact, when reserves fall below to precarious levels, profitable price increases may be facilitated. So, the policy, technical and institutional measures to ensure safe reserve margins are extremely important.”<sup>5</sup>

A major factor for the disastrous situation of SEBs is the inefficient operational culture in their companies. The problems vary from unskilled workers to over-manning and even criminal actions undertaken by employees. If this culture is not changed, it will be very difficult to achieve the goals expected from privatisation.

### Lack of Investors

In Delhi there is a shortage of electricity supply. So theoretically it should be attractive for investors to set up power plants and sell electricity to inhabitants of Delhi. Also DVB has tried to encourage private investors in building new power plants to reduce the supply-demand gap. But all attempts to gain IPPs for Delhi failed. So why do not private investors want to invest in new power plants though people demand for electricity and are willing to pay for it? One answer is that as a result of the current trend towards privatisation in the electricity sector in various countries, there are more investment possibilities than investors. So not many competitors apply for investments into specific projects. In many cases, it is just the other way round. Governments which want to privatise their electricity sector have to attract foreign investors. So often, there is a competition between governments to pull in investors.

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<sup>5</sup> K N Reddy, Amulya, “California Energy Crisis and Its Lessons for Power Sector Reform In India,” *Economic and Political Weekly*, 5-11 May, 2001.

An effort to make investment in the own state as attractive as possible involves the threat that regulations are too relaxed and that too many concessions to investors are made.

These concessions often contain:

- Subsidies
- A hike in tariffs
- Guaranteed profits
- Overtaking of debts, and
- Maintaining monopolies.

### Unsustainable Subsidies

One reason for privatisation in many countries is that the state does not want to pay for the losses of its SEBs any more. These losses often arise because SEBs do not pass on their full costs to the consumer. If now the state continues to subsidise consumers it would still have to spend large amounts of money on the electricity sector. It would even have to spend more if it promises companies fixed rates of profits. The consequence of this policy were, that state, and so the public, would lose substantial influence and still transfer taxes into this sector.

One place (among many others) where this has already happened is the Dominican Republic. Generation and distribution had been privatised and transmission remained in the ownership of government. As generation prices rose by over 50 percent and the government did not want to pass on these costs to the consumer, so they absorbed about 40 percent of the price hike. In total, the money paid as a subsidy to generators amounted to five million dollars every month.

### A Hike in Tariffs

Another possibility to attract foreign investors is to offer increased tariffs in order to make this business more profitable. For example, this happened in the UK where prices rose by seven percent between 1987 and 1990.

### Guaranteed Profits

The problem with guaranteed profits is that they distort the picture of the present situation of the company. For example, if profits on investments were guaranteed, the company could tend to over invest or would not evaluate precisely which investments are more or less profitable.

### Maintaining Monopolies

An easy way to make an electricity company attractive to investors is to maintain the monopoly status. If consumers do not have the choice to choose between different providers, they will have to accept any terms and conditions imposed by the electricity companies. It would be easy to increase tariffs and the incentive for companies to increase efficiency would be very low.

For example, in Ukraine, distribution has been split up into seven different companies in July 2000. In spite of introducing competition in the market, every distribution company has a near monopoly in its region.

### Employee Problem

Privatisation of public owned companies always causes agitation in the concerned labour unions because they fear that many employees could lose their jobs or be worse off after the restructuring process. But till now, this fears have usually been unfounded as employees have always been assured that no one will lose his job and that working conditions will be the same in the new companies.

So the problem of the employees is solved but this is only at the expense of the succeeding owners. In most cases they will be confronted with too many workers, unskilled mainly, and not be allowed to get rid of them. The reaction of most companies has been to stop hiring new workers but the problem of this measure is that then there are many skilled working forces missing. So generally speaking, there is the threat that new privately owned companies will be less competitive because of high costs of unskilled workers and a lack of skilled workers.

### Other Possible Threats

Privatisation in California impressively demonstrated that under conditions of electricity shortage, competition does not work. As long as electricity supply does not match demand there is no incentive for suppliers to compete with each other.

An essential condition for creating competition is that everyone must have the possibility to choose his energy supplier. This means, that the distribution system has to also provide the technical feasibility to meet this requirement.

Another possible threat is the recreation of monopolies. Companies were unbundled in order to create competition. But examples in other countries show that there is a trend towards reunification. So in El Salvador, the electricity company AES got under control three distribution companies due to acquisitions outside the country. They now supply electricity for approximately 60 percent of the population of El Salvador.

The credit rating of government owned companies is much better than that of private companies. In a period where large investments are required, this can be a critical factor for a weak electricity company.

### Comments and Suggestions on the Problems in a Privatised Electricity Sector

In fact the goal of private companies is profit maximisation. For many critics of privatisation and liberalisation, the word profit maximisation has a negative connotation. But actually the strive for profit maximisation could be one of the major advantages of a privatised and liberalised market. One has to ask oneself, how the goal of profit maximisation can be realised. The answer always will be to provide a service which serves the needs of the customers and for which people are willing to pay. So I ask now, what is so bad about profit maximisation? Is it not desirable to try to satisfy the customer?

In the public sector the main aim is not always so clear. Of course it should be to serve the people's needs, but has the government achieved this goal? Obviously not, otherwise the citizens of Delhi would not be confronted with power shortcuts, load schedules and ongoing price hikes. The main goal of the government and bureaucrats is to be re-elected and to increase power. To become re-elected the government concentrates more on short-term projects and not much on important long-term projects, like investments in the power sector. The reason is that long-term projects usually cost much money and that achievements will be visible after a long period, and not within their term of office. Bureaucrats want to increase their power and this does not always conform with the needs of the public.

Another very simple reason why privately owned companies operate more efficiently than public owned is that they spend their money on themselves whereas public-owned companies spend someone else's money on somebody else. It is obvious that if you spend your money on yourself you will evaluate your decisions much more careful than if you would spend someone else's money on somebody else. (Milton Friedman's Law of Spending)

In the section above, I collected and structured all problems which the private sector is accused to bring about. Now I will try to verify them and demonstrate a possible solution that is compatible with free markets.



### Social Impacts of Privatising the Electricity Sector

One of the major criticisms of privatisation is that private companies are not interested in serving customers who can not pay or where the costs of supplying services exceed the profits. Hence if forced to supply these customers, they will try to work around it. That is a fact which can not be refuted.

If a society decides that everyone, the rich as well the poor, should be provided with electricity then they will have to find a way to do so. Till now there has been a universal service obligation and a system of subsidies. This means that electricity companies are forced to provide a service and everything which has to be enforced has to be controlled. Controlling is expensive, time consuming and does not always bring the desired results.

The answer of V K Sood, Chairman of DERC, when asked about the social impacts of the reform assured that fears of non-profitable customers being neglected or even disconnected are unfounded. As returns on investment are guaranteed, distribution companies would not mind investing in unprofitable customers. About the fear that many people will be disconnected because they are unable to pay, V K Sood argued that most of the people are and have been able to pay their electricity bill but they did not want to pay. Now if there are two electricity bills not paid, the defaulter will be disconnected from the electricity grid. Till now, according to him, there has been no substantial increase in the number of disconnections.

Also Rakesh Kacker, an economist from the Tata Energy Research Institute (TERI) argued, that because of the universal service obligation, everyone has to be supplied with electricity. The quality of service is determined in the grid code. So theoretically, the fear that households in remote areas or households which are not very *attractive* for electricity suppliers will be disconnected or not supplied with high quality energy is unfounded. But of course, suppliers themselves will not apply much effort in guaranteeing supply for *non-attractive* customers. So it is the regulator's task to ensure maintenance of supply for these people.

A better solution would be to introduce a voucher system. Instead of subsidies to electricity companies, every household with an income below a certain threshold would get a voucher, which can only be used for settling electricity bills. Contrary to the current system, the voucher system would provide incentives to distributors also to meet the power demand of former non-profitable consumers. Instead of working around the universal service obligation, companies would compete with each other to gain contracts with formerly avoided customers. In Delhi, at the moment, a voucher system is not in consideration.

### Environmental Impacts of a Privatised Electricity Sector

The private industry causes pollution because avoiding it would minimise their profits. Therefore privatisation has a negative impact on the environment. Even if there are environmental regulations, companies will try to bypass them—so far the arguments of privatisation opponents and so-called environmentalists.

I suggest the fact that private companies always try to maximise their profits, to achieve environmental improvements. The strive for profits could be the key to a completely new and effective working environmental policy. How this could work, I would discuss in the section "Power Sector and Environmental Issues."

### The Unbundling Process

Opponents of privatisation criticise that as cooperation between generation, transmission and distribution is of utmost importance because of the unique characteristics of electricity, the unbundling of the system threatens the coherence of the whole sector. For example, generators would not have an incentive to provide a reserve capacity margin because they could gain lucrative profits in peak hours because of power shortages.

I do not believe that unbundling threatens the coherence of the sector. In a competitive free market GENCOMS, TRANSCOMS AND DISCOMS can only make profits if they serve the needs of their customers. Each of these companies depends on the service of the others because, for example, a generator can not sell power without a transmission grid and a distributor cannot sell power without a generator. So they have to cooperate with each other. If a generator does not provide a reserve capacity margin and increases its price because of a power shortcut in peak hours then he will have problems to sell his expensive power to the market because other generators, who do not have a power shortage can sell their power much cheaper.

Opponents now, maybe, would argue that no generator would have a sufficient reserve capacity margin and so all of them would have a shortage in peak hours. If this were the case, in fact, electricity prices would rise. They would rise as long as the price is that high, that a generator decides to produce more energy in peak hours because the profits gained from selling more power are still higher than costs of required investment in extra capacity. And this investment in extra capacity is nothing but a reserve capacity margin. Subsequently the price of energy in peak hours would decrease. So every company has the choice to provide this margin or not and this choice together with competition leads automatically to the lowest possible price in the market. Imagine what would happen if every generator had to provide a prescribed margin of at least 15 percent. In many cases the additional capacity would not be completely used, but the customer would have to pay for the supply of these facilities and so electricity prices would be higher. This proves that opponents do not have to worry about the availability of reserve capacity margin. Free market and competition are the guarantor for the most efficient and cheapest solution.

Another possibility which automatically leads to an efficient solution without worrying about reserve capacity margins and the coherence of the power sector are long-term contracts. Long-term contracts guarantee a fixed price to retailers or consumers for a certain period and the generator himself has to find a solution as to how to deal with power shortages. He cannot increase the price in peak hours more than the agreed limit in the contract. There are again two possibilities for the generator. He can install a reserve capacity margin so that he is able to meet the power demand in peak hours himself or he can buy additional power from other generators. Again he will chose the most efficient variant. If it is cheaper to produce the additional power himself than to buy it from other generators, he would do so otherwise, he would buy it from outside. In other countries this concept has led to setting up small power plants which are specialised for providing power in peak hours. This power is than sold to major power producers who have to fulfil their contracts but cannot because they do not have enough capacity to supply sufficient electricity in peak hours. Anyway, the output is the most efficient variant and so also the best solution for the customer.

In Delhi, however, none of these two solutions can be applied. The reasons are that on the one side, generation and transmission are still in public hands and on the other side prices are regulated by the commission and also direct contracts with retailers or customers are not allowed. Theoretically also some private generation plants could exist, but due to the financially weak situation of the transmission company, which is the only company which can directly buy from GENCOMS, no one is interested in setting up a power plant.

### Lack of Investors

One threat of privatisation is the lack of investors. To attract them, governments often grant unsustainable subsidies, guaranteed profits, a hike in tariffs and even maintaining monopolies. Indeed these threats exist and as prescribed in the previous section, all fears that these threats occur also in Delhi have become true.

#### *Arguments from Proponents of the Delhi Privatisation Model for Granting Benefits, Subsidies, Monopolies*

Rakesh Kacker argues that the reason for granting regional monopolies for DISCOMs is that under conditions of shortage, competition does not work. According to Sood, chairman of the DERC there is no need for competition. Distribution companies will try to improve their efficiency and bring down AT&D losses so that they can increase their profits. Also for reducing consumer prices, competition is not necessary because prices are determined by the DERC. Further it would at the moment technically not be possible to introduce competition among distributors. Rakesh Kacker further states, that it is very risky for companies to invest in markets which are regulated and which always have made losses. For example, in Massachusetts, important investments in transmission facilities have not taken place because regulators did not set up rules which guarantee revenues on investments. So it was too insecure for companies to invest. Also Anjali Garg agrees, that it is very risky to invest in the power sector. According to her, one reason is that the state electricity board had such huge accumulated losses that any private player would not have been able to sustain if guaranteed profits and some level of initial subsidies had not been assured. In the view of V K Sood, the reason why investors get 16 percent as a guaranteed revenue on equity is that DVB found this is the best way to attract foreign investors. V K Sood and Kacker correspond that the concern that investments are not evaluated carefully or that too many investments are made because of guaranteed RoE, are unfounded because every investment above Rs five crore has to be approved by the regulator. Additionally the regulator has the power to prescribe specific investments if he thinks that they are required. The optimistic outlook of Kacker is that privatised distribution companies will be able to reduce T&D losses (which is in their own interest) and so selling electricity becomes more and more profitable. This will result in a higher demand and so IPPs will be interested in setting up power plants to produce energy for Delhi. If there are enough IPPs it will be possible to set up a spot market and to enable making direct contracts. At the moment a spot market would not work because there are no power providers who would supply electricity. Once there is competition in the generation sector, competition in the distribution sector can also be introduced.

### Attracting Investors in Accordance with a Free Market

In fact it is important to attract investors! But is this (the above mentioned), the only way to do so? Thank goodness not. The simplest and most effective way of attracting investors is, to allow direct contracts with retailers and consumers. This would solve most of the problems in one go. Generators would not depend on the weak purchasing power of the state owned transmission company anymore. The role of the transmission company should be limited to wheeling electricity and to charge a wheeling fee for this service, not buying and selling electricity. Selling power directly to the retailer or customer would be incentive enough to risk high initial investments in this industrial sector. Supposing the public owned transmission grid does not fulfil the needs of generators and buyers, then it should be allowed to build an own transmission grid. So allowing direct contracts without restrictions is the best way to guarantee profits. Further, it would not be necessary to regulate prices anymore. If there are enough IPPs who compete with each other, prices will regulate themselves.

The argument, that under conditions of shortage, competition does not work is simply not true. I will explain this with the help of a small example. Imagine there are two shoe sellers who produce 20 pairs of shoes per month each and there are 100 potential shoe buyers every month. What would happen with the price? The price would increase as long as there are only 40 persons left who want or can afford to buy shoes. All other people would have to go barefoot. In winter the price for shoes will

increase even more because as it is cold, people are willing to pay more for it. But this also is competition. Of course it is not desirable that 60 persons get cold feet because they cannot afford to buy them, but what would happen next? Others would recognise that producing shoes and selling them is a highly profitable business. So they also would set up a shoe store and automatically the number of shoes available would increase. Supply of shoes would grow as long as the demand of 100 pairs is met. Competition among the shoe sellers will then guarantee that consumers will be able to buy a pair of shoes at a reasonable price. Maybe the demand for shoes would even increase because more and more people can afford buying shoes and so shopkeepers could enhance their business. Now let us think about what would happen if the prices were regulated? If the fixed price includes a profit margin which gives an incentive to produce shoes than the shoe supply will also increase till the demand of 100 pairs is met. But it will take longer as the profit which could be expected is much lower. So it will, maybe, take many winters till everyone will be able to have a pair of shoes. When finally the demand of shoes is met, there still would not be any competition among the shoe sellers. If a shoe producer could sell shoes cheaper, he would not be allowed to do so. In the end consumers will have to pay a higher price than in a competitive market.

The same that happens in the shoe market is applicable to the electricity sector. The best way to increase power supply and to fill the supply–demand gap is to introduce competition. In the long run, this would not only increase power supply, it would even lead to cheapest possible electricity prices for consumers. If increasing electricity prices in the initial period does not fit into the concept of the society then politics should consider a solution which helps everyone to be able to afford power and which does not affect competition among the electricity companies. One solution, like mentioned before, could be a voucher system.

Another possibility to solve the power shortage in the initial period in a free market is to regulate the demand while using the price. Usually generators know in which periods there is a power shortage and in which they have excess energy. Making power expensive in peak hours and cheap in periods where they have excess energy would automatically shift demand. For example, production plants would try to carry out power consuming activities during the night, when electricity prices are down. A perfect price mechanism could erase every power shortcut. At the same time higher prices in peak hours makes it attractive to invest in the enhancement of generation facilities and this goes hand in hand with a price reduction.

### Recreation of Monopolies

Critics mention that in a privatised electricity sector, there exists a movement towards the recreation of monopolies like it happens in El Salvador. But if you believe prominent economists like Milton Friedman and Ludwig von Mises, natural monopolies do not exist in a free market. To explain this, I want to come back to the example of the shoe seller. What would happen if he is the only one in the whole country and so decides to increase prices twofold? Others would realise the enormous profit margins and would also start producing and selling shoes. The result is that the first shoe seller will lose his monopoly and prices would fall.

The same would happen in a free market in the power sector. If power companies start merging and then increase their prices, others would be encouraged to set up new power plants. Or people would not buy their electricity from the generation companies any more. They would start to stick to captive power plants or household generators. Industries would also stop buying from the monopolist and build their own power plants. So fears that monopolies will be recreated and that then population is confronted with enormous price hikes are completely unfounded.

### Power Sector and Environmental Issues

In this section I want to show, how the drive for profit maximisation in private companies, can be used for reducing the impacts on the environment.

To reduce the impacts of power production on the environment there are two different ways. The first concentrates on improving efficiency in the area of generation, transmission, distribution and end-users and the other one on enforcing the production and use of renewable energy like hydro, solar and wind power. In Delhi, there are nearly no renewable energy resources but as Delhi has to buy the major part of its power from outside, it could have substantial influence on the production of renewable energy in other states.

Still I want to concentrate on the issue as to how to increase efficiency because this is more relevant for the situation in Delhi. I will first list the barriers to energy efficiency and then try to find out how they could be overcome. But before developing a model for the future, I want to mention the different ways of how the goal of reducing pollution can be achieved. Generally speaking there are two different systems. The first one is known as a “command and control” regulation and the second one is a system which works with market based incentives.

### The Command and Control System

In the command and control system, which is currently used in nearly all countries, emission standards and technology standards have to be fixed. Emission standards have direct effects on emissions, technology standards affect emissions indirectly.

The disadvantages of this system as mentioned earlier are:

- prescribed standards reduce flexibility and the possibility to choose the most efficient way of production;
- it is difficult or rather impossible to decide, which quantity of pollution is good, correct or desirable;
- to reduce emissions continuously, emission standards have to be revised frequently;
- such regulations do not provide incentives to companies to reduce emissions;
- as it is not in the self interest of companies to reduce emissions they will try to work around it;
- to safeguard the compliance with these rules, a tough control mechanism is required.

### Marked Based Instruments (MBI)

Marked based instruments give the companies incentives to reduce their emissions. They do not set fixed standards, they turn emission reduction into the self interest of the company. Examples are emission fees, marketable permits and environmental taxes. The first two have direct effects, the latter indirect effects on emissions. More details about MBI will follow later.

### Barriers to Energy Efficiency

- Lack of Information: Often consumers do not know about energy saving measures and the saving potential. In many cases it is not possible to find out if appliances consume much energy or not.
- High initial costs/ lack of finance
- Lack of confidence due to lack of information: People do not want to risk spending much money on highly efficient appliances if they do not know they will be reimbursed.
- High Transaction Costs: One needs to inform oneself about the different opportunities, find suppliers, install the equipment, finance it and much more. This can reduce the willingness to invest in energy saving measures.

- Energy Price Distortions: Energy Prices do not reflect the true social and environmental costs. Due to subsidies and externalities not internalised, the prices are usually below their actual value. The consequence is that this is a lower incentive for customers to invest in energy saving measures.

### Use of Profit Maximisation to overcome these Barriers

Like I mentioned in the previous section, profit maximisation in private companies can be used as a powerful tool in order to improve the environmental situation. On the one hand, companies try to improve efficiency, which automatically reduces environmental impact and on the other hand this tool can be used by the government while making rules which leave the decision to implement an environmental friendly policy by the company, but making the environmental-friendly one more profitable.

### Economic Incentives

Economic incentives or MBIs are emission fees, tradable emissions and environmental taxes which are used for environmental regulation. In OECD countries, environmental taxes on carbon, sulphur and ozone are commonly used and a study by Bohlin, 1998 proves that carbon taxes in Sweden led to a substantial reduction in emissions. Also China implemented environmental taxes on 20 different air pollutants. The money collected this way usually flows into environmental funds which in most cases serve objectives like preserving biodiversity, promoting environmental research, building and maintaining environmental institutions, and investing in pollution abatement equipment and infrastructure.

The advantages of this system are:

- As it is in the self-interest of companies to reduce their emissions, waste production etc., they will really try to do so in order to maximise their profits.
- Prices will reflect the true costs of production. If environmental costs were not included in the price, demand and supply would be distorted.
- Many measures in the MBI System are much easier to monitor than the compliance with certain standards.

An example should help for better understanding. Imagine an environment tax imposed on carbon emissions. Once the tax rate is fixed there is nothing more to do for regulators, ministry and other agencies than to collect this tax. It would not be necessary to set standards anymore, to adopt these standards and to fine companies that do not comply. So this would save time and money. Additionally, companies would try to improve efficiency while implementing state of the art technology. In many cases the improvement will be more substantial than it would have been otherwise. The reason for this is that if, for example, only an emission standard is prescribed, companies would not try to achieve better emission results because this does not lead to higher profits. The costs of the environmental tax will be passed on to consumers and this would end up in a drop of demand and also supply and additionally lead to increasing end user efficiency.

This small example clearly shows that better results could be achieved at lower costs. The only requirement to ensure that market based instruments work properly is that all market agents have to belong to private owners and that it is ensured that prices reflect the true costs of production. This can be done by a regulator or better by the free market. At the moment, the power sector in Delhi is far off from emission fees because this measure can only be applied to IPPs. Current incentives only provide corporate tax exemptions for natural resource conservation and accelerated depreciation for energy-conserving devices. Further a water levy is confined to thermal power plants (and also to other large scale-industries). But according to the Environmental Agenda for CERC by TERI, the costs for collecting this tax exceed the amount collected.

Another kind of MBIs is tradable emissions. In a system of tradable emissions, every producer of emissions gets a certain number of emission permissions. If he emits less than that allowed by the emission permissions, he can sell these to others who do not have enough emission permissions to cover their emissions. These emission permissions are traded on a free permission market and so the prices are determined by supply and demand. If the costs for reducing emissions are less than the costs for emission permissions, companies will reduce their emissions. If it is the other way round, they will buy emission permissions. If now many companies prefer to buy permissions rather than reduce them, the price for permissions will increase. This price hike will then encourage more companies to invest in the reduction of their emissions as they can achieve more money while selling them on the permission market than it costs reducing them. Another advantage of this system is that renewable forms of energy become more competitive as they nearly have no emissions. So a part of higher production costs can be compensated. At the moment, this system exists in the USA, Canada, Chile, Germany, Sweden and Australia.

Again, a precondition for a properly working emission trading system is that the trading companies are in private hands and this is, at the moment, not the case in Delhi. Also required is the political will to really improve the environmental situation. If for example, pollution permissions have to be distributed and the political will is missing, politicians might decide that every company gets more pollution permissions than it requires at its present status. The effect would be that no company has an incentive to reduce pollution because no other company would buy the created surplus of pollution permissions.

### Energy Service Companies/ Energy Contracting

Energy Service Companies (ESCOs) are providing energy efficiency services. That means they offer project development, financing, design, installation and maintenance, for example, for office buildings. The difference to an engineering company is that they get paid according to their achievements in energy savings. Usually they receive 50-90 percent of energy savings in the first five to fifteen years. So ESCOs have the incentives to bring down energy consumption as much as possible to gain higher revenues. In fact, ESCOs can increase energy efficiency by more than 50 percent. Another advantage of ESCOs is that they reduce barriers of energy efficiency like the lack of information, transaction costs, high initial costs, lack of confidence or high discount rates.

An important precondition for energy contracting is that energy subsidies have to be removed so that energy prices reflect the full market costs of energy. At the moment, ESCOs exist in the USA and Canada and their business accounts to several hundred million dollars a year.

### Improving the Quality of Coal

Domestic coal often includes extraneous material due to poor mining methods. This leads to more emissions and reduction in efficiency. Washing the coal after mining would improve the quality of the coal and would reduce carbon dioxide emissions from 0.983 to 0.866 kg per kilowatt hour. Further the costs of transportation would decrease. Savings due to increased efficiency in power generation would exceed investments needed for setting up coal washeries. So in order to maximise profits, it is in the own interest of generators to buy washed coal.

### Modernisation

A modernisation of power plants would not only lead to a reduction of emissions due to improved efficiency, it would also reduce the costs of generation. However, for major investments in Delhi's power plans there is not enough money at the moment. So substantial improvement cannot be expected in the near future.

### True Electricity Prices

One major problem of the Indian power sector is that electricity prices do not reflect the true value of production. The reasons for this are that externalities are not included in the price and that subsidies are granted. So for example the poor quality domestic coal, which is much more polluting than foreign coal is 15-40 percent below world prices due to subsidies. So there are no incentives for power generators to use a different kind of fuel. Also prices for petroleum products fare below world prices. This leads to the case that long-run marginal production costs (if calculated with the real fuel price) are twice the price of the electricity price. Moreover this matter, that conventional energy is sold below the real market price reduces the competitiveness of renewable forms of energy. If all prices would reflect the true costs, including externalities, then generators would in order to increase their profits not use domestic coal any more and maybe even facilitate the use of renewable kinds of energy (because of their few external costs).

So one aim for the future should be to reduce subsidies gradually so that electricity prices reflect the true costs of production. Assuming a price elasticity of 0.5 percent, a price increase of 10 percent would lead to reduction in pollution by 5 percent. Additionally, end user efficiency would increase. Further, this measure would stabilise the power sector and so would encourage private investors to participate.

Regarding the low fuel prices, the MCD cannot do much to improve the situation because the determination of subsidies is not its business. Of course, the regulator could increase electricity prices and argue that now the prices reflect the costs of production, but this would only increase the profits of producers and it would not encourage them to change their fuel. So the only thing DVB and DERC can do is to influence the authorities who are responsible for this matter. What the regulator could do is to pass on total costs of generation and transmission to the customers. But this would not be politically possible because the reason for the extraordinary costs is just inefficiency of the whole system and nobody is willing to pay for inefficiency. So the only way out is to reduce generation costs and T&D losses because then it would be no problem to pass these costs on to consumers.

The strategy of cutting T&D losses is exactly what DVB is trying to do now. Electricity distribution has been privatised with the aim of reducing them. This was also reflected in the competitive bidding process, where those companies were chosen which offered the biggest reduction in AT&D losses.

### Demand Side Management (*DSM*)

"DSM commonly refers to programs, policies, technologies, and rate structures that reduce or shift electricity demand. Power companies promote DSM as a way to reduce high marginal costs of generation. High marginal costs may relate to high peak loads, high fluctuations, or high capital growth requirements."<sup>6</sup>

The World Bank identified 26 different end-user technologies which could, if implemented, reduce electricity demand by 20 percent and peak demand by 30 percent. Of course this cannot be achieved within a few years but it is estimated that a reduction by 10 percent would be possible by the end of 2010.

The role of companies in DSM is to set tariff structures which influence the pattern of energy usage. The government can give information on energy saving opportunities to customers or promote investments into energy saving measures. Additionally, it is important to cooperate with equipment producers to encourage them to increase the efficiency of their products.

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<sup>6</sup> Environmental Agenda for CERC, 2000, TERI.



Effective DSM creates a win-win situation for everyone in the market. Generating companies save future investments which would occur due to increasing demand. Customers consume less electricity due to energy saving measures and could profit from the savings of generating companies if they are passed on. In California, for example, two generating companies introduced DSM and were able to reduce electricity demand by 6-14 percent within eight years.

Delhi has chosen a different way to deal with peak demands and to influence patterns of energy consumption. During the hot season with temperatures far beyond 40°C, where electricity supply cannot meet demand because of the extensive use of air conditioners and fans, electricity is cut off every day for a certain period. So people are forced to use household generators, which are much more expensive, inefficient and polluting. In a free market in electricity, the demand-supply gap would be closed through higher electricity prices in peak hours for customers. This could be achieved indirectly while charging a high price only for consumption which exceeds a certain limit or through a meter system, which is able to identify not only the amount of electricity used, but also the time when it is consumed. This would give people the choice to decide themselves whether to consume energy in peak hours or not. So it would not happen that consumers who are willing to pay are excluded from the electricity market.

### Conclusion

The environmental framework in India consists of mostly restrictions, limits and prohibitions. The process of getting a clearance certificate is very time consuming and incalculable. There are no incentives for companies to reduce pollution and so environmental friendly production is not in the self-interest of market agents. Exactly the opposite is the case. Environmental guidelines become a barrier to achieving the companies' goals. They have costs, but the benefit goes to someone else. The consequence is that companies try to work around these restrictions. And even if, for example, power producers really stick to the rules, they will never try to achieve better results than prescribed because it is not of use to them. Continuous improvement of the results is only possible while permanently changing the rules and this is expensive and time consuming because much information is required. The authority must know about the costs and benefits of different measures for different power plants, which pollution control measures are available, what pollution control costs, how much electricity will be required in future and much more. And, probably the biggest problem is that there has to be a political will to change rules. And the political will, especially in India, does not always orient itself on the needs of the majority of the people.

So to sum it up, the existing environmental framework in India (apart from some slight improvements)

- is very expensive,
- the regulations are insufficient and,
- it does not work as most prescribed standards are ignored without resulting in considerable consequences for the lawbreaker.

So the questions arising out of this finding are

- What did policy makers in Delhi do to improve this situation?
- How are the new private companies encouraged to contribute to pollution reduction?

According to Rakesh Kacker, these questions are quite simple to answer. Policy makers in Delhi did not do anything to improve this situation and there still are no incentives for investors to reduce the pollution or to increase end user efficiency.