Chapter 1

INTRODUCTORY

"No power is costlier than no power." - Dr. W.J. Dahha

From time immemorial electric power has contributed invaluable aid to human progress. "Nature builds no locomotives, no machines, railways, electric telegraph, self-acting mules etc. These are the product of human will over the nature or of human participation in nature. They are the organ of human brain, created by hand, the knowledge objectified." It can be inferred that human progress is not a natural but a scientific attempt towards progress in which energy is a prime ingredient. Today the world is proceeding at a fast pace to meet the challenge of future. The challenge can be squarely faced only if the energy is properly utilised for the welfare of the society. From dawn to dusk energy is used in a variety of purposes. As is well established by now, energy is the prime mover in all scientific activities. Enlarged availability of electric power is a crucial factor in the promotion of rapid economic development. Again in case of commercial civilisation its importance is very much remarkable as in every step energy is inevitable.

Energy provides the motive or moving power to progress. The natural resources of a country may be large but they can be transformed into wealth or sources if they are developed, used and exchanged for the goods. This cannot be achieved without energy. Availability of energy and its proper use in any country can result in its people raising from subsistence level to the highest standard of living. So, electrical energy is an essential variable for the industrial and all-round development of any country. It is a coveted form of energy, it can be generated centrally in bulk and transmitted economically over a long distance. It can be adopted easily and efficiently to domestic and industrial applications, particularly for lighting purposes and for mechanical works. The per capita consumption of electrical energy is a reliable indicator for a country's rate of economic and scientific development. The per capita consumption of electricity in states like Delhi, Punjab, Haryana, U.P., Bihar, and Assam was 377, 314, 205, 87, 79, and 55 units respectively in the year 1980 whereas the same was 187, 133, 111, 15, 18, and 4 units in the year 1960. Accordingly the standard of living varies at different states at different times.

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With the advent of sophisticated technology, science can utilise the power sources for the betterment of the society. Moving power is considered to be a pivotal input for production. A country cannot be said to be developed until the condition of rural economy along with urban areas are equally developed. Harnessing of potential energetical power resources might ease the process of emergence of industrial economy. To the household consumers it represents the most convenient and versatile form of energy and to many vital industries there is no substitute for electrical power. In the past, its use in India was mainly confined to industrial and domestic consumers, but it is playing now an important role in agriculture and transport also.

**Power and Energy:** Power refers to the capacity of electrical forces for doing work. This is measurable in terms of Megawatt (MW) and Kilowatt (KW). On the contrary energy indicates the power that is used for a specific purpose in a given period of time. So, energy is the product of power and time. This is expressed in terms of Kilowatt hour (KWh) or units. The word "Electricity" is derived from the Greek word "Elektron" meaning ember.\(^4\)

\(^4\) The first practical source of an electric current took place in the year 1800 when Alessandro Volta invented and patented a primary battery. There is a distinct relationship between electricity and magnetism. Michael Faraday invented in 1831 for converting mechanical energy to electrical energy. It was actually a special kind of Direct Current
Historical Background: The supply of power in this country was inadequate and the need for assured supply of power was keenly felt during the Second World War years. This agitated the erstwhile Government of India to take effective steps for accelerating the pace of power development and rationalization of it. During this period the development of electricity was mainly localized in urban areas and all development works were entrusted to public utility Companies called the "licensees" in terms of the Indian Electricity Act of 1910.  

The era of electricity in India began in 1897 when the first ever electric station in the country was set up in Darjeeling. Again in 1900, a hydropower station was commissioned at Sivasamudram at Karnataka. Despite this early beginning the progress was not impressive till 1947. The installed capacity at national level was as low as 1900 KW only and the development was mainly concentrated around urban areas. 

(AC) generator. Just a year later an Alternate Current (AC) generator was invented by the Frenchman, Hippolyte Pixii (Source: Verbal discussion with Executive Engineer, 1971, Guhali: The Telegraph, 10th August 1985).

5. "Licenses" means any person licensed under part II to supply energy, The Indian Electricity Act 1910, p. 1
Empowering Legislation: The electricity sector has been included in the Concurrent List of the Constitution which implies joint responsibility of both central and state Governments for its development. In the pre-independence days, the electricity industry was in the sole domain of private sector. The growth and management of this industry was somewhat haphazard and the need for unified organisational structure was keenly felt. This became more evident after independence, in the context of national development.

Therefore, a comprehensive legislation outside the purview of the Indian Electricity Act 1910 was conceived. Accordingly, the Electricity (Supply) Act 1948, aimed at nationalisation and Co-ordination of production and supply of electricity was passed. The Act provides for the creation of State Electricity Boards (SEBs) at the State level and Central Electricity Authority (CEA) for policy planning and co-ordination at the national level. Electricity (Supply) Act 1948 forms the basis of administrative structure of the electricity industry.

This Act was amended in 1976 to enlarge the scope and function of CEA and to enable the creation of companies for generation of electricity. Further the amendment of 1978 provides for equity share capital, but no SEB generally follows the floating of equity. Among others the functions of CEA are developing a

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9. CEA was established in 1950 in Delhi under Section 7 of the Act with a view to increase the power consumption in the country as a whole and to look after the matter of SEBs and PEBs.
national power policy formulation and co-ordination of plans for power development, techno-economic appraisal of projects, monitoring the progress of implementation of projects, ensuring efficient performance of power station and system, development of manpower, investigation of power projects, arbitration of certain matters, promotion of co-ordination of research and design activities of state Government and SCBs, collection of data and publication of statistical information relating to power supply industry and consultancy services.

Components of Electricity Organisation: Both generation and transmission of power call for dissemination of the level of consumption. This necessitates decentralization of its organisational structure. To this end a number of Regional and State Electricity Board had been set up at different times. SCBs have been established in eighteen out of twenty two states and they are mainly responsible for generation and distribution in their respective states. Electricity supplies are natural monopolies as it does not make sense to have many of them at the same place. As enterprises, they are vertically integrated from production process to distribution activities. Competition is absent to assure efficiency and guarantee quality of service. Hence some kind of public control prevails. As a rule they are

9. Out of twenty two states, Manipur, Nagaland, Sikkim and Tripura have no separate SCBs. Electricity Department of the respective State Government will look after this activity.
autonomous legal bodies and in the nature of public utilities.

The guiding economic principles for SEBs ought to be efficiency and equity. This involves making accurate forecasting of electricity demand, choosing least cost technology mix and timely commissioning of new plants. These assure reliable service at all times at minimum cost of the nation.

Regional Electricity Boards (REBs) were constituted in 1964 in each of the five regions to bring about voluntary co-operation among the States for developing regional grids and promoting co-ordinated operation of power system. The five REBs are Northern REB, Western REB, Eastern REB, North Eastern REB, and Southern REB.

State Electricity Consultative Council: State Electricity Consultative Council (SECC) has been established under section 16 of the Act, for the purpose of advising the Electricity Board on major question of policy and scheme, to review the progress and the work of the Board from time to time, to consider matter as the State Government may prescribe by rule.

or to advise on such other matter as the Board may place before it. Under Section 17 the State Government constitutes a Local Advisory Committee. It considers the Annual Financial Statement and Supplementary Statement, if any, before they are submitted to the Government under Section 61 of the Act. It is an advisory body consisting of representatives from the State Government, interest for commerce, transport, industry and electricity industry.

**Sources of Power**

Electricity can be generated from any one of the primary sources of energy such as coal, lignite, water-fall, Uranium, thorium, Oil, natural and refinery gases. Tidal power, geothermal power, solar energy, atomic energy, wind energy are also alternative sources. But their impact on energy development in developing countries, particularly in India is not a remarkable one. Vacuums in technology development coupled with financial stringency is the main hurdle of power development. If we turn our look, the State of Assam, despite having abundant natural resources, cannot utilise these fully for generation of electricity due to multidimensional constraints which are elaborated in subsequent chapters.

11. Section 61 provides for submission of Budget estimates during the month of February of each year for Government approval. Section 77-A provides that the State Government may form Rating Committee for determination of electricity rates.
The requirement of energy in India are not from both commercial and non-commercial sources. The most important sources of commercial form of energy are coal and oil. Hydro power and coal contribute primarily to electricity production. Firewood, cowdung, cakes and vegetables waste, which contribute the non-commercial form of energy, meet the bulk of the rural energy demand.

The pattern of power sources in the country has been changing from time to time depending upon the availability of resources. Currently, the State of Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, and Meghalaya depend primarily on hydro-electric power while Delhi, Bihar, and West Bengal depend mainly on thermal power sources. Andhra Pradesh, Assam, Gujrat, Haryana, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu and U.P. derive their power supply both from hydro and thermal resources.

**State Level Position** Till 1958 Assam had no power generation project in the public sector and the small quantity of power required in the important towns, mostly for domestic consumption was supplied by diesel units operated privately. Some tea gardens managed by the Britishers generated power at their own initiative under private control.

Assam has the highest power potential in the country based on water, natural gas, coal and oil. The hydro-power
potential available in the state before bifurcation had been estimated at 12 million KW which is about 30 per cent of India's total hydro power resources excluding that of Brahmaputra, which has itself 30 million KW at 60 per cent load factor on the basis of minimum discharge. This represents one of the largest concentration of hydro-electric power potential in the country. Inspite of bounties of nature, Assam is one of the least developed states as dearth of power has been a limiting factor to industrial development. The British regime was indifferent, if not opposed to industrialization of the country. The problem of poverty and unemployment cannot be solved without industrialization. Industrialization is again hardly possible without power. Power is also necessary for irrigation to augment food production. The motive power position during the Independence days was a sorry state of affairs in Assam. Not to speak of rural areas even the urban population in most of the towns of Assam after Independence, Directorate of Statistics and Information, Government of India, 1966. Though the Brahmaputra has adequate water resources but its commercial exploitation has not been found to be financially viable owing to the reasons that: (i) construction of dam in plain areas involves insurmountable capital outlay, (ii) construction of dam with wide spread in plain area cannot satisfy technical test, (iii) flow and discharge of water in plain area is relatively lower, (iv) vast tributaries of the Brahmaputra being underexploited the plain area has not yet been ventured upon, (v) the major chunk of the river Brahmaputra in Assam flows mostly through plain areas, (vi) geographical and geological support and terrace facilities have been absent in the plains.
Assam were used to kerosene light. Planning for electrical power was the direct corollary of national freedom and elimination of foreign control. The national government can rightly be proud of extending the benefit of power to a large number of villages besides all towns by extending Rural Electrification (RE).  

Formation of Board: Though Assam has potentiality of power generation, power position was not better till the incorporation of the Assam State Electricity Board (ASEB) on First June 1959. There were nine private Electricity Supply companies before Board’s formation. The companies were managed by some private licenceholders. But the company form of enterprise is

13. Rural Electrification Corporation Ltd., was formed by the Government of India on Twenty five July, 1969 as per the recommendation of the Rural Credit Review Committee as a Government Co. under the Co. Act 1956. It helps in Rural electrification.

14. ASEB was constituted by the Government of Assam under Section 5 of the Electricity (Supply) Act 1918 with effect from First June 1958, under the Government Notification No. PD7L 60/56 dated 27th May 1958 with a temporary Headquarter at Shillong. The Board took over the functions of generation, transmission and distribution of electrical energy from the Electricity Department of the State Government.

POWER MAP OF ASSAM
SHOWING THE ELECTRICITY GENERATING STATIONS,
SUB-STATIONS, TRANSMISSION LINES ETC. EXISTING
AND UNDER CONSTRUCTION
DURING 1958.

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EXHIBIT ON THE ELECTRICITY GENERATING STATIONS,
SUB-STATIONS, TRANSMISSION LINES ETC. EXISTING
AND UNDER CONSTRUCTION
DURING 1958.
not desirable in case of public utility concern. Organisation and management of such private ownership business was of autocratic nature. Exploitation made by the private suppliers during the Second World War was maximum. This was the result of economic crisis and depression during the War. The workers had no right and dignity of labour at all. The consumers were exploited by imposing higher rate of tariffs. Private licenses for want of vast financial resources could not invest for power generation to meet the growing demand for power. Acceptance of national policy of "Socialistic pattern of society in 1956" and "Industrial policy Resolution 1956" led state intervention into the power sector with definite objectives. Accordingly, the Government of Assam took over the business of private electricity undertakings by constituting a Board with an installed capacity of 14,04 MW only.

The task of the Board was initially to meet up the power supply speedily so that the need of household demand can be met within the state itself. Due to setting up of the oil refinery, greater emphasis on industrialisation, formation

Silchar Electric Supply Ltd., M/A, M/5 Sarada Charan Sarada
Kanta Roy, Silchar, (vi) The Guwahati Electric Supply
Corporation (1927) Ltd., M/A is as 5 above, (vii) The
Tinsukia Electric Supply Co. Ltd., P.O. Senapati Bazar,
Tinsukia, (viii) The Tezpur Electric Supply Co. Pvt. Ltd.,
Automobile, Electrical and Mechanical Engineers, Tezpur,
(ix) The Jorhat Electric Supply Ltd., M/A, M/5 K.N.
Himatsingka Co., Temple Chamber, 6, Old Post Office Street,
Calcutta (M/A - Managing Agent), Source: Public Electricity
Supply, All India Statistics, C.A, New Delhi, 1956
16, Nocunotri Refinery at Guwahati was established in 1962 and
of North-Eastern Frontier Railway Zonal Headquarter at Pundra, construction of Seraighat Bridge over the Brahmaputra in the earlier period and formation of Assam Glass Industries Ltd. (1970), The Assam Petrochemicals Ltd. (1971), Cachar Sugar Mill Ltd. (1972), Panchgram Paper Mill and Jagir Road Paper Mill in the latter period necessitated ASTB's expansion. Again in recent years construction of Bhasaraguri Bridge and Naranarayan Setu over the Brahmaputra in the district of Darrang and Goalpara respectively culminated in need for greater electricity generation in the state.

Area of Operation: ASTB had operational jurisdiction over the entire composite Assam and it was termed as composite ASTB. With a view to reorganise Assam, the present ASTB was formed on 20th January 1973. This composite unit was bifurcated consequent upon emergence of the State of Meghalaya under the North Eastern Areas (Reorganisation) Act 1971. Yet the tenure of composite ASTB had been extended up to 20th March 1975. Thereafter, new Board and new consultative councils was a landmark in the history of Assam's industrialisation after independence.


18. In exercise of the power conferred by Clause (a) of sub-sec 4 of Sec 53 of the North Eastern Areas (Reorganisation) Act 1971 and in continuation of the order of the Government of India in the Ministry of Energy, Department of Power, No. 11 3(11)/73 dated 20th January 1975.
were constituted between Meghalaya State Electricity Board (MSED) and ASED. On bifurcation assets and liabilities and the manpower of the composite ASED were being divided at the proportion of 66 per cent, 33 per cent and 1 per cent among Assam, Meghalaya and Mizoram respectively.¹⁹ The eventual bifurcation has given a jolt to the hydel power generation in the state, for a vast hydel power potential of Üstribhain had gone to Meghalaya, the lower Assam Region was left only with thermal source such as Chandipur thermal power Station (CPS), and Numurup Thermal Power Station (NTPS) in Upper Assam. In order to meet the eventual shortfall, the Board had searched for alternative avenues to cope with the growing demand for power. Nevertheless, it had to borrow power from MSED.

The ASED is solely responsible for co-ordinated development of generation, transmission and distribution of power in the state. At the time of formation it served only 13,000 consumers as against 3.15 lakh consumers during 1973 with 329.5 MW generating capacity.²⁰ The shortage of power has dampened the spirit of the entrepreneurs to set up new industrial ventures or expanding the existing one. In the context of backwardness the formation of ASED provided a boost to the industrial activities.

¹⁹. Circular issued by the Joint Secretary to the Government of India, Ministry of Energy, Department of power on 16th March 1975.

The Board may distribute the surplus power generated within the state to other neighbouring states under interstate agreement. Emphasis is being laid down, interalia, to provide power to areas underserved or unserved. Without prejudice to the generality it shall be the duty of the Board:

(1) To prepare and carry out schemes with a view to nationalising the production and supply of energy in particular areas.

(2) To supply electricity to privately owned electricity companies before taking over and to licenses authorized for onward distribution by virtue of Section 3 of the Indian Electricity Act 1910.

(3) To supply electricity as soon as practicable to any other licensee or person requiring such supply.

Boards vis-a-vis Corporation: Both the terms Board and Corporation are analogous carrying the same meaning. This usually signifies the statutory organisation established under the special Act of the Parliament or State Legislature. Even the word Corporation is used by non-statutory organisation such as State Trading Corporation, Tourism Corporation etc. The term Board is thus wisely used in case of State Electricity Board, State Housing Board, Khadi and Graminoddog Board and
Major Objectives: There are various problems of electricity industry in India which affect the smooth working of the sector. Chronic shortage of power and unreliable supply affect the states as well as national economy. Financial management, staffing pattern, choice of technology, material management, operation and maintenance, production mix, capacity utilization, rural electrification, system losses, potentiality and exploitation and pricing policies are different critical areas and controversial issues to be analysed at state as well as at national level and probable shortcoming pinpointed. Though there had been several committees appointed from time to time which examined the operational efficiency from different angles and suggest measures for the same, the real position has been still deplorable. Of the eighteen PEBs, AEPC is the most backward in almost all respect of performance criteria. So, the present study attempts to examine the problems of AEPC.

21. Personal communication with Dr. Landi Narain, Principal, University College of Commerce and Business Management, Osmania University, Hyderabad, 1985.

with national level and to identify organizational and other deficiencies in the policies and operation. It has suggested future courses of action to make the Board more efficient and viable.

Methodology adopted: Data have been collected from both primary and secondary sources. Secondary sources are official documents, rules, regulations and interviews and primary sources of data include annual reports and accounts, interviews and questionnaires etc. The methodology comprises of field study, verbal discussion with concerned authorities and employees. Field visits to selected thermal and hydro power generating stations had been undertaken.

Sources of materials: Official documents, rules, regulations, annual reports and accounts from 1958 onwards have been collected from the Head Office of the Board, situated at Narengi, Gauhati. Materials for this research work has also been collected from various World Bank's publications brought out from time to time, books and journals on energy management and reports of various committees. Reference has been made with Central Electricity Authority (CEA) and Jawaharlal Nehru University (JNU) Library at Delhi, and Assam Legislative Assembly Library, Gauhati University Library at Guwahati.

Statistical treatment and tests have been conducted over the data collected in order to establish the factual
position with statistical analysis. Statistical techniques such as correlation, T-Square Test and Time Series Analysis are incorporated in appropriate places. Few graphs have also been inserted exhibiting level of operation in different aspects for the years under review.

Hypotheses Tested: The present work is based on the hypotheses that the Board could not materialize its ultimate objectives of power supply, that there is ample scope of improving operational and maintenance aspects; that the Board could not exploit the potentiality of power generation in the state; that the Board is financed adequately and it is not retarded due to lack of resources. The financing pattern of the Board does not penalize its inefficiency and promote extravagance; that the social obligation of Rural Electrification Scheme is impairing the Board's viability; that the pricing policy is not based on equity and justice and always not on cost consciousness. The power tariff structure is irrational in the sense that it is neither based on cost nor on capacity considerations, but on the basis of administered prices fixed by the Government; that the billing system and collection of revenue are effectively done and material management is carried out suitably. In the subsequent chapters the present researcher attempts to examine the correctness of the above hypotheses.