**SENATE** **No. 1538**

The Commonwealth of Massachusetts

# LEGISLATIVE RESEARCH COUNCIL

REPORT RELATIVE TO

# A MASSACHUSETTS POWER AUTHORITY

*For Summary, See*
*Text in Bold Face Type.*

July 9, 1972.

# The Commonwealth of Massachusetts

## ORDER AUTHORIZING STUDY

(House, No. 5971 of 1971)

*Ordered,* That the Legislative Research Council be directed to investigate and study the feasibility of establishing a Massachusetts State Power Authority to make available electric energy to best serve the needs of the people and industry of the commonwealth and to co-operate and negotiate with appropriate agencies of the United States, of other states, and of Canada to accomplish this purpose, and any other related matters, and to file the results of its statistical research and factfinding with the clerk of the senate from time to time but not later than the last Wednesday of January, nineteen hundred and seventy-two.

*Adopted:*

*By the House of Representatives, July 21, 1971*

*By the Senate, in concurrence, August 6, 1971*

(Senate, No. 1144 of 1972)

*Ordered,* That the time be extended to the first Wednesday of September in the current year within which the Legislative Research Council (authorized by order House, No. 5971 of 1971) to study the feasibility of establishing a Massachusetts State Power Authority to make available electric energy to best serve the needs of the people and industry of the commonwealth and to co-operate and negotiate with appropriate agencies of the United States, of other states, and of Canada to accomplish this purpose, and any other related matters, shall file the results of its statistical research and factfinding with the clerk of the senate.

*Adopted:*

*By the Senate, January 26, 1972*

*By the House, in concurrence, January 27, 1972*

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*To the Honorable Senate and House of Representatives:*

GENTLEMEN: — The Legislative Research Council submits herewith a report relative to the feasibility of establishing a Massachusetts Power Authority. This report was required by House Order, No. 5971 of 1971 which was adopted by both branches of the General Court.

The Legislative Research Bureau, which prepared this report, is limited by statute to "statistical research and fact-finding." Therefore, this report contains factual material only, without recommendations by either the Council or the Bureau. It does not necessarily reflect the opinions of the undersigned members of the Legislative Research Council.

Respectfully submitted,

MEMBERS OF THE LEGISLATIVE RESEARCH COUNCIL

Sen. Joseph D. Ward of Worcester
*Chairman*
Rep. John F. Coffey of West Springfield
*House Chairman*
Sen. Andrea F. Nuciforo of Berkshire
Sen. John F. Parker of Bristol
Sen. Fred Lamson of Middlesex
Rep. Charles F. Flaherty, Jr. of Cambridge
Rep. Robert B. Ambler of Weymouth
Rep. Rudy Chmura of Springfield
Rep. Sidney Q. Curtiss of Sheffield
Rep. Harrison Chadwick of Winchester
Rep. James A. Adams of Westfield
Rep. William H. Ryan of Haverhill

## The Commonwealth of Massachusetts

### LETTER OF TRANSMITTAL TO THE LEGISLATIVE RESEARCH COUNCIL

*To the Members of the Legislative Research Council:*

GENTLEMEN: — House Order, No. 5971 of 1971 directs the Legislative Research Council to study and report on the feasibility of establishing a Massachusetts State Power Authority and other related matters.

The Legislative Research Bureau herewith submits such a report in accordance with the above directive. Its scope and content are governed by statutory provisions which limit the Bureau to factual reports without recommendations.

The preparation of this report was the primary responsibility of James E. Ritzo of the Bureau staff.

Respectfully submitted,

DANIEL M. O'SULLIVAN, *Director*
*Legislative Research Bureau*

The Commonwealth of Massachusetts

# A MASSACHUSETTS POWER AUTHORITY

## SUMMARY OF REPORT

### *Origin and Scope of Study*

This report is based on House Order, No. 5971 of 1971 which was introduced by Representative John R. Buckley of Abington and which directed the Legislative Research Council to study and report on the feasibility of establishing a state power authority. Encompassed in this discussion is a brief history of the development of the electric power industry and the role of the government, both federal and state, in regulating this industry. Also discussed is the present status of power in Massachusetts and projections for future power requirements. Alternatives to the creation of a state power authority, the super-agency concept of regionalization and expansion of the present power pool agreements, are also considered. Finally, the report treats the activity of the Power Authority of the State of New York and the Arizona Power Authority.

Some past and present legislative proposals concerning the electric industry in general and in relation to power authorities in particular are included as are some related studies which have been proposed by private sources.

### *Development of Power in Massachusetts*

The early methods of obtaining power consisted of harnessing the moving water and air, with the first method more prevelant in Massachusetts.

One of the earliest uses of water power in Massachusetts was the construction of a grist mill on the Neponset River in 1634. With the introduction of the factory system in the textile industry in the Eighteenth Century, there came into being a more effective and expanded method of using water power to produce electricity. With increased use of machines, larger amounts of power were needed, and as a result planned industrial cities were built on the larger

rivers. Storage reservoirs were often constructed upstream in neighboring states to insure an adequate supply of water.

During the second half of the Eighteenth Century, the steam engine was invented and was soon perfected until it had become a dependable but expensive source of power. In the industrial power field, significant enonomies were realized by the use of exhaust steam or the use of steam extracted between high and low pressure cylinders of compound engines to replace steam at higher pressures for process purposes in textile and paper mills.

The electrical industry may be considered to have started with the construction of Thomas Edison's Pearl Street Station in New York City in 1882. Edison relied heavily on what inventors who had gone before had discovered. By the end of the Nineteenth Century, electricity had been used to develop the telegraph circuit, the telephone, the electric motor, and was being used in manufacturing and in transportation, and numerous small electrical companies sprang up throughout the country. The first areas to be served with electrical power were thickly populated urban centers. This was due to the fact that electricity could only be sent over a relatively short distance and to be economically feasible had to reach as many customers as possible.

During the past twenty years a new power source to generate electricity emerged in the form of nuclear energy. Up until this time the major principal raw energy sources had been the limited supplies of fossil fuels such as coal, gas and oil. Since that time, advancements and improvements have been made in construction and design and today there are currently three nuclear power plants in various stages of operation in New England. Five other nuclear plants are being constructed or are planned for the New England area.

### *Governmental Regulation of Power*

The primary reason for governmental regulation of the electric utility industry is to assure the consumer the best possible service at the fairest price while providing the investor with the largest return possible. In a sense, governmental regulation of the power industry has replaced the concept of direct competition between electric companies.

Governmental regulation of the electric power industry may take the form of legislation, proceedings of administrative agencies, judicial review by the court, or, as frequently happens, by a combination of the three.

Governmental regulation of electrical utilities in particular and public utilities in general is based on the principle that the utilities are businesses which are "affected with the public interest". Property becomes so affected when it is used in a manner which makes it of public consequence in relation to the community at large. When a business devotes the use of its property to an activity in which the public has an interest, it in effect grants to the public an interest in that use and must submit to control by the public for the common good.

The extent of regulation of public utilities varies from one type of business to another. However, the granting of operating rights to public utilities other than common carriers usually results in an exclusive monopoly and regulation extends beyond control over rates and standards of service to jurisdiction over the issuance of securities, sale or purchase of facilities and the form of purchasing procedures. All regulation, even to its broadest extent, is predicated on the police power of the state to protect the public from excessive charges for services and to insure against possible ruinous competition between utilities performing similar services in the same area. The monopolistic position of a public utility is justified by the need of protection against competition which could result in a breakdown of essential services to the community.

In order for the utility to meet the standards required, its earnings must be commensurate with its needs for maintenance and for an adequate return on its investment. When a regulatory commission is confronted with the problem of establishing or reviewing the schedule of rates being charged by a public utility, it must first establish a rate base upon which to decide the amount of a fair value and fair return. The question of what constitutes a fair value of any utility has resulted in much controversy and litigation with the U.S. Supreme Court deciding that if the result which is reached is just and reasonable then the method of reaching that result need not be rigid.

Governmental regulation first existed on the local level in the

form of by-laws or ordinances which attempted to control the many separate electric companies operating in the community. Very often these statutes set maximum rates which could be changed and quite often the maximum charges produced rigid, spasmodic and inept regulation. By 1900 there arose a demand for specific scientific regulation by a body of administrators with sufficient powers to determine facts and to issue rules and orders. As an outgrowth of these demands, public utility commissions were established by state legislative action. The public utility commission, or public service commission as they are sometimes called, often have jurisdiction over a wide range of services including electric light and power, manufactured and natural gas, oil and gas lines, common carriers, water, and telegraph and telephone services. Commissions in certain states are concerned with the regulation of fewer utilities, the regulation of other utilities having been left to the responsibility of local units.

Regulation of electric utilities by the federal government rests upon its constitutional responsibilities for the preservation of public lands and the protection of interstate commerce. The Federal Power Commission, created in 1920, is empowered to issue licenses to construct and maintain dams and other works for the improvement of navigation and for the establishment of power sources.

Beginning with the Reclamation Act of 1902, the federal government became concerned with land reclamation and flood prevention and undertook projects such as the Tennessee Valley Authority, the Arkansas Valley Authority, the Mississippi Valley Authority and the Bonneville Project. In 1935 the federal government began a campaign to bring electric service to the rural areas of the country.

The Securities and Exchange Commission under a provision of the Holding Company Act of 1935 also regulates public service companies. The SEC may pass on all costs of reorganization, dissolution, liquidation, bankruptcy and receivership and is empowered to require each registered holding company and subsidiary to take appropriate steps to insure that the corporate structure or continued existence of any company in the system does not unduly or unnecessarily complicate the structure, or unfairly or inequitably distribute voting power among security holders.

Governmental control of energy sources sometimes takes the form of special utility districts or municipal ownership.

*Present Status of the Power of Industry in Massachusetts*

The current trend in the utility industry is toward the concept of interconnection of generation, transmission and distribution facilities. The reason behind this concept is the necessity of eliminating duplication of facilities while improving service and maintaining reasonable rates. The most frequent type of interconnection agreement which is made between two parties is for one to supply power to the other should an emergency arise or to interchange separate blocks of surplus power when it appears likely to become available. When transmission is expected to be fairly continuous, large in volume, predominantly in one direction and indispensable to the purchaser, the arrangement usually takes the form of a contract for firm power extending for a number of years.

In some instances power pools such as the New England Power Pool (NEPOOL) have been established in an attempt to operate electrical facilities in the most reliable manner and with maximum practicable economy. The interconnection of various power plants and transmission facilities leads to a regional power supply and eventually the control of the participating utilities by a single regional agency.

There are presently 19 investor owned and 40 municipally owned power supply companies in Massachusetts. Of the 19 investor owned companies, 13 are participants in four principal electric systems: Eastern Utilities Association (EUA), New England Electric System (NEES), New England Gas and Electric System (NEGAS) and Northeast Utilities (NU). Most of the power in Massachusetts is generated by conventional steam power plants while the remainder is generated by hydro, internal combustion and nuclear plants.

The operation of the 40 municipal lighting plants is authorized under section 34 of Chapter 164 of the General Laws. This authority includes the power to obtain the necessary land, structures, machinery and other apparatus incidental to either the generation and/or distribution of electric power. The construction of municipally owned plants is financed by the issuance of general obligation bonds, a practice which limits the amount of funds available

and thereby limits the size of the generation facilities which can be constructed. The 40 municipal power companies in Massachusetts are generally found in the suburban or rural parts of the state rather than in industrial sections. It has been estimated that these 40 systems serve 13% of the state's customers and produce approximately 10% of the total power consumed in the state. These municipal systems rely heavily on the purchase of power from private companies.

Electric power rates for residential, commercial and industrial users are somewhat higher in New England as compared to the rest of the country. Several reasons account for this fact, including the high cost of fuel and higher taxes paid by the electric power companies, particularly in Massachusetts. The residential consumer in Boston pays one of the highest rates among the nation's large cities.

It has been estimated that the demand for peak power will increase over four times in the next 20 years and that if this demand is to be met new nuclear generating plants must be constructed. However, before this can be done on a large scale basis, research and studies on the effect of this expansion on the environment will have to be examined to see if they are adequate.

*Massachusetts Department of Public Utilities*

The Department of Public Utilities has supervisory authority over both public and private gas and electric companies within the state. This authority extends to the operations of the companies in setting price or quality standards and in selling or purchasing gas or electricity from other affiliated companies. It has also jurisdiction over the location and design of transmission lines.

On the other hand, the Department does not exercise authority over the construction of generating facilities or power plant siting. This authority is left to the cities and towns through land use controls and zoning ordinances and to state conservation agencies through their controls over particular environmental areas. However, by statute the Department acting as an appellate forum may suspend the operation of a local zoning ordinance or by-law. Moreover, while local governments have primary authority in regard to permits for crossing streets with transmission lines, the Department

may overrule the action of local authorities when certain conditions are met.

*A State Power Authority*

Proponents of a State Power Authority argue that there exists a need for a single agency which would be responsible for conducting an independent evaluation of projections of power demands and to determine the impact of these projections on the state's economy. Such an agency could recommend a state policy relative to energy growth programs. Advocates of this arrangement emphasize that it would be advantageous in developing a coordinated program of power plant siting. Finally they point out that a State Power Authority may serve as the sole negotiating agent for power companies, in obtaining power from other companies within the state, from other states, and from Canada.

Opponents of a State Power Authority cite the growing trend toward regionalization in the power industry and discount the state-by-state method of planning for the future. Similarly others stress that the area's future energy requirements can be satisfied at economical cost to the consumer through the free enterprise system. On this score, they point to the establishment of power pools as a significant approach.

*The Power Authority of the State of New York*

The Power Authority of the State of New York is both a corporate and politic body, constituting a public corporation and a political subdivision. It was created in 1931 at the urging of Governor Franklin D. Roosevelt.

The Authority is directed to develop and improve the Niagara River and portions of the St. Lawrence River; to construct hydro-electric pumped storage projects; and to supply adequate low cost power and energy to the Authority's customers.

The Authority's operations are reflected in two hydro-electric plants, one on the St. Lawrence River and one on the Niagara River. The St. Lawrence Project was authorized by a 50 year license issued by the Federal Power Commision in 1953 and was financed by a $335,000,000 original bond issue. The power plant consists of thirty-two 57 kw generators with a rated capacity of 1,824,000

kw, half of which is installed on the United States side of the border. As of December 31, 1970, approximately 72 billion kilowatt hours from the project had been sold. Average annual production approximates 6.5 billion kilowatt-hours of energy.

In 1958 the Federal Power Commission issued to the Authority a license for a period of 50 years for the construction, operation and maintenance of the Niagara River Project. The Authority's enabling legislation gives it full authority to establish and modify its rates as necessary for the financial requirements of the project. The Niagara project was financed by a bond issue of $737,000,000 and has an entire plant capacity of 2,190,00 kw.

In compliance with 1968 legislation, the Authority is building a 1,000,000 kw pumped storage project in Schoharie County and an 800,000 kw nuclear power plant in the town of Scriba.

The State of New York Power Authority has been a highly successful enterprise but it is doubtful that an operation of this dimension can be undertaken in Massachusetts because of the lack of similar natural resources and other topographical features.

Power authorities exist in less than a handful of other states but are limited to the performance of specific functions instead of being responsible for the total generation transmission and distribution of electric energy. For example, the Arizona Power Authority does not own power production equipment or transmission or distribution properties other than certain metering equipment. It functions primarily as an agent for the distribution of power produced by federal projects.

The Commonwealth of Massachusetts

# A MASSACHUSETTS POWER AUTHORITY

## Chapter I. Introduction

*Origin of Study*

House Order, No. 5971 of 1971, which is reprinted on the inside front cover of this report, directs the Legislative Research Council to study and report on the feasibility of establishing a state power authority. The function of this authority would be to make available electric energy to best serve the needs of the people and industries of the Commonwealth.

House Order, No. 5971 was introduced by Representative John R. Buckley of Abington and was adopted by the House of Representatives on July 21, 1971 and by the Senate on a reconsideration vote on August 6, 1971.

Representative Buckley's initiation of this study order stems from his interest and concern over the possibility of power shortages, brownouts and blackouts which could result from the inability of the power industry to adequately satisfy customers' demands. Representative Buckley feels that the feasibility of creating a state power authority should be considered in the course of finding a solution to the power supply problem.

*Scope of Study*

This study is concerned principally with the present status of the power industry in Massachusetts and the ability of the industry to make available electric energy to best serve the needs of the people and industries of Massachusetts.

The report treats the historical development of power and the power industry and the role of the government, both federal and state, in regulating this industry. Also discussed is the present status of the power industry in Massachusetts and projections for future power requirements. Alternatives discussed for solving the

power shortages include regionalization, the establishment of a super administrative agency, and the creation of a state power authority. The experience of Arizona, New York and other states with power authorities is examined. In discussing future requirements, special emphasis is placed on environmental factors.

*Past Legislative Proposals*

As a result of the massive Northeast power failure of November 9, 1965, a special legislative commission was established by Chapter 139 of the Resolves of 1965. This special commission, in addition to investigating the relative causes of the blackout, was instructed to consider the availability and adequacy of alternative electrical power sources in all state departments and institutions and in all hospitals. Also to be considered by the special commission was the manufacture, distribution and availability of electrical energy and the best means of producing adequate electrical energy for consumers and industry in the Commonwealth. The scope of the special commission was increased by Chapter 54 of the Resolves of 1966, Chapter 67 of the Resolves of 1967, and Chapter 80 of the Resolves of 1968. The commission was in existence until 1969. However, no final report was filed.

In 1970, Michael J. Collins and Representative Hugh J. Morgan of Wakefield filed unsuccessful legislation to establish an interlocal power authority (House, No. 4049). Under the terms of that proposal, two or more cities or towns having electric departments as established under the General Laws would be able to form and be members of a power authority.

The purposes of the authority were to establish, operate and maintain facilities for the nuclear generation of electricity in the Town of Ipswich and to sell the same in bulk to municipalities, railroads, street railways or electric railroad companies and to corporations engaged in the business of generating, transmitting or distributing electricity.

The authority, under the proposal, had the power to borrow money for capital purposes and to issue bonds as general obligations or as obligations payable solely from particular funds. The authority also had the power to fix and collect rates charged for the electricity sold.

Chapter 78 of the Resolves of 1971 established a special commission for the purpose of making an investigation and study of the regulatory procedures which are employed by the Commonwealth and its political subdivisions relative to the location and operation of electrical utility generation and transmission facilities. This special commission will also consider the feasibility of establishing a comprehensive state regulatory jurisdiction over the siting of electric generating plants and the routing of major transmission facilities and, as an alternative, shall consider the feasibility of creating a state administrative procedure or agency by which appeals from local regulatory decisions by aggrieved parties can be resolved.

*Related Studies*

A recent 1970 study dealing with the electric power situation in New England was prepared for the New England Regional Commission by H. Zinder and Associates, Inc., Acres American Incorporated, Joseph C. Swindler and Charles J. McCarthy. This report, entitled *A Study of the Electric Power Situation in New England, 1970-1990,* observes that electric power in New England is neither abundant nor inexpensive and that, if the region is to prosper, both of these trends must be reversed.

The ultimate conclusion of the Zinder Report is that New England needs a regional public agency which will be responsible for the generation and transmission of energy for the entire six state area. Such an agency would also have sole responsibility for locating and obtaining sites for generation facilities and high voltage transmission lines.

The above conclusion was reached even though the existing New England power companies have organized the New England Power Pool (NEPOOL) which is open to all New England utility companies. In May, 1970, NEPOOL established the New England Power Exchange (NEPEX) to provide for the centralized dispatch of electric energy in the region.

The Zinder Report sees the NEPOOL arrangement as a step in the right direction but questions whether the region's 60 investor-owned power companies can develop a truly regional power system while sacrificing at times the best interest of the bondholders. The

report also questions whether the individual utilities, working alone or as a group, will be able to obtain the necessary sites on which to build generating plants and transmission lines. The solution, according to Zinder, lies with the creation of a Regional Agency. The power companies counter, stating that this problem would be solved if the individual New England states would develop more efficient and timely power plant siting regulations.

The New England Regional Commission conducted two days of hearings on June 31 and July 1, 1971 to gather testimony on the Zinder Report. Governor Francis W. Sargent, whose statement was presented to the Commission by William Cowin, Chairman of the Massachusetts Department of Public Utilities, stressed the importance of the development of a national energy policy and a coordinated system for the licensing and approval of generating facilities and transmission lines. He further emphasized the need for consideration of environmental factors in planning new facilities and for the development of a strong regional voice in all energy policy decisions.

## Chapter II. Development Of Power In Massachusetts

### *Early Methods*

The only methods of mechanical power available to the early settlers of Massachusetts were the use of falling water and the wind. With the exception of the use of windmills on Cape Cod where the land is relatively flat and there are few streams, the most prevalent and effective method was to harness the moving water to move wheels which in turn would grind the grain and saw wood.

One of the earliest water power developments was constructed by Israel Stoughton in 1634 at the Lower Falls of the Neponset River between Milton and Dorchester. Here the water power was used to drive a grist mill, a saw mill and a powder mill. In recent years a hydro-electric plant has been constructed at the same site. Another of the very early practical applications of water

power was the use of a tidal mill which was built on Mill Creek near Boston in 1631.[1]

As the population of Massachusetts increased and moved inland, more and more mills were constructed and they served as the focal industry of the new town. Since the amount of power required by the grist and wood mills was relatively small, the methods used to harness the power of the water usually consisted of low dams on small streams and operating water wheels of the overshot, undershot or breast method. Many of the streams which were so used were quite small and the power which was needed could only be obtained in periods of heavy drainage and runoff.

With the introduction of the factory system in the textile industry, there came into being a more effective and expanded method of using the power of water. The first American mill which used power driven machinery was the Slater mill at Pawtucket, Rhode Island in 1793. This operation was closely followed in 1813 by the Boston Manufacturing Company of Waltham, Massachusetts which was the first complete cotton textile mill and was the forerunner of the large New England cotton mills.

With the increased use of machines and the widened scope of the manufacturing industry, which resulted from the Industrial Revolution, larger amounts of power were required. This demand for more power was frequently met by water power developers on a cooperative basis on the larger rivers of Massachusetts and New Hampshire and led to the building of planned industrial cities.

The pattern of these developments was set by the practical impossibility of transmitting power, except for short distances from the water wheel, to the driven pulley by belts, gears and shafting. Therefore, the energy producing medium, water, had to be brought by a canal to the point where the power was used. The first half of the 1800s was one of construction and internal improvements, of dams and waterways, and included the building of navigation canals for the transportation of freight.

The scheme which was usually followed involved the purchase of the land and riparian rights of a river or stream by a water

[1] The New England Council, *Power in New England,* Boston, Massachusetts, 1948, p. 2.

power company and the building of a dam and canal system. The canals were laid out to permit the construction of mills between water levels, usually with falls of about fifteen feet, between adjacent canals or between the canal above and the river below. Very often the same company which developed the dam and canal system laid out streets, parks, and other facilities of the town.[1]

The first large scale development of a city planned around water power was at Lowell, Massachusetts. The navigation canal of the Proprietors of the Locks and Canals on the Merrimack River, founded in 1792, was utilized with the dam which already existed. The first mill, the Merrimack Company, was established in 1822.[2]

As early as 1840, the use of power on the Merrimack River exceeded the low water flow and power shortages developed. To remedy this situation, storage reservoirs were constructed upstream in New Hampshire. One such project which was undertaken was the construction of a dam at Lake Winnipesaukee which raised the level of the water in the lake 2.5 feet. This dam was built by the "Lake Company", a subsidiary of the Locks and Canals Company and the Essex Company of Lawrence. The construction of dams at Newfound and Squam Lakes was also a part of the program of providing water storage. In 1848 a dam of unprecedented size was constructed at Holyoke, Massachusetts and the canal system consisting of three different water levels was the largest such system built up to that time.

Many other developments with divided ownership of water powers were made on smaller rivers. Most of these developments were made before the Civil War and were for textile mills, sawmills, tanneries, metal working shops, foundries and similar industries.

*Introduction of Steam Power*

In the second half of the Eighteenth Century, early forms of the steam engine were being developed in Europe for use in pumping water out of coal mine shafts. Within a period of about 50 years, the steam engine had been perfected to the extent that it became a dependable but expensive source of power. The refine-

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[1] *Op. cit.*, p.2.
[2] *Ibid.* p. 3.

ment of the steam engine lead to the establishment of industries in towns where water power was not available or did not exist in the quantities needed. Examples of the early industrial plants were the Naumkeag Steam Cotton Mills of Salem in 1845 and the Wamsutta Mills of New Bedford built in 1846.

Two years later, in 1848, the steam engine was further improved by the invention of the "corliss valve" which resulted in the adoption of this type of engine in many industrial plants either as the sole source of power or to supplement water power. During this same period, great advances were also made in the development of water wheel machinery. The old overshot, undershot and breast wheels were supplanted by water turbines which increased the amount of steam power available.

During the last century steam power plants have grown in size and have increased in efficiency. Large central steam stations were built at locations where coal and oil could be delivered and where condensing water was available. The Edgar Station in North Weymouth, when built in 1925, contained the first commercial high pressure steam electric power unit in the world. This unit embodied the now well-known principle of the topping steam boiler and turbine and the reheat cycle, both of which were major contributions in the development of an economical method of producing steam power.

In the industrial power field, significant economies were realized by the use of exhaust steam or the use of steam extracted between high and low pressure cylinders of compound engines to replace steam at higher pressures for process purposes in textile and paper mills.

Steam as a power source has made a continually increasing contribution to the New England power supply. During 1970, for example, 82% of New England's power requirements was generated by conventional steam plants and 7% was derived from the region's three nuclear steam plants.[1]

*Electrical Power*

The electrical industry may be considered to have started with

[1] Electric Council of New England, *Electric Utility Industry in New England, Statistical Bulletin 1970,* Burlington, Mass., p. 9.

the construction of Thomas A. Edison's famous Pearl Street Station in New York City which began operations September 4, 1882. Of course, Edison could not have accomplished what he did without knowledge of the work done on electricity by others before him.

Throughout the centuries men have been aware of magnetism and currents. For example, the ancient Chinese used a magnetic needle which, when floated on water, served as a compass. Many years later, Thales, a Greek philosopher, found that he could produce static electricity by rubbing amber with a piece of cloth.[1]

Very little was done with the phenomenon discovered by Thales until the Seventeenth and Eighteenth Century. In the early 1800s, Sir Humphry Davy of England was successful in making an electric current jump the gap between two pieces of carbon and a few years later another English inventor, Michael Faraday, succeeded in generating a continuous current of electric energy by moving a magnet through a coil of wire.[2]

By the end of the Nineteenth Century, electricity had been used to develop the telegraph circuit, the telephone, the electric motor, and was being used in manufacturing and transportation. In 1877, Charles Brush, a Cleveland chemist, designed a practical arc lighting system and two years later the California Electric Company of San Francisco was established.[3] This company serviced industry and did not offer electricity for home use because of the high operating expenses.

In 1877, Thomas A. Edison set out to change the impracticality of generating electricity and began to develop an economical generator, a system of conductors, multiple circuits and measuring meters.[4] To finance these major projects, the Edison Electric Light Company was formed and shares of stock were sold. Edison progressed very well in his experiments and by 1881 all the essential elements for a commercially successful central station lighting system had been developed, and by 1882 the Pearl Street Station

[1]Edwin Vennard, *The Electric Power Business,* McGraw-Hill, New York, N. Y., Second Edition 1970, p. 2.
[2] *Ibid.,* p. 2.
[3] *Ibid.,* p. 3.
[4] *Ibid.,* p. 5.

began furnishing electricity to its 59 customers over lines of less than 5,000 feet.[1]

In September of the same year, the world's first hydro-electric station was placed in operation at Appleton, Wisconsin under the control of Edison. Shortly after this time, George Westinghouse and William Stanley developed an alternating current system which allowed electric power to be generated at a low voltage for more economical transmission and then "stepped back down" to a lower voltage. The end result of this transformation was that the source of power no longer needed to be close to the site where it was to be used. The first application of the transmission of power by using the step-up and step-down transformers was made at Great Barrington, Massachusetts on March 16, 1886.

The end of the Nineteenth Century saw numerous small electrical companies springing up throughout the country. These small companies began consolidating almost immediately in an attempt to lower the costs of generating electricity and eventually took on the corporate form of doing business. By 1902, 73% of the 2,805 investor-owned central generating stations were owned by companies instead of individuals.[2]

The first areas of the country to be serviced with electrical power were the thickly populated urban centers. This was due to the fact that, as heretofore discussed, the knowledge of how to generate and transmit electricity was limited and power could only be sent over a relatively short distance. Also, if the power companies were to realize a prompt, efficient return on their investment they would have to serve the greatest number of people within the smallest geographical area. As the knowledge and technology of electricity increased, so did the length of the transmission lines until even small towns and rural areas were served with electric power.

*Nuclear Power*

During the past twenty years a new raw power source to generate electricity has emerged in the form of nuclear energy. Until

[1] *Op. cit.*, Vennard, p. 7.
[2] *Ibid.*, p. 11.

the 1940's the major principal raw energy source had been the limited supplies of the fossil fuels, viz. coal, gas and oil which were burned in order to generate electricity. At this time, nuclear energy was discovered and refined principally by the federal government. In 1954, an act of Congress made the knowledge of nuclear power available to the public and, as a result of the close cooperation of the electrical power industry and others, a nuclear power plant was constructed in 1964 which could compete with existing fossil fuel plants.[1]

The operation of the nuclear power plant has been described by Edwin Vennard of the Edison Electric Institute as follows:

> "A nuclear power plant is in many respects similar to a conventional fossil-fuel-burning plant. The chief difference is in the way the heat is generated, controlled and used to produce steam to turn the turbine generator.
>
> In a nuclear power plant the furnace which is used for burning coal, oil, or gas in a conventional plant is replaced by a reactor which contains a core of nuclear fuel. Energy is produced in the reactor by a process called fission. In this process the center or nucleus of certain atoms, upon being struck by a subatomic particle called a neutron, splits into fragments called fission products which fly apart at great speed and generate heat as they collide with surrounding matter.
>
> The splitting of the atomic nuclear into parts is accompanied by the emission of high energy electromagnetic radiation and the release of additional neutrons. The released neutrons may in turn strike other fissionable nuclei in the nuclear fuel, causing further fissions.
>
> A nuclear reactor is a device for starting and controlling a self-sustaining fission reaction. The nuclear core of the reactor generally consists of fuel elements in some chemical form of uranium and thorium or plutonium, depending on the type of reactor. Heat energy is produced by the fissioning of the nuclear fuel. A coolant is used to remove this heat energy from the reactor core so that it can be utilized in producing electricity. Fuel elements for water-cooled reactors are metal tubes containing small cyclindrical pellets of uranium oxide . . .
>
> To control the rate at which fission occurs, most reactors regulate the "population" of neutrons in the core. This is done mainly by rods which, when inserted into the core, absorb neutrons and retard the fission process. If the operator wishes to increase the power level or reaction rate, the regulating rods are withdrawn. To shut down the reactor, the rods are fully inserted.

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[1] *Op. Cit.*, Vennard, p. 28.

Currently there are three nuclear power plants in operation in New England. One is located in Rowe, Massachusetts and is operated by the Yankee Electric Company and is sponsored by a group of 11 New England utilities.[1] The other two nuclear plants are located in Connecticut: the first a 600 megawatt (MW) plant in Haddam, owned and operated by the Connecticut Yankee Atomic Power Company and also sponsored by a group of eleven utilities;[2] the second, Millstone I in Waterford, a 650 MW plant which began operations in December 1970 and which is owned by Northeast Utilities.

Five other nuclear plants are being constructed or are planned for the New England area. One of these five is the Pilgrim I plant in Plymouth, Massachusetts which is scheduled to begin operations later this year.

## Chapter III. Governmental Regulation Of Power

*Need for Regulation*

The primary reason for governmental regulation of the electric utility industry is to assure the consumer of electricity the best possible service at the fairest price while providing the investor with the largest return possible. Because of the nature of the industry, direct competition, in the American free enterprise sense of the word, is not in the best interests of the ultimate consumer. The electric industry has a responsibility to serve, at fair rates, all those who apply for service. Electric power suppliers must combine generating and transmission facilities and avoid duplication of resources if these rates are to remain low. In a sense, regulation has replaced the concept of competition between electric companies. Of course, competition still exists between those in the electric power industry and those who offer an alternative power

[1] New England Power, Connecticut Light & Power, Boston Edison, Central Maine Power, Hartford Electric Light, Western Massachusetts Electric, Public Service of New Hampshire, Montaug Electric, New Bedford Gas & Light, Cambridge Electric Light and Central Vermont Public Service.

[2] All of above, excluding New Bedford Gas & Light and including United Illuminating.

source and with those who offer merchandise other than electrical appliances.

*Forms Of Regulation*

Governmental regulation of the electric power industry may take the form of legislation, proceedings of administrative agencies, judicial review by the court, or, as happens frequently, by a combination of the three. The usual course which is followed is that the Legislature sets the framework of public policy, the administrative agency then implements this policy by interpreting the statutes and applying the conclusion to specific conditions. Should the findings be disputed, the aggrieved party will then seek judicial review, with the court examining and affirming or rejecting the findings of the agency.

*Theory Of Regulation*

The theory of governmental regulation of electric utilities in particular, and public utilities in general, is based on the principle that utilities are businesses which are "affected with the public interest." Property becomes so affected when it is used in a manner which makes it of public consequence in relation to the community at large. When a business devotes the use of its property to an activity in which the public has an interest, it in effect grants to the public an interest in that use and must submit to control by the public for the common good.[1] These businesses which are "affected with the public interest" have certain common characteristics:

1. They use the public ways extensively as the place of doing business.
2. They exist largely as natural monopolies which are regulated by the government.
3. They have the right to take property by exercising the right of eminent domain.
4. They are generally considered to be necessities in the conduct of the general affairs of the community.

The extent of regulation of public utilities varies from one type of business to another as well as from one jurisdiction to another.

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[1] *Munn v. Illinois*, 94 U. S. 113, 24 L. Ed. 77 (1876).

The granting of operating rights to public utilities, other than common carriers, usually takes the form of an exclusive monopoly and regulation extends beyond control over rates and standards of service to jurisdiction over the issuance of securities, sale or purchase of facilities and the form of purchasing procedures.

In regard to these public utilities, as well as in the whole field of regulation, the aspect which is of the most immediate concern to the general public is the control over rates and standards of service. All regulation, even to its broadest extent, is predicated on the police power of the state to protect the public from excessive charges for service and to insure against possible ruinous competition between utilities performing similar services in the same area. Constancy and reliability of service share with payment for services rendered as points of the most obvious concern to the consuming and using public.

The monopolistic position of a public utility is justified by the need of protection against competition which could result in a breakdown of essential services to the community. In return for its exclusive right to operate, the business is expected to provide adequate services. This result is guaranteed through the regulation of its services by a public agency. In order for the utility to meet the standards required, its earnings must be commensurate with its needs for maintenance and investment.

*Rate Making*

The utility company is entitled to a fair return on a fair value of its investment. In fact, this fair return is essential if the utility is to meet its responsibilities to the public.

When a regulatory commission or administrative agency is confronted with the problem of establishing or reviewing the schedule of rates being charged by a public utility, it must first establish a "rate base" upon which to decide the amount of a fair value and fair return.

The question of what constitutes a "fair value" of any utility has resulted in much controversy and litigation. The United States Supreme Court in 1898 in deciding a railroad rate controversy held

that the "apparent value of the property and franchises used by the corporation, as represented by its stock, bonds and obligations, is not alone to be considered when determining the rates that may be reasonably charged." [1] To calculate a fair return on such a valuation might introduce errors of excessive bonded indebtedness or overvalued stock investments. The Court in the *Smyth* case stated:

> "(W)hat the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience. On the other hand, what the public is entitled to demand is that no more be exacted from it for the use of a public highway than the services rendered by it are reasonably worth . . ."

In line with the decision in *Smyth v. Ames*, the standard formula for fixing utility rates during the next 45 years was "fair return on fair value of a company's properties," fair value meaning reproduction cost new, less observed depreciation. Later the cost of reproduction theory gradually gave way to a new formula adopted by the Federal Power Commission, the validity of which was upheld by the United States Supreme Court:

> The Constitution does not bind rate-making bodies to the service of any single formula or combination of formulas. Agencies to whom this legislative power has been delegated are free, within the ambit of their statutory authority to make the pragmatic adjustments which may be called for by particular circumstances. Once a fair hearing has been given, proper findings made, and other statutory findings satisfied, the courts cannot intervene in the absence of a clear showing that the limits of due process have been overstepped. If the Commission orders, as applied to the facts before it and viewed in its entirety, produces no arbitrary results, our inquiry is at an end . . ." [2]

Two years later, in 1944, the Supreme Court reviewed and approved a formula adopted by the Federal Power Commission, stating that "under the statutory standard of 'just and reasonable' it is the result reached, not the method employed which is controlling." Since the formula of original cost, less depreciation reserve plus working capital was, in the Court's opinion, reasonable, it was allowed to stand. [3]

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[1] *Smyth v. Ames*, 169 U. S. 466, 42 L. Ed. 819 (1898).

[2] *Federal Power Commission v. Natural Gas Pipeline*, 315 U. S. 575 (1942).

[3] *Federal Power Commission v. Hope Natural Gas Company*, 324 U. S. 591 (1944).

In light of the latter two Supreme Court decisions, many state regulatory commissions adopted the "original cost" method of valuation. In 1948 the Federal Power Commission reported 18 state commissions using one or the other of these methods. In 1966 the number was 26. [1]

The computation and establishment of "fair value" is difficult to say the least, and is becoming exceedingly more complicated. Adding to the difficulties inherent in the computation of this factor have been, in recent times, inflation in the general economy, population growth, and the increased demand for service. All of these factors must be considered in their proper perspective in order to arrive at an equitable rate schedule which will bring about a fair return on the investment.

Once the fair value of the utility has been ascertained at any one time and a just rate of return on that investment has been decided upon, then the problem is to adjust the rate schedule in such a manner which will produce the rate of return.

*Development of Regulation*

Governmental regulation first existed on the local level in the form of by-laws or ordinances which attempted to control the many separate electric companies operating in the community. Very often these statutes set maximum rates which could be changed. These maximum charges often produced rigid, spasmodic and inept, if not, corrupt regulation.[2]

Regulation by the municipalities eventually proved to be ineffectual, and by 1900 there arose a demand for specific, scientific regulation by a body of administrators with sufficient powers to determine facts and issue rules and orders.[3] In 1907, administrative commissions were set up in Wisconsin and New York with general powers of supervision over utilities which previously had been subject to local regulation. Georgia in the same year extended the jurisdiction of its railroad commission to enable it to deal with

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[1] Edwin Vennard, *The Electric Power Business,* McGraw Hill, New York, N. Y., 1970, p. 91.

[2] The Twentieth Century Fund, *Electric Power and Government Policy,* Baltimore, Md., 1948, p. 42.

[3] *Ibid.*

other forms of quasi-public enterprise. In 1908, Vermont replaced its railroad commission with a public service commission and in 1910 New Jersey also created such a commission. In 1911, Connecticut, Kansas, Nevada, New Hampshire, Ohio and Washington established public service commissions in each case substituting the new commission for the united railroad agencies. During the next two years commissions were created with some control over electric utilities in California, Colorado, Idaho, Illinois, Indiana, Missouri, Montana, Oregon, Pennsylvania, Rhode Island and West Virginia. Then the movement spread until every state had established a public service commission or similar agency, as is the case today.

Most of the commissions are designated as a Public Utility Commission, Public Service Commission or Corporation Commission. With the exception of Oregon where there is but a single commissioner, multi-member commissions composed of from three to seven members, with a three member unit the more common, perform the regulatory function. Members' terms range from a low of four years in 10 states to a high of 10 years in two jurisdictions. In a majority of states (33), a six year appointment is in force.

The Governor exercises exclusive power of appointment in six jurisdictions. In 23 states he shares this authority with the Senate; in one state with either the Senate or the House and in one state his nominations are approved by the legislature in joint session. The three states of Maine, Massachusetts, and New Hampshire require the consent of the Executive Council and in two states the legislature alone makes the appointments. Finally, the post is an elective office in 14 states.

The public utility regulatory bodies vary in the extent of their jurisdiction. The term "public utility" covers a wide range of services including electric light and power, manufactured and natural gas, common carriers, oil and gas lines, and water, telegraph and telephone services. In most states, practically all such activity is subject to supervision by the state agency. Commissions in certain states are concerned with the regulation of fewer utilities, the regulation of other utilities being the responsibility of local governments.

In the states of Minnesota, South Dakota and Texas, the public

utility commission has no regulatory authority over electric utilities and in ten states the jurisdiction over electric light and power is qualified (Ala., Ga., Ida., Miss., Mo., Mont., N.C., N.D., Ohio and Okla.).

In addition, the public service commission or similar agency in seven states exercises substantial control over municipally owned utilities (Ind., Me., *Mass.*, Minn., Mont., W. Va. and Wisc.).

*Role of Courts*

Public service commissions are created by legislative enactment and the extent of a commission's power is determined by such legislation. Public utility legislation, like all other legislation, may be subject to judicial review either in the case of its constitutionality or in its application. However, utility regulation is primarily a legislative function and not a judicial process and as such the judiciary must wait until a specific controversy has been presented before it can interpretate the legislation.

The regulation of quasi-public or public utility enterprises is usually justified upon the grounds that such regulation is a valid exercise of the police power of the state. This theory is based on the conclusion that certain enterprises bear so close a relation to the public that the state has a right to exercise such control over these enterprises as will guarantee its citizens the right to use these services. This power, which may be said to be inherent in sovereignty, involves the right to enact measures in the interests of of public health, safety, morals and economic welfare. While the exercise of the police power is primarily a legislative function, the question of whether a given law is a valid exercise of that power becomes in actual litigation a matter for judicial determination.

The courts have sustained as a proper exercise of police power state statutes which are designed to secure the protection of health and morals, the preservation of safety and order and the regulation of public callings. The power to regulate under the police power is inherent in the state; however, its exercise may be limited by constitutional provisions in the several states and like all other powers of the state by provisions of the federal Constitution. It is the view of constitutional scholars that since the United States government is a government of delegated powers there is no gen-

eral police power but rather a quasi-police power as is necessary and proper to carry into execution the enumerated and implied powers of the Constitution. The litigation which has come before the federal courts challenging the validity of state regulation has been largely concerned with alleged deprivations of liberty and property without due process under Article XIV, s. 1 of the United States Constitution.

*Concept of Judicial Review.* The term "judicial review" is commonly used to describe all forms of judicial scrutiny. However, the forms most often applied when relating the concept of judicial review to public utility regulations are the statutory proceedings for the review of the actions of a named agency usually provided in the statute establishing the agency and the system of remedies generally available to scrutinize administrative actions except insofar as they are excluded by specific statutory proceedings.[1] In the majority of jurisdictions the general review system rests on common law with the remedies of certiorari, mandamus, injunction, and occasionally habeas corpus, prohibition and quo warranto. The remedy of declaratory judgment has been nearly everywhere added by statute and in a number of states the system of general remedies has been modified by statute. In New York, for example, certiorari, mandamus, and prohibition have in nomenclature at least been superseded by a "proceeding to review the action of a board or offices."

Aside from these provisions a general rule governing judicial review may be stated as follows:

1. All cases involving questions of law in contradistinction to cases involving questions of fact may be reviewed by the courts.
2. All cases in which a federal question is involved, i.e., where the utility asserts a right under the federal constitution, may be reviewed by the courts.[2] Whether or not the commission order which is challenged warrants review will depend on the discretion of the judge.

If judicial review is granted, depending on the nature of the com-

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[1] Louis L. Jaffee and Nathaniel L. Nathanson, *Administrative Law Cases and Materials*, Little Brown and Company, Boston, 1968, pp. 191-207.

[2] William E. Mosher, *Electrical Utilities — The Crisis in Public Control*, Harper & Bros., New York, 1929, p. 50.

plaint, it may involve questions arising from the regulation of the administrative actions of the board, the regulation of service or the regulation of rates; the regulation of the latter being based on the common law premise of a "reasonable rate." [1]

*Federal Power Commission*

Regulation of electric utilities by the federal government rests upon its constitutional responsibilities for the preservation of public lands and the protection of interstate commerce.

Until 1896, water power sites on public lands were acquired by private interests under the pre-emption and homestead laws; between 1896 and 1920 various cabinet officers licensed their use. [2] In 1920, the Federal Water Power Act created the Federal Power Commission, consisting of the Secretaries of Agriculture, Interior and War, to conserve the remaining natural resources of the country. This Commission was empowered to license the use of public lands and water resources within federal jurisdiction. In 1930 the powers of the Commission were transferred by statute to an independent five-member commission appointed by the President.

The Federal Power Commission is empowered to issue licenses to construct and maintain dams and other works for the improvement of navigation and for the development, transmission, and utilization of power across, along, from or in any of the streams or other bodies of water over which Congress has jurisdiction under its authority to regulate commerce . . . or upon any part of the public lands of the United States . . . or for the purpose of utilizing the surplus water or water power from any government dam.[3]

The Commission is the only federal agency with power directly to regulate the rates and service of electric utilities. Its jurisdiction over rates is limited to (a) power produced at hydro-electric developments which it has licensed; (b) power transported in interstate commerce and sold at wholesale for resale; and (c) power generated at certain federally-operated projects. The authority of

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[1] See *Smyth v. Ames*, 169 U. S. 466, 42 L. Ed. 819 (1898).

[2] The Twentieth Century Fund, *The Power Industry and the Public Interest*, New York, N. Y., 1944, p. 23.

[3] *Ibid.*, p. 24.

the Federal Power Commission over service rendered by utilities, although more restricted than that of most of the state commissions, applies to all utilities, public and private, subject to its jurisdiction, whether it controls the rates or not.[1]

The Federal Power Commission has divided the country into separate power supply areas. Generally, the power supply areas are co-extensive with the territories served by several "substantially interconnected utility systems operating as an essentially self-sufficient group independent of adjacent systems."[2] The New England area is divided into two well defined power supply areas under the Commission's classification, power supply area number one being the State of Maine and number two the remaining New England States.

*Securities and Exchange Commission*

The Securities and Exchange Commission (SEC) under a provision of the Holding Company Act of 1935 also regulates public service companies. The section of the Holding Company Act which provides for federal regulation has three main objectives:

1. The performance of utility servicing at cost;
2. Efficiency and economy; and
3. Fair and equitable allocation of costs among the companies receiving service.

Since proper accounting and reporting are basic to regulation, the Securities and Exchange Commission has required public service companies to keep accounts on a uniform basis.

The SEC is empowered to: (1) supervise the growth of holding company systems; (2) prohibit the issue of nonvoting common stock, debentures, or common stock not having equal voting power with other outstanding securities; and (3) to control the composition of corporate capital, and changes in the priorities, voting power and other rights of security holders.[3] The SEC may pass upon all costs of reorganization, dissolution, liquidation, bankrupt-

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[1] *Op. cit.*, The Twentieth Century Fund, pp. 45-46.

[2] William D. Shipman, *An Inquiry Into the High Cost of Electricity in New England,* Wesleyan University Press, Middleton, Conn., 1962, pp. 5 and 11.

[3] *Op. cit.,* The Twentieth Century Fund, p. 74.

cy and receivership and is empowered to require each registered holding company and subsidiary to take appropriate steps to insure that the corporate structure or continued existence of any company in the system does not unduly or unnecessarily complicate the structure, or unfairly or inequitably distribute voting power among security holders.[1]

*Federal Power Projects*

The development and maintenance of rivers for navigation has long been deemed to be within the realm of federal jurisdiction. Related to this control over navigable waters are the problems of irrigation, soil erosion and land reclamation, all of which led to the passage of the Reclamation Act of 1902. This act established a reclamation fund from the sale of public lands in arid and semi-arid states which the Secretary of the Interior was to use to finance irrigation projects. While the main purpose of this statute was to provide irrigation, some electricity was produced and used at the site of the facility for pumping and some was sold. Congress had not formulated a policy for the disposal of this electrical power in the 1902 legislation. This contingency was provided for in the Reclamation Act of 1906 which authorized the Secretary of the Interior to contract for the sale of surplus power for not more than ten years, or to lease lease power privileges wherever generation of power was necessary for irrigation, or where there was an opportunity to develop power facilities.[2]

In mobilizing for World War I, the federal government found it necessary not only to regulate private power systems but also to develop power resources of its own. Under the National Defense Act of 1916, President Wilson directed the construction of a dam at Muscle Shoals on the Tennessee River, a site which had been a serious obstacle to navigation and transportation on the river. The dam was to be used to produce electrical power for an experimental nitrate plant. Construction was started on the project; however, the Armistice was signed before work was completed. Work was resumed in 1925 and in 1933 the project came under federal control.

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[1] *Op. cit.*, The Twentieth Century Fund, p. 75.
[2] 34 U. S. Stat. 116, s. 5 (1960).

Throughout the 1800s, Congress was urged to control floods, mainly on the Mississippi River; however, action was withheld on the grounds that the building of dams provided local and not national benefits. After several serious floods and much damage to property, Congress decided that flood control was a proper federal function.

In 1922 the Bureau of Reclamation issued a report recommending that the federal government undertake construction of a canal and dam on the Colorado River, later to be the 795 foot high Hoover Dam, which would provide both flood control and a source of water to those states in the Colorado River basin (Ariz., Calif., Colo., N. M., Nev., Utah and Wyo.).

The multiple purposes of the projected dam on the Colorado River raised complex legal issues concerning the rights of the various states in the basin. In particular, the equitable division of the water created serious problems which, in time, were settled on the basis of a compact drawn up by a special commission of representatives of the governors of the states involved.[1] In 1922, the Supreme Court in *Wyoming v. Colorado*, 259 U.S. 419 ruled that anyone who has established himself in the beneficial use of the waters of a stream shall be secure in his supply of water against all later appropriations no matter what his location on the stream. This decision virtually abolished state lines so far as water rights were concerned.

*Tennessee Valley Authority*

The passage of the Tennessee Valley Authority Act (TVA) in 1933 was the culmination of a gradual extension of federal responsibility relative to navigation, flood control and the provision of electric power. Moreover, the TVA project was presented as a program which would alleviate the depressed economic conditions of the southeastern United States.

Under the terms of the statute, the Authority was charged with the following responsibilities: (1) flood control; (2) the maximum development of the Tennessee River for navigation purposes; (3) the maximum generation of electric power consistent with flood

[1] Edwin Vennard, *Government in the Power Business,* McGraw-Hill, New York, N. Y., 1968, p. 93.

control and navigation; (4) the proper use of marginal lands; and (5) the reforestation of all lands in the drainage basin.[1]

To carry out the above purposes, Congress set up an agency with the prerogatives of government but the flexibility of a private corporation.

The act creating the TVA did not specifically mention the generation of power as a primary purpose but rather, as above, to generate power consistent with flood control and navigation. The Authority is authorized to generate and sell power in order to "avoid the waste of water power" and "to assist in liquidating the cost or aid in the maintenance of the Authority project".[2] After the needs of the Authority and other federal agencies involved are satisfied, the surplus power is sold primarily for the benefit of the domestic and rural consumers of the area at rates fixed by the TVA board of directors.

Two years later, in 1935, the TVA Act was amended and the powers of the directors were increased to include the acquisition of existing electric facilities used in serving rural areas and to control the amount of power purchased by the consumers. In effect, the TVA was able to keep its customers completely dependent on it and to force almost every investor-owned electric utility company in the area out of business.[3]

The favorable experience with TVA operations prompted Congress to enact similar proposals based on the TVA plan. These included the Arkansas Valley Authority, the Mississippi Valley Authority, and the Bonneville Project Act.

*Rural Electrification Administration Cooperatives*

In 1935 the federal government began a campaign to bring electric service to the rural areas of the country. In that year the Rural Electrification Administration (REA) was established to make federal funds available in the form of low cost loans to help finance the construction and operation of generating plants and transmission lines in rural areas which did not have central station service. Fostered and financed by this program, rural coopera-

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[1] *TVA Act. of 1933*, s. 23 (73d Cong., 1st Session, Public Law 17).
[2] TVA Act of 1933, s. 9(a).
[3] Edwin Vennard, *Government in the Power Business*, p. 103.

tives increased so that by June, 1968, 98% of all the farms in the United States had electric service available.[1]

*Public Utility Districts*

The public utility district is one example of the category of government known as the special district. Special districts are organized entities which are endowed with sufficient autonomy and discretion in the management of their own affairs as to distinguish them as independent and separate from the administrative structure of any other governmental unit.

Until recently, a special district could be distinguished from other units of general government by its limited authority to undertake only one or perhaps a few related functions. However, now some special districts have received broad statutory authority.

The advantages of setting up special districts to render a service to a particular area include (1) the ease and convenience of establishing such a district; (2) the capacity to adapt the district's jurisdiction to the territorial requirements of the appropriate service area; (3) the ability to circumvent constitutional and statutory limitations upon the taxing power and borrowing capacity of other units of general government; (4) a high degree of flexibility in providing services not readily attainable through recourse to established local governments; (5) the opportunity to achieve such services through a more modern, professional and flexible administrative system than is sometimes characteristic of established local governments.[2]

The use of special public utility districts is prevalent in the States of Washington and Nebraska. In Washington, the district usually encompasses a county while in Nebraska the area covered may vary in size from a single town to a county or even larger area.[3]

*Municipal Ownership*

Municipal ownership of electric utilities dates from the very

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[1] Edwin Vennard, *The Electric Power Business,* p. 83.

[2] Tennessee Legislative Council Committee, *Study on Public Utility Services,* 1966, p. 14.

[3] Edwin Vennard, *The Electric Power Business,* p. 82.

beginnings of the industry. The facilities owned by the municipality, in most instances, are quite small in comparison to private electric systems and often serve only one particular geographic area. Because of their small size, the municipal power plants cannot make electricity as cheaply as do the large interconnected power companies and oftimes find production of electricity impractical.

Since 1882, more than 4,300 municipalities have at one time or another established local electric utility systems.[1] By 1965 only 1,959 of these plants were still in operation, 40 of which are in Massachusetts. The decrease in the number of plants is due largely to the fact that the plants are limited in size and usually serve only the town or city in which they operate. Also, due to the small size the municipal power plant cannot generate power as cheaply as can the larger investor owned companies which utilize the interconnected generating and distribution system.

The status of the 40 municipal power plants in Massachusetts will be covered in the following chapter.

## CHAPTER IV. PRESENT STATUS OF THE POWER INDUSTRY IN MASSACHUSETTS

*Interconnection*

It is exceedingly difficult, if not impossible, to discuss the present status of the power industry in Massachusetts exclusively. The pattern of growth of the industry in the Commonwealth and in New England has been characterized by an interconnection of generating plants and transmission lines with those in other states and provinces. Even within the interconnected areas are small groups of suppliers of electricity who have pooled their resources for the construction and operation of power plants. The concept of interconnection is based upon the need for providing more and better electrical service while retaining reasonable rates. As a result of the interconnecting of generating plants and transmission lines, service is improved, duplicity is avoided, and rates remain

[1] Edwin Vennard, *The Electric Power Business*, p. 82.

lower. Also, the practice of interconnection is in line with the Federal Power Commission action of dividing the country into power service areas.

The most frequent type of interconnection agreement which is made between two parties is for one to supply power to the other should an emergency arise or to interchange separate blocks of surplus power when it appears likely to become available. When transmission is expected to be fairly continuous, large in volume, predominantly in one direction and indispensable to the purchaser, the arrangement usually takes the form of a contract for firm power extending for a number of years.

*Power Pools*

In some instances, power pools such as the New England Power Pool (NEPOOL) have been established to facilitate the interconnection of power resources. The power pool is usually a quasi-independent agency for whose benefit investments are made and to whose account total economies achieved as a result of the interconnected operations are credited. Some pooling agreements provide that parties with less than average reserves pay a capital charge on their deficiency to those with more than the average. After applying the aggregate savings to the costs and upkeep of the pool, any remaining net benefits are distributed among the parties concerned.

The NEPOOL effort by the New England utilities industry has been continuing for approximately the last five years. The objectives sought to be realized with the creation of NEPOOL include: (1) the operation of the available generating facilities in the New England region on a day to day basis in the most reliable manner and with maximum practicable economy; (2) the construction of the required additions to generating facilities in the region on a timely basis and in the manner which is most economical for the region; and (3) the operation of available transmission facilities in the region at adequate capacity.[1] The first of these objectives was achieved when the New England Power Exchange (NEPEX) central dispatch station began coordinating its activities

[1] New England Regional Commission, *Public Hearings on Electric Power*, 1971, p. 61.

with other pools located in the Northeastern United States and Canada. At the same time as the creation of NEPEX, according to NEPOOL officials, plans were formulated to achieve the second and third objectives.[1] Shortly thereafter an integrated planning staff (NEPLAN) was established to coordinate the planning and expansion of the power pool.

Regionalization is the creation of a bulk power supply for all utilities in a certain area. Some utility companies feel that regionalization is essential to a modern, reliable power supply system covering all aspects of generation, distribution and transmission of wholesale electricity. The Electric Coordinating Council of New England took the position that:

> 'To achieve the economies of today's technology it is necessary that the philosophy of our approach to bulk power supply be the same as if an overall system supplied the entire region. Today's technology makes such an approach engineeringly and economically viable for the six-state area.[2]

The power pools were the outgrowth of regional planning by the Electric Coordinating Council of New England. Other examples of a developing trend toward regionalization are the merger of certain utilities in adjoining areas of Connecticut and Western Massachusetts into Northeast Utilities, thus bringing the companies under the control of a single agency; and the attempts on the part of Boston Edison, the New England Electric System and Eastern Utilities Association to merge their power facilities in eastern Massachusetts, Rhode Island and New Hampshire.[3] The purpose of this proposed affiliation is to structure an electric system which will provide more efficient management, financing, operation, engineering and construction particularly with respect to the large new generating plants and bulk transmission facilities under today's technology that are required to meet economically and reliably the constantly increasing demand for electric energy with the least impact on the environment.[4]

[1] *Op. Cit.*

[2] Electric Coordinating Council of New England, *Fourth Progress Report*, December, 1969.

[3] New England Regional Commission, *A Study of the Power Situation in New England 1970-1990*, 1970.

[4] Brief of Applicants, Securities & Exchange Commission on the matter of New England Electric System, Eastern Utilities Association, Boston Edison Company and Eastern Electric Energy System (70-4663), Administrative Proceeding File No. 3-1698.

The consolidation matter is currently before the Securities and Exchange Commission and briefs have been filed and hearings scheduled.

*Types of Power Suppliers*

Power supply companies are usually classified as either investor-owned utilities or publicly owned utilities. The Federal Power Commission separates the investor or privately owned utilities into four general categories: A, B, C, and D. Class A companies are those having annual electric operating revenues of $2.5 million or more, while class B are those having electric operating revenues of between $1 million and 2.5 million. These two classes account for better than 98% of the private electric utility industry in the United States on the basis of both assets and revenues.[1]

Publicly owned utilities are those operated by municipalities and federal power agencies. The Federal Power Act defines the term municipality as a "city, county, irrigation district, drainage district or other political subdivision or agency of a State competent under the laws thereof to carry on the business of developing, transmitting, utilizing or distributing power" (Par I, s. 3).

*Massachusetts Power Industry*

As is indicated by Table 1, there were 19 investor-owned and 40 municipally owned power supply companies in Massachusetts as of December, 1968. Of the 19 investor-owned companies, 13 are participants in four principal electric systems: Eastern Utilities Association (EUA), New England Electric System (NEES), New England Gas and Electric System (NEGES), and Northeast Utilities (NU).

Most of the power in Massachusetts is generated by conventional steam power plants while the remainder is generated by hydro, internal combustion and nuclear plants. As noted in Chapter II of this report, there are currently three nuclear plants in New England; one sponsored by 11 utility companies is located in Rowe, Massachusetts.[2] Other nuclear plants either under construction or announced for New England are (a) Millstone II, to be operated

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[1] William D. Shipman, *An Inquiry Into the High Cost of Electricity in New England*, 1962, p. 14.

[2] See Chapter II, p. 25, footnote 1.

TABLE 1.

*Investor-Owned and Municipal Power Suppliers in Massachusetts*
*(As of December 31, 1968)*

| | | Sales to Ultimate Consumers | | | Installed Generating Capacity | |
|---|---|---|---|---|---|---|
| *Investor - Owned (19)* | *Affiliation* | *1968 Revenues (Thousands)* | *1968 Average Customers* | *1968 Sales KWH (Millions)* | *Kilowatts (Thousands)* | *No. of Plants* |
| Boston Edison Co. | | $155,990 | 556,961 | 6,004.6 | 1,981.7 | 5 |
| Boston Gas Co. | | 1,695 | 4,690 | 80.7 | — | — |
| Brockton Edison Co. | EAU[1] | 16,595 | 79,705 | 738.3 | 20.0 | 1 |
| Cambridge Electric Light Co. | NEGEA[2] | 12,838 | 39,547 | 676.6 | 92.2 | 2 |
| Canal Electric Co.[(a)] | NEGEA | 7,279 | 5 | 872.9 | 542.5 | 1 |
| Cape & Vineyard Electric Co. | NEGEA | 12,077 | 63,185 | 402.9 | 2.8 | 1 |
| Fall River Electric Light Co. | EUA | 8,260 | 46,607 | 356.6 | 14.3 | 1 |
| Fitchburg Gas & Electric Light Co. | | 6,136 | 20,090 | 239.5 | 61.4 | 1 |
| Holyoke Power & Electric Co.[(a)] | NU[3] | 157 | 2 | 11.1 | — | — |
| Holyoke Water Power Co. | NU | 1,660 | 80 | 118.1 | 208.7 | 8 |
| Huntington Electric Light Co. | NU | N.A.[5] | N.A. | N.A. | — | — |
| Manchester Electric Co. | | 384 | 1,961 | 11.4 | — | — |
| Massachusetts Electric Co. | NEES[4] | 161,980 | 657,042 | 6,763.9 | 91.0 | 2 |
| Montaup Electric Co.[(a)] | EUA | 19,004 | 6 | 2,452.1 | 329.0 | 1 |
| Nantucket Gas & Electric Co. | | 855 | N.A. | N.A. | 8.0 | 1 |
| New Bedford Gas & Edison Light Co. | NEGEA | 17,558 | 92,801 | 764.7 | 130.5 | 1 |
| New England Power Co. | NEES | 2,019 | 13 | 161.2 | 1,328.1 | 18 |
| Western Massachusetts Electric Co. | NU | 45,246 | 148,401 | 2,317.4 | 359.9 | 10 |
| Yankee Atomic Electric Co.[(a) (b)] | | 10,330 | 10 | 1,211.0 | 185.0 | 1 |
| *Municipals (40)* | | | | | | |
| Ashburnham Municipal Light Plant | | 261 | 1,720 | 9.4 | — | — |
| Belmont Municipal Light Plant | | 1,632 | 9,800 | 61.6 | — | — |
| Boylston Municipal Light Plant | | 168 | 926 | 7.0 | — | — |
| Braintree Electric Light Dept. | | 3,513 | 10,661 | 180.2 | 38.8 | 3 |
| Chester Municipal Electric Light Plant | | 73 | 415 | 3.3 | — | — |

TABLE 1. — *(Continued)*

*Investor-Owned and Municipal Power Suppliers in Massachusetts*
*(As of December 31, 1968)*

| | Affiliation | Sales to Ultimate Consumers 1968 Revenues (Thousands) | 1968 Average Customers | 1968 Sales KWH (Millions) | Installed Generating Capacity Kilowatts (Thousands) | No. of Plants |
|---|---|---|---|---|---|---|
| *Municipals (40) — Continued* | | | | | | |
| Chicopee Electric Light Dept. | | 4,196 | 19,403 | 221.8 | — | — |
| Concord Municipal Light Plant | | 1,208 | 4,666 | 59.1 | — | — |
| Danvers Electric Dept. | | 2,049 | 7,897 | 108.7 | — | — |
| Georgetown Municipal Electric Dept. | | 264 | 1,653 | 11.6 | — | — |
| Groton Electric Light Dept. | | 306 | 1,930 | 12.2 | — | — |
| Groveland Municipal Electric System | | 240 | 1,569 | 9.0 | — | — |
| Hingham Municipal Lighting Plant | | 1,223 | 6,664 | 56.0 | — | — |
| Holden Municipal Light Plant | | 766 | 3,996 | 29.8 | — | — |
| Holyoke Municipal Gas & Electric Dept. | | 3,047 | 20,504 | 128.6 | 42.9 | 6 |
| Hudson Light & Power Dept. | | 1,338 | 6,132 | 53.4 | 19.9 | 1 |
| Hull Municipal Light Plant | | 618 | 4,455 | 22.0 | — | — |
| Ipswich Municipal Light Dept. | | 791 | 3,826 | 32.0 | 9.2 | 1 |
| Littleton Light & Water Dept. | | 597 | 2,699 | 27.0 | — | — |
| Mansfield Municipal Light Dept. | | 813 | 3,287 | 40.9 | — | — |
| Marblehead Municipal Light Plant | | 1,130 | 8,214 | 48.7 | 1.1 | 1 |
| Merrimac Municipal Light Plant | | 198 | 1,472 | 6.8 | — | — |
| Middleborough Gas & Electric Dept. | | 1,172 | 6,280 | 40.3 | — | — |
| Middleton Municipal Light Dept. | | 320 | 1,289 | 14.1 | — | — |
| North Attleboro Municipal Electric Light Dept. | | 1,323 | 6,618 | 56.6 | — | — |
| Norwood Municipal Light Plant | | 2,555 | 10,959 | 121.1 | — | — |
| Paxton Electric Light Dept. | | 217 | 1,149 | 9.4 | — | — |
| Peabody Municipal Light Plant | | 3,332 | 16,225 | 145.6 | 11.2 | 1 |
| Princeton Municipal Light Dept. | | 100 | N.A. | 3.3 | — | — |
| Reading Municipal Light Dept. | | 4,194 | 16,379 | 195.3 | — | — |

TABLE 1. — *(Continued)*

*Investor-Owned and Municipal Power Suppliers in Massachusetts*

***(As of December 31, 1968)***

*Municipals (40) — Continued*

| | Affiliation | Sales to Ultimate Consumers 1968 Revenues (Thousands) | 1968 Average Customers | 1968 Sales KWH (Millions) | Installed Generating Capacity Kilowatts (Thousands) | No. of Plants |
|---|---|---|---|---|---|---|
| Rowley Municipal Light Plant | | 180 | 1,019 | 5.9 | — | — |
| Russell Electric Light Dept. | | 43 | 327 | 1.9 | — | — |
| Shrewsbury Municipal Light Plant | | 1,641 | 6,275 | 74.4 | — | — |
| South Hadley Electric Light Dept. | | 1,260 | 5,239 | 70.8 | — | — |
| Sterling Municipal Electric Light Plant | | 267 | 1,347 | 9.9 | — | — |
| Taunton Municipal Lighting Plant | | 3,893 | 17,431 | 191.0 | 77.3 | 2 |
| Templeton Municipal Light Dept. | | 308 | 2,008 | 11.9 | — | — |
| Wakefield Municipal Light Dept. | | 1,784 | 8,560 | 79.9 | — | — |
| Wellesley Municipal Light Plant | | 2,195 | 8,359 | 89.9 | — | — |
| West Boylston Municipal Light Dept. | | 487 | 1,964 | 24.2 | — | — |
| Westfield Gas & Electric Light Dept. | | 2,094 | 10,125 | 108.2 | — | — |

(a) Generation or wholesale.
(b) Sponsored by 11 investor-owned utilities.
1 Eastern Utilities Association.
2 New England Gas and Electric Association.
3 Northeast Utilities.
4 New England Electric System.
5 Not available.

*Source:* Adapted from New England Regional Commission, ***A Study of the Electric Power Situation in New England, 1970-1990,*** 1970 Table 3-1.

by Northeast Utilities, (b) Vermont Yankee, (c) Maine Yankee and (d) Boston Edison's Pilgram I.[1]

*Municipal Lighting Plants*

A municipality (city or town) is authorized under section 34 of Chapter 164 of the General Laws to construct, purchase or lease, and maintain one or more plants for the manufacture or distribution of electricity or gas for its own use or for the use of its inhabitants. This authority includes the power to obtain the necessary land, structures, machinery and other apparatus and appliances. The city or town which is engaged in the business of distributing gas or electricity may also, subject to appropriation, sell appliances incidental to the use of the product at prevailing retail prices, and may also install and service the same.

The construction of municipally owned plants is financed by the issuance of general obligation bonds; revenue bond financing is not permitted. Under general obligation bonds, the taxing power of the community is pledged for repayment whereas revenue bonds are redeemed by the income derived from the project. Funding through general obligation bonds, according to the Municipal Electric Association, limits the amount of funds available, and therefore limits the size of the generation facilities which can be constructed.[2] Also, the municipality cannot obtain ownership in, or finance the construction of, electric facilities located outside the town boundaries or service areas.

Prices charged for gas and electricity by municipal power companies must be approved by the State Department of Public Utilities[3] and all receipts of the municipal light plants are paid directly to the city or town treasurer, who in turn, pays all bills and payrolls of the plant.

At the beginning of each fiscal year, the manager of the municipal light plant must furnish to the mayor, selectmen, or municipal

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[1] New England Regional Commission, *A Study of the Electric Power Situation in New England 1970-1990,* 1970, p. 45.

[2] Robert G. Taylor, *Municipally Owned Electric Systems of Massachusetts,* R. W. Beck and Associates, Memorandum, 1971 p. 5.

[3] See G. L. c. 164, s. 58 for the method of determining the price to be charged the city or town for gas or electricity used by it.

light board the estimates of the income from sales to private consumers and of the expense of the plant during the ensuing year. The latter shall include gross expenses of operation, maintenance and repair, interest on indebtedness, depreciation allowance, sinking fund requirements, operating loss if any during the preceding year, and the cost of gas and electricity to be used by the city or town (G.L. c. 164, s. 57).

The 40 municipal electric power companies in Massachusetts are generally found in the suburban or rural parts of the state rather than in the industrial sections. It has been estimated that these 40 systems serve 13% of the state's customers and produce approximately 10% of the total power consumed in the state.[1] This 10% figure of the total state requirement excludes the Massachusetts Bay Transportation Authority's rapid transit system power source which is the largest public owned power consumer in the state. The MBTA's power consumption is equal to 14% of the total municipal system's requirements. It has a separate generating capacity which is used to supply a major portion of its required powers.[2]

The municipally owned electric systems, for the most part, rely heavily on the purchase of power from the private power companies within the state. Presently, the municipalities own less than 4% of the generating capacity within the state while state authorities such as the MBTA own approximately 2% and the remaining approximately 94% of the generation plant is owned by the private utilities.[3]

The municipal power companies have not participated in the power pool system discussed earlier chiefly because of the inability of the local company under present general laws to issue the revenue bonds required to finance the affiliation.

*Rates*

The price of electricity is higher in New England than elsewhere in the United States and highest in New Hampshire, Massachu-

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[1] Robert G. Taylor, *Municipally Owned Electric Systems of Massachusetts*, R. W. Beck and Associates, Memorandum, p. 2, 1971.
[2] *Ibid.*, p. 3.
[3] *Ibid.*, p. 3.

setts and Connecticut. The highest commercial rates are found in Boston, Massachusetts. Such high rates are due chiefly to (1) large production costs, (2) high state and local taxes, (3) low electric usage in all classes of service and (4) moderately high administrative expenses.

Several other factors contribute to higher costs of electricity in New England. The geographical location of the area plays an important role in making the electric rates somewhat steep. The area is devoid of natural fuel (although ther is a possibility that there may be oil reserves off the coast of some states) and any fuel which is used in generating power must be brought in, thus increasing the cost of production. The area also has relatively long cold winters which require more electricity and other power sources for lighting and heating than in other parts of the country. Moreover, much of the area is rural in character. And lastly many of the commercial and industrial customers use only small amounts of electricity. The larger manufacturers such as the textile and paper industries generate their own power for internal consumption.

Production costs remain relatively high in New England mainly because of the high cost of fuel required to operate the conventional steam power stations. It has been estimated that fuel expenses typically account for 70 to 80% of the total generating cost in a steam station.[1] The region itself has virtually no coal, oil or natural gas and must import that which is required The distances involved from the source of the supply to point of destination, coupled with the high cost of transportation, have a strong bearing on the cost of fuel to the New England utility.

Production costs of electric power promise to be somewhat lower with the increased use of nuclear power plants. Many of the existing fossil fuel plants are relatively old and have a limited capacity for producing electricity. These older plants often include a high factor of maintenance and labor and are generally somewhat inefficient in terms of low cost power production.

As indicated, a second factor to be taken into consideration in

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[1] William D. Shipman, *An Inquiry into the High Cost of Electricity in New England.* p. 143.

explaining the high electric rates in New England is the tax burden imposed on the utility companies, particularly in Massachusetts. Presently, the properties of the utility companies are assessed on the municipal level at various rates. The taxes obviously vary in amount between districts and are not subject to control by management. A frequently used comparative ratio is to show other taxes (which include all taxes other than federal income taxes) as a percent of revenue as indicated in the following tabulation which was prepared by a recent study group.

OTHER TAXES

CLASS A AND B UTILITIES

*Percent of Revenue*

| | *1961* | *1964* | *1968* |
|---|---|---|---|
| New England | 12.4% | 12.5% | 13.2% |
| Maine | 7.8 | 7.9 | 8.1 |
| New Hampshire | 11.8 | 11.3 | 11.0 |
| Vermont | 11.5 | 11.2 | 10.1 |
| Massachusetts | 14.9 | 15.3 | 16.4 |
| Rhode Island | 10.0 | 9.6 | 10.1 |
| Connecticut | 10.3 | 10.3 | 11.3 |
| United States (Excluding New England) | 10.2 | 10.3 | 10.8 |
| New York | 13.4 | 13.2 | 15.0 |
| Michigan | 8.3 | 8.0 | 8.9 |
| Wisconsin | 10.0 | 9.5 | 10.3 |

*Source:* New England Regional Commission. *A Study of the Electric Power Situation in New England 1970-1990*, 1970, p. 76.

As the tabulation points out, other taxes in 1968 amounted to 13.2% of electric company revenues in New England as compared with 10.8% for the rest of the country. Taxes in Massachusetts are the more burdensome, being twice as high as those in Maine and about 50% higher than in the other New England states.

*Residential Rates* — Differences between New England and other sections of the country with respect to residential electric rates may be demonstrated by the following Table 2 which compares typically monthly bills in specific communities.

TABLE 2.

*Typical Monthly Bills for Residential and Commercial Service, Selected Cities, January 1968*

| | Residential | | | | Commercial | | | |
|---|---|---|---|---|---|---|---|---|
| | 250Kwh | 500Kwh | 750Kwh | 1,000Kwh | 6 Kw 750Kwh | 12 Kw 1,500Kwh | 30 Kw 6,000Kwh | 40 Kw 10,000Kwh |
| MAINE | | | | | | | | |
| Bangor | $ 7.83 | $11.37 | $15.62 | $19.62 | $29.50 | $46.00 | $127.00 | $199.00 |
| Lewiston | 8.66 | 11.73 | 15.71 | 21.48 | 34.08 | 58.15 | 160.10 | 228.50 |
| Portland | 8.66 | 11.73 | 15.71 | 21.48 | 34.08 | 58.15 | 160.10 | 228.50 |
| NEW HAMPSHIRE | | | | | | | | |
| Concord | 7.37 | 10.62 | 15.07 | 20.32 | 30.83 | 61.65 | 199.13 | 283.50 |
| Manchester | 8.81 | 11.56 | 16.26 | 21.81 | 35.65 | 67.75 | 164.05 | 238.55 |
| Nashua | 8.81 | 11.56 | 16.26 | 21.81 | 35.65 | 67.75 | 164.05 | 238.55 |
| VERMONT | | | | | | | | |
| Barre | 7.35 | 10.97 | 15.68 | 19.60 | 27.80 | 48.80 | 147.50 | 188.50 |
| Burlington[1] | 6.70 | 8.80 | 11.88 | 14.97 | 23.24 | 41.74 | 139.66 | 194.26 |
| Rutland | 7.00 | 10.38 | 14.73 | 19.73 | 25.75 | 48.25 | 175.75 | 240.75 |
| MASSACHUSETTS | | | | | | | | |
| Boston | 9.50 | 12.81 | 17.68 | 22.56 | 41.10 | 77.97 | 223.20 | 316.20 |
| Cambridge | 7.12 | 9.97 | 13.81 | 18.31 | 26.80 | 53.60 | 174.40 | 265.00 |
| Fall River | 8.28 | 10.88 | 15.08 | 19.93 | 30.83 | 57.63 | 172.43 | 289.50 |
| Holyoke[1] | 6.25 | 9.75 | 13.32 | 17.59 | 25.29 | 49.58 | 164.29 | 254.25 |
| Springfield | 8.26 | 10.85 | 15.17 | 19.28 | 33.14 | 66.31 | 208.10 | 296.58 |
| Worcester | 8.29 | 11.19 | 15.98 | 22.01 | 31.70 | 54.04 | 152.27 | 222.79 |

TABLE 2. *(Continued)*

*Typical Monthly Bills for Residential and Commercial Service, Selected Cities, January 1968*

| | Residential | | | | Commercial | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | 6 Kw | 12 Kw | 30 Kw | 40 Kw |
| | 250Kwh | 500Kwh | 750Kwh | 1,000Kwh | 750Kwh | 1,500Kwh | 6,000Kwh | 10,000Kwh |
| RHODE ISLAND | | | | | | | | |
| Pawtucket | 8.33 | 10.83 | 15.08 | 19.33 | 32.00 | 58.55 | 156.69 | 225.25 |
| Providence | 8.65 | 10.50 | 14.40 | 18.65 | 31.65 | 60.90 | 171.28 | 237.00 |
| CONNECTICUT | | | | | | | | |
| Bridgeport | 7.30 | 9.80 | 13.80 | 18.30 | 32.35 | 56.35 | 162.55 | 231.75 |
| Hartford | 8.25 | 10.50 | 14.70 | 20.20 | 38.35 | 68.10 | 194.00 | 274.50 |
| New Haven | 7.30 | 9.80 | 13.80 | 18.30 | 32.35 | 56.35 | 162.55 | 231.75 |
| Waterbury | 8.13 | 12.36 | 16.13 | 19.88 | 30.90 | 61.80 | 193.50 | 264.00 |
| OTHER CITIES | | | | | | | | |
| Baltimore | 8.01 | 12.49 | 15.31 | 18.14 | 26.05 | 50.95 | 167.28 | 258.42 |
| Buffalo | 6.90 | 10.77 | 14.65 | 18.52 | 21.42 | 36.72 | 128.52 | 202.77 |
| Chattanooga | 4.35 | 6.60 | 7.85 | 9.10 | 14.25 | 22.20 | 70.20 | 117.00 |
| Chicago | 7.57 | 10.03 | 13.64 | 17.91 | 28.04 | 64.21 | 188.20 | 263.62 |
| Cincinnati | 7.18 | 10.77 | 15.02 | 20.24 | 31.78 | 58.31 | 164.75 | 226.05 |
| Cleveland[2] | 7.04 | 10.39 | 13.14 | 17.69 | 24.95 | 48.20 | 158.37 | 238.65 |
| Detroit | 7.74 | 6.84 | 11.61 | 16.82 | 26.54 | 47.27 | 157.48 | 255.44 |

TABLE 2. *(Continued)*

*Typical Monthly Bills for Residential and Commercial Service, Selected Cities, January 1968*

| | Residential | | | | Commercial | | | |
|---|---|---|---|---|---|---|---|---|
| | 250Kwh | 500Kwh | 750Kwh | 1,000Kwh | 6 Kw 750Kwh | 12 Kw 1,500Kwh | 30 Kw 6,000Kwh | 40 Kw 10,000Kwh |
| Houston | 6.93 | 10.63 | 13.07 | 15.52 | 21.54 | 38.42 | 126.21 | 171.31 |
| Kansas City | 7.89 | 10.85 | 15.45 | 20.05 | 30.73 | 61.85 | 185.81 | 276.03 |
| Los Angeles[1] | 5.63 | 7.88 | 10.72 | 13.85 | 18.71 | 33.43 | 104.28 | 158.58 |
| Milwaukee | 6.35 | 8.85 | 12.70 | 16.45 | 20.63 | 39.00 | 141.25 | 231.25 |
| Minneapolis | 7.11 | 10.15 | 13.96 | 17.76 | 27.41 | 47.71 | 161.89 | 243.09 |
| Newark | 7.34 | 10.28 | 14.68 | 19.52 | 31.59 | 59.89 | 191.63 | 277.43 |
| New Orleans[2] | 6.76 | 9.53 | 14.29 | 18.70 | 31.84 | 62.33 | 173.95 | 238.65 |
| New York | 10.02 | 15.77 | 21.53 | 27.28 | 31.81 | 63.71 | 226.49 | 332.81 |
| Philadelphia | 6.48 | 8.98 | 12.68 | 17.18 | 29.38 | 57.25 | 163.38 | 236.34 |
| Pittsburgh | 6.85 | 9.25 | 13.50 | 17.75 | 26.60 | 51.65 | 145.45 | 215.85 |
| St. Louis | 7.33 | 10.49 | 14.39 | 18.82 | 30.98 | 54.37 | 167.09 | 245.89 |
| San Francisco | 6.20 | 9.40 | 12.60 | 15.80 | 24.87 | 46.77 | 146.52 | 226.52 |
| Seattle[1] | 4.40 | 5.00 | 6.40 | 8.15 | 11.26 | 21.76 | 78.76 | 123.76 |
| Washington, D. C. | 6.36 | 8.85 | 12.88 | 17.38 | 20.74 | 40.09 | 143.04 | 214.99 |

[1] Served by a publicly owned utility.

[2] Data applies to company serving the majority of customers in city and to general service only.

*Source:* FPC — Typical Electric Bills, 1968, in New England Regional Commission, *A Study of the Electric Power Situation in New England, 1970-1990,* 1970, Tables 5-3 and 5-6.

TABLE 3.

*Typical Monthly Bills for Industrial Service, Selected Cities, January, 1968*

| | | Typical Monthly Bills | | | | | |
|---|---|---|---|---|---|---|---|
| | | 150 Kw | | 300 Kw | | 1,000 Kw | |
| | Type of Service | 30,000 Kwh | 60,000 Kwh | 60,000 Kwh | 120,000 Kwh | 200,000 Kwh | 400,000 Kwh |
| MAINE | | | | | | | |
| Bangor | MRL | $ 555 | $ 870 | $1,110 | $1,740 | $ — | $ — |
| | MRL | — | — | — | — | 3,560 | ,5360 |
| | MRL | 657 | 1,089 | 1,315 | 2,179 | — | — |
| Lewiston | MUL | 668 | 1,031 | 1,309 | 2,035 | 4,323 | 6,743 |
| | MRL | — | — | 1,289 | 1,809 | 3,350 | 4,733 |
| | MRL | 657 | 1,089 | 1,315 | 2,179 | — | — |
| Portland | MUL | 668 | 1,301 | 1,309 | 2,035 | 4,323 | 6,743 |
| | MRL | — | — | 1,289 | 1,809 | 3,350 | 4,733 |
| NEW HAMPSHIRE | | | | | | | |
| Concord | MRL | 559 | 835 | 1,098 | 1,648 | 3,605 | 5 ,441 |
| Manchester | MUL | 607 | 859 | 1,168 | 1,673 | 3,739 | 4,928 |
| Nashua | MUL | 607 | 859 | 1,168 | 1,672 | 3,739 | 4,928 |
| VERMONT | | | | | | | |
| Barre | MUL | 544 | 800 | 1,067 | 1,579 | 3,508 | 5,215 |
| Burlington | MUL | 544 | 800 | 1,067 | 1,579 | 3,508 | 5,215 |
| | MUL | 491 | 823 | 939 | 1,604 | 3,029 | 5,246 |
| Rutland | MUL | 604 | 806 | 1,208 | 1,613 | 4,025 | 5,375 |
| MASSACHUSETTS | | | | | | | |
| Boston | MRL | 801 | 1,154 | 1,454 | 2,160 | 4,156 | 5,812 |
| Cambridge | MUL | 657 | 966 | 1,258 | 1,857 | 4,056 | 6,054 |
| | MUL | — | — | 1,195 | 1,729 | 3,725 | 5,505 |
| Fall River | MUL | 625 | 929 | 1,204 | 1,812 | 3,578 | 5,411 |
| | MUL | — | — | — | — | 3,780 | 4,885 |
| Holyoke | MUL | 621 | 962 | 962 | 1,862 | 3,013 | 5,891 |
| Springfield | MUL | 590 | 835 | 1,141 | 1,631 | 3,709 | 5,344 |
| Worcester | MUL | 636 | 998 | 1,229 | 1,953 | 3,995 | 6,409 |
| | MUL | — | — | — | — | 3,985 | 6,351 |
| | MUL | — | — | — | — | 4,029 | 6,053 |
| RHODE ISLAND | | | | | | | |
| Pawtucket | MUL | 645 | 946 | 1,169 | 1,741 | 3,460 | 5,370 |
| Providence | MUL | 641 | 943 | 1,200 | 1,803 | 3,640 | 5,649 |
| CONNECTICUT | | | | | | | |
| Bridgeport | MUL | 585 | 879 | 1,080 | 1,668 | 3,390 | 5,070 |
| | MUL | — | — | — | — | — | 5,020 |
| Hartford | MRL | 723 | 933 | 1,299 | 1,719 | 3,936 | 5,336 |
| New Haven | MUL | 585 | 879 | 1,080 | 1,668 | 3,390 | 5,070 |
| | MUL | — | — | — | — | — | 5,020 |
| Waterbury | MUL | 664 | 975 | 1,258 | 1,765 | 3,706 | 5,395 |

TABLE 3. *(Continued)*

*Typical Monthly Bills for Industrial Service, Selected Cities, January, 1968*

| | | Typical Monthly Bills | | | | | |
|---|---|---|---|---|---|---|---|
| | | 150 Kw | | 300 Kw | | 1,000 Kw | |
| | Type of Service | 30,000 Kwh | 60,000 Kwh | 60,000 Kwh | 120,000 Kwh | 200,000 Kwh | 400,000 Kwh |
| OTHER CITIES | | | | | | | |
| Baltimore | MUL | 729 | 1,092 | 1,380 | 2,076 | 4,208 | 6,016 |
| | MUL | — | — | 1,174 | 1,774 | 3,757 | 5,467 |
| Buffalo | MUL | 461 | 604 | 795 | 1,081 | 2,396 | 3,351 |
| Chattanooga | MUL | 379 | 523 | 688 | 914 | 1,932 | 2,552 |
| Chicago | MUL | 738 | 1,039 | 1,282 | 1,832 | 3,425 | 4,921 |
| Cincinnati | MUL | 613 | 827 | 1,032 | 1,438 | 3,189 | 4,526 |
| Cleveland[1] | MUL | 714 | 1,108 | 1,320 | 1,967 | 3,665 | 5,434 |
| Detroit | MUL | 648 | 1,237 | 1,237 | — | — | — |
| | MUL | 890 | 1,184 | — | — | — | — |
| | MUL | 665 | 880 | 1,280 | 1,710 | 4,034 | 5,468 |
| Houston | MUL | 500 | 704 | 969 | 1,376 | — | — |
| | MUL | — | — | — | — | 2,809 | 4,023 |
| | MUL | — | — | — | — | 2,633 | 3,846 |
| | MUL | — | — | — | — | 2,574 | 3,788 |
| Kansas City | MUL | 784 | 1,108 | 1,481 | 2,084 | 4,505 | 6,461 |
| | MUL | 722 | 1,021 | 1,364 | 1,920 | 4,149 | 5,954 |
| | MUL | — | — | — | — | 3,867 | 5,682 |
| Los Angeles | MUL | 402 | 602 | 757 | 1,111 | 2,252 | 3,202 |
| | MUL | 374 | 556 | 729 | 1,030 | 2,180 | 3,130 |
| Milwaukee | MUL | 641 | 1,117 | 1,237 | 2,053 | 3,741 | 5,921 |
| | MUL | 701 | 1,060 | 1,273 | 1,939 | 3,694 | 5,278 |
| | MRL | 631 | 990 | 1,140 | 1,805 | 3,283 | 4,868 |
| Minneapolis | MUL | 681 | 1,014 | 1,143 | 1,730 | 3,185 | 4,998 |
| Newark | MUL | 669 | 1,004 | 1,232 | 1,903 | — | — |
| | MUL | 683 | 1,008 | — | — | — | — |
| | MUL | 624 | 902 | — | — | — | — |
| | MUL | — | — | 1,137 | 1,713 | 3,335 | 5,119 |
| | MUL | — | — | 1,042 | 1,551 | 3,065 | 4,714 |
| New Orleans[1] | MUL | 535 | 736 | 923 | 1,300 | 2,734 | 3,990 |
| | MUL | 513 | 713 | 878 | 1,255 | 2,584 | 3,840 |
| New York | MUL | 1,029 | 1,456 | 1,917 | 2,706 | 5,721 | 7,914 |

TABLE 3. *(Continued)*

*Typical Monthly Bills for Industrial Service, Selected Cities, January, 1968*

| | | Typical Monthly Bills | | | | | |
|---|---|---|---|---|---|---|---|
| | | 150 Kw | | 300 Kw | | 1,000 Kw | |
| | Type of Service | 30,000 Kwh | 60,000 Kwh | 60,000 Kwh | 120,000 Kwh | 200,000 Kwh | 400,000 Kwh |
| Philadelphia | MUL | 626 | 842 | 1,198 | 1,628 | 3,763 | 5,198 |
| | MUL | 535 | 721 | 1,016 | 1,386 | 3,099 | 4,335 |
| Pittsburgh | MUL | 601 | 823 | — | — | — | — |
| | MUL | — | — | 1,091 | 1,535 | 3,071 | 4,548 |
| St. Louis | MUL | 590 | 847 | 1,154 | 1,668 | 3,661 | 5,373 |
| | MUL | 570 | 820 | 1,098 | 1,596 | 3,456 | 5,118 |
| San Francisco | MRL | 573 | 863 | — | — | — | — |
| | MUL | 516 | 780 | 947 | 1,433 | 2,827 | 4,339 |
| Seattle | MRL | 305 | 437 | — | — | — | — |
| | MRL | — | — | 540 | 780 | 1,660 | 2,460 |
| Washington, D.C. | MUL | 595 | 883 | 1,119 | 1,666 | 3,421 | 5,052 |
| | MUL | 525 | 761 | 971 | 1,444 | 3,055 | 4,611 |

1 Amounts shown apply to company serving the majority of customers in the city.

MRL — Denotes unrestricted motive power and restricted lighting.

MUL — Denotes unrestricted lighting in addition to unrestricted motive power.

*Source:* FPC — Typical Electric Bills, 1968 in New England Regional Commission, *A Study of the Electric Power Situation in New England, 1970-1990*, 1970, Table 5-9.

The residents of Boston, for example, are second only to New York City in paying the highest rates for electricity. In the important 250 Kwh-per month range the average bill as of January 1, 1968 was $9.50 in Boston as compared with $10.02 in New York; $7.57 in Chicago; and $6.20 in San Francisco. The prices in the higher use categories remain proportionally consistent with those in the 250 Kwh-per month range.

*Commercial Rates.* A comparison of electric rates applicable to commercial customers reveals a differential existing between New England and the rest of the country which is somewhat greater than the differential in rates for residential service. Table 2 shows that highest rates for commercial service are paid with few exceptions in the states of New Hampshire, Massachusetts and Connecticut, with the highest rate in all categories of power used being found in Boston.

*Industrial Rates.* Again, the electric rates for industrial customers are somewhat higher in New England than elsewhere in the country although the differential is somewhat less than in the case of residential and commercial service. Table 3 contains specific information on bills in various cities of New England and throughout the country. As with commercial service, where the utility has several rate schedules generally applicable for these demands and consumption bills are shown for each service. Special features in the rate schedules, competitive situations and other qualifications are indicated by footnotes.

*Future Requirements*

Assuming that economic conditions remain relatively stable and the present upward population trend continues, the power requirements of the New England area are expected to increase 4.4 times in the next 20 years, from 11,900 megawatts in 1970, to 25,100 in 1980, with 1990 estimates reaching 52,800 megawatts.[1] This conclusion was reached after a review of peak power demand projections, economic analysis studies of the New England area and studies by the New England area and studies by the New England Regional Commission on the historic growth of power requirements in the area. Also taken into consideration by the commission were new innovations in the power market such as residential and commercial space heaters.

With the rising cost and diminishing supply of fuel and since nearly all of the conventional hydro-electric power potential has been realized,[2] additional nuclear power plants will have to be constructed in order to meet the increased power requirements. The nuclear facilities which are projected for the New England area will be able to generate high load electricity at lower costs. However, many problems have to be overcome before large scale nuclear generation can become a reality. Aside from the high construction costs and technical obstacles to be surmounted, one of the most relevant questions being asked concerns the effect of nuclear generating facilities on the surrounding environment.

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[1] New England Regional Commission, *A Study of the Electric Power Situation in New England, 1970-1990,* 1970, p. 95.

[2] Excluding the Dickey-Lincoln School Project in Maine which is, as of this date, still undeveloped.

There has emerged within the past five years a growing concern on the part of the public over the possibility of preventing environmental degradation. Much time, effort and money have been spent on improving air and water standards and terms such as ecology and pollution have taken on new meanings. Because of the scope and nature of the electric power industry, attention has centered on their operations and laws and regulations have been passed to influence their future plans. For example, M.G.L. c. 21, s. 43 requires that a permit from the state water pollution control agency be obtained before any matter may be discharged into the waters of the Commonwealth.

The power industry is faced with the problem of developing an adequate reliable power system which is to be able to meet all demands of the future while at the same time preventing environmental degradation. The first important consideration is centered around the site where the nuclear plant is to be constructed. Essential to nuclear operation is a large water supply which will be used to dissipate the heat which has not been converted into mechanical energy. The effects of the thermal discharge on the recovery body of water must be realized. A second consideration involves the availability and suitability of the land required for the nuclear generating facility. Problems of zoning on both the state and local level are likely to be encountered and opposition from adjoining landowners and environmental groups must be dealt with. Also, the costs and feasibility of generating and transmitting power from a given site and geological and meteorological conditions must be taken into account.

Since a large water supply is essential for the nuclear operations, the availability of adequate sites in Massachusetts is limited. The most likely sites are to be found on the coast from Cape Ann to Cape Cod. This area is commonly used as a residential area although some parts have been developed into recreational areas. Extreme care must be taken when choosing plant sites not to disrupt the environmental and esthetic qualities of the area. With careful site selection and special attention focused on the esthetic aspects of the plant design a compatible solution could be reached.

## CHAPTER V. CREATION OF A STATE POWER AUTHORITY

*Impact on Department of Public Utilities*

The Massachusetts Department of Public Utilities evolved from the Board of Railroad Commissioners which was created in 1869 (c. 408). The Board at this time had the power to investigate and recommend procedures and practices. In 1885, more extensive powers were delegated with the establishment of the Board of Gas Commissioners, to whose jurisdiction electricity and water companies were subsequently added. To replace the Board of Railroad Commissioners, the Public Service Commission was created in 1913 with broad powers over common carriers, and the statute establishing that Commission is the origin of much of the statutory language pertaining to the Department (Acts of 1913, c. 787). In order to comply with a constitutional provision limiting independent administrative units to certain departments, the Department of Public Utilities was constituted in 1919 to replace the Board of Gas and Electric Light Commissioners and the Public Service Commission.

The Department of Public Utilities currently has supervisory authority over gas and electric companies within the state (G.L. c. 164, s. 76). This authority extends to both public and privately owned companies and includes the supervision of all transactions and dealings, either direct or indirect, involving the operations of the company in setting price or quality standards and in selling or purchasing gas or electricity from other affiliated companies (G.L. c. 164, s. 76A).

The Department of Public Utilities is also authorized to act as the bargaining agency on behalf of the Commonwealth for the procurement of power from the Power Authority of the State of New York and to contract on behalf of the Commonwealth for the resale of the electricity to both public and private utility companies within the state (Acts of 1955, c. 604). The Department has not yet exercised this authority.

The Department of Public Utilities does not have authority over the construction of generating facilities or power plant siting. Rather, this authority is left to the cities and towns through land use controls and zoning ordinances and to state conservation agen-

cies through their controls over particular environmental areas.

Massachusetts law does allow a utility to appeal to the DPU from the operation of a zoning ordinance or by-law. After a public hearing, the Department, upon finding that the utility's proposal is necessary for the convenience or welfare of the public, may issue an order setting aside the operation of the zoning ordinance and permit the construction (G.L. c. 40A, s. 10). If a state power authority were to be created it could assume the role of the Department of Public Utilities in exempting the public service corporations from the zoning ordinances.

The procedure which is currently followed in regard to power plant siting in the Commonwealth is that a technical advisory commission is set up consisting of representatives of the power company, representatives from the appropriate department of the Executive Office of Environmental Affairs, and officials of the Department of Public Health. This commission then makes recommendations which may or may not be followed. The Department of Public Utilities is primarily interested in the regulation of securities and rates and becomes involved in the commission when questions on these matters arise. There is some indication, however, that the Department of Public Utilities will participate in the special commission established by Chapter 78 of the Resolves of 1971 designed to study the feasibility of establishing a comprehensive state regulatory body having jurisdiction over electric generating plants and transmission facilities.

On the other hand, the Department has jurisdiction over the location and design of transmission lines. Departmental approval in respect to such matters is usually reflected in two types of orders issued by the Department: one is a finding of necessity and convenience for a line along a certain location and the second is an authorization for a utility company to acquire land needed by eminent domain. The controlling statute provides for notification to the communities affected by such proposals, plus notice of, and a hearing in one or more of the affected towns (G.L. c. 164, s. 72).

If the eminent domain authority is granted for a particular purpose it is subject to two limitations: (1) land dedicated to another public use may not be taken without the consent of the authority or company having jurisdiction over it; and (2) the utility must

acquire from the local government all necessary rights in the public ways or public places in the towns, parks or reservations through which the line passes.

Local governments have primary authority in respect to permits for crossing streets with lines, with the DPU acting as an appeal agency. The board of aldermen or selectmen or other such authority as may have jurisdiction may grant permission on such terms as will not "incommode the public use of public ways or endanger or interrupt use of public ways or endanger or interrupt navigation." A refusal to grant the petition of a utility for a street crossing may be appealed after three months to the Department of Public Utilities. This appeal cannot be taken unless the applicant utility has been granted street crossing permits in either a majority of the communities through which the line will pass or in two adjoining towns on the proposed route. Thus, when a solid bloc of towns along a proposed transmission line route is opposed to overhead construction of the line, and no two adjoining towns can be persuaded to permit the overhead line, the Department of Public Utilities is barred from hearing the appeal and overruling the localities. While an appeal may be taken to the district court, the Supreme Judicial Court has ruled that a town may refuse to permit overhead street crossings on aesthetic grounds.[1]

*Power Authority*

There has been a considerable amount of discussion in Massachusetts and in other states concerning the establishment of a State Power Authority. The term state power authority could be applied to a myriad of different agencies depending upon the type of supervision, regulation or operation to be undertaken. The common factor in each type of power authority, however, is governmental regulation of some aspect of the industry.

Proponents of a State Power Authority for Massachusetts argue that there exists a need for a single agency which would be responsible for conducting an independent evaluation of projections of power demands and to determine the impact of these projections on the state's economy. The Authority could also transmit recom-

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[1] *Boston Edison Co. v. Selectmen of Concord,* 355 Mass. 79, 242 NE 2d 868 (1968).

mendations for state policy and action related to energy growth policies. An additional argument in favor of creating a State Power Authority centers on the conception that there should be a single agency which would be responsible for statewide power plant siting with due respect to ecological considerations.

Another type of power authority being considered would have as its main function the responsibility to act as the negotiating agent for power companies, both public and private, in the Commonwealth in obtaining power from other companies within the state, from other states, and from Canada.[1]

Opponents to the creation of a State Power Authority cite the growing trend toward regionalization in the power industry and emphasize that no longer can power resources be planned on a state-by-state basis. Reasons given for their position include the fact that the New England area is relatively isolated, being bounded by New York State on the west and Canada on the north.

Moreover, advocates of a regional power agency which would be responsible for the future construction, generation and transmission of electric power contend that maximum efficiency would result and duplication of plants and lines would cease. This agency, in their view, may act as the sole negotiating agent with Canada and other states and could keep pace with the rising demand for more electricity — a feature which could be difficult for the many different companies now in existence.

A third school of thought stresses that the demand for more power can be met by encouragement of free enterprise. Supporters in favor of letting the power companies chart their own course in regard to future development cite the establishment of NEPOOL and other power pools as proof that future demands are being considered and that future affiiliations will help to keep the costs of power down as demands rise.

Parties are generally in agreement, however, that the present plant siting regulations could be improved in all states and that uniform standards should be set wherever possible.

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[1] The Department of Public Utilities has the authority to procure power from the Power Authority of the State of New York (Acts of 1955, c. 604).

*Power Authority of the State of New York*

Discussion of the Power Authority of the State of New York is deemed relevant in this chapter because of that state's proximity to and a climate similar to that of Massachusetts, and because of the Authority's successful operations in generating and transmitting electric power. Many of the aspects of the Power Authority of the State of New York will not be applicable to Massachusetts, however, because of a difference in natural resources and topographical features.

*General Provisions.* The Power Authority of the State of New York is both a corporate and politic body, constituting a public corporation and a political sub-division of the State of New York. The New York Power Authority Act was originally enacted as Chapter 772, Laws of New York, 1931 at the urging of Governor Franklin D. Roosevelt.

The declaration of policy found in the legislation states that the need for obtaining and maintaining a continuous and adequate supply of dependable electric power and energy is a matter of public concern to be controlled by the people of the state. It is within this function which the Power Authority operates. The Power Authority is vested with the authority to (a) develop and improve the Niagara River and portions of the St. Lawrence River; (b) to construct such hydro-electric pumped storage projects as are deemed necessary or desirable to supplement the supply of energy and power; (c) to supply sufficient supplemental energy to make possible optimum use of the generating capacity of the Authority's projects; (d) to supply low cost power and energy to high load factor manufacturers which will build new facilities in the Authority's area of service or expand existing facilities, and (e) to supply the future needs of the Authority's existing municipal electric and rural electric cooperative customers. The Authority consists of five trustees appointed by the Governor with the advice and consent of the Senate to serve staggered terms of five years each.

The Authority is directed to cooperate with the appropriate agencies and officials of the United States Government in improving commerce and navigation on the rivers within its jurisdiction and to negotiate with the appropriate Canadian authorities and agen-

cies. Additional directives instruct the Authority to study the desirability and means of attracting industry to the State of New York.

The Power Authority may issue negotiable general obligation notes for any corporate purpose and may authorize the issuance of negotiable general obligation and revenue bonds for the purpose of financing any authorized projects.

The rates, services and practices relating to the generation, transmission, distribution and sale by the Authority of power generated from the projects are not subject to the provisions of the public service law nor to regulation by the Department of Public Service.

The Authority is primarily a wholesale power supplier, and sells its power to three utility companies for resale to rural, domestic and industrial consumers, to 41 municipal and cooperatively owned electric systems in New York State, to a military installation, to the State of Vermont, and to a group of rural cooperatives in the State of Pennsylvania.[1]

*St. Lawrence Project.* The Authority's operations are reflected in two hydro-electric plants, one on the St. Lawrence and the other located on the Niagara River.

The St. Lawrence Project begins about 67 miles downstream from Lake Ontario in the International Rapids section of the St. Lawrence River and continues for about 40 miles further downstream. It consists of two major dams, the Iroquois Dam and the Long Sault Dam, the Barnhart Island power plant, power generating and transforming facilities, extensive channel works, and dikes and wing dams. All power is generated at the Barnhart Island power plant, the United States half of which is designated as the Robert Moses Power Dam and is located approximately 300 miles north of New York City and 240 miles northeast of Buffalo.

The power plant contains thirty-two 57 kw generators, for a rated capacity of 1,824,000 kw, half of which is installed on the United States side of the border. Power is sold in three categories: (1) firm, capacity and energy marketed at a load factor averaging

[1] Power Authority of the State of New York, *Annual Report, 1970*, New York, N. Y., 1971, p. 1.

85%; (2) interruptible capacity and energy, available for substantive periods of time at 100% load factor but subject to interruption; and (3) secondary energy, available intermittently during times of very high stream flow. At present, 800,000 kw of the St. Lawrence Project are considered firm.

The construction and operation of the St. Lawrence Project was authorized by a 50 year license issued to the Authority by the Federal Power Commission, effective November 1, 1953. It was financed by the sale of a $335,000,000 original issue by the Authority in 1955. Commercial production of power started in July, 1958. As of December 31, 1970, approximately 72 billion kilowatt-hours from the St. Lawrence Project had been sold. Average annual production approximates 6.5 billion killowatt-hours of energy.

*Niagara Project.* The Niagara Project is a hydro-electric power project constructed by the Authority at Niagara Falls, New York. The project consists of a water intake, waterways, a pump generating plant with storage reservoir, a conventional generating plant, and power transformation and transmission facilities.

The natural flow of water from four of the Great Lakes into Lake Ontario by way of the Niagara River makes possible this major hydro-electric development. Water is diverted from the river through an intake above Niagara Falls, flowing through covered conduits to the forebay of the pump-generating plant and then to the Robert Moses Niagara Power Plant below the Falls. The Moses power plant houses thirteen kw generators totalling 1,950,000 kw; the pump generating plant houses twelve 20,000 kw units totalling 240,000 kw. The entire plant capacity is 2,190,000 kw but the plants have been found capable of producing 2,400,000 kw of firm and peaking capacity.

In 1958 the Federal Power Commission issued to the Authority a license for a period of 50 years, effective as of September 1, 1957, for the construction, operation and maintenance of the project, the power marketing objectives as set forth in the state and federal statutes to govern the two projects. The Authority's enabling legislation gives it full authority to establish and modify its rates as necessary for the financial requirements of the project. The Niagara project was financed by a bond issue of $737,000,000.

The Power Authority also maintains transmission lines which were financed by original bonds in the aggregate principal amount of $30,050,000.

In accordance with 1968 legislation, the Authority is building a 1,000,000 kw Blenheim-Gilboa Pumped Storage Power Project in Schoharie County, the Fitzpatrick Nuclear Power Plant of 800,000 kw capacity in the town of Scriba, and the necessary transmission lines.

The Authority's rates for firm and peaking power have been consistently below the cost of power from alternative sources, and its rates for interruptible energy have also been advantageous. The Authority's concern in marketing its power has consequently been to allocate the available supply among competing applicants in such a manner as best to accomplish the power marketing objectives as set forth in the state and federal statutes governing the two projects.

*Other Power Authorities*

Power authorities exist in a less than handful of other states but they are limited to the performance of specific functions instead of being responsible for the total generation, transmission and distribution of electric energy. For example, the Arizona Power Authority does not own power production equipment or transmission or distribution properties other than certain metering equipment. The power used is purchased from the United States Board of Reclamation and from other generating agencies and is delivered to customers over transmission facilities owned by the Bureau of Reclamation. These types of power authorities are not discussed at length because of the differences in the type and nature of power suppliers between the other states and Massachusetts.