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THE CONCENTRATION OF WATER POWERS

Control of water powers furnishes the basis for leadership in the productive world. Concentration of ownership and control of water powers is progressing at an alarming rate. Water-power interests are effecting consolidations of gigantic proportions. Mr. Pinchot recently showed that during the decade preceding 1913 the ten leading water-power combinations in the United states doubled their control of water-power sites.[1] In 1909 the Bureau of Corporations reported that thirteen groups of interests controlled one-third of the commercial water power of the United States.[2] In 1912 the Bureau reported that only ten groups controlled three-fifths of it.[3] It was stated in the House of Representatives that from 1911 to 1913 the ten largest groups increased their holdings of developed power 48 per cent and of undeveloped power 141 per cent.[4]

The continually increasing proportion of undeveloped to developed powers owned and controlled by a small number of operators indicates that concentration is rapidly being made effective. Strenuous efforts are being expended to employ the most extraordinary methods to secure control of sites. Representatives were engaged by a large power company in Colorado to locate the best power sites in order that it might get control of them. Its activities were extended, not only to acquire new sites, but also to take over those rights which others found it necessary to relinquish. This was illustrated in the cases of the Glenwood and Kremling sites. A Denver promoter was known as a professional filer for water rights. By filing in the names of his friends he secured many rights

[1] *New York Times*, November 30, 1913, V, 13.

[2] Theodore Roosevelt, special message, January 15, 1909, 60th Cong., 2d sess., House Document 1350.

[3] Commissioner of Corporations, *Report on Water-Power Development in the United States*, March 14, 1912, p. 181.

[4] Lenroot, M. C., *House Record*, July 18, 1914, p. 13446. Developed power increased from 1,821,000 horsepower to 2,711,000 horsepower. Undeveloped power increased from 1,450,000 horsepower to 3,500,000 horsepower.

which were used for the benefits of a large power company. It was said that the Moffat railroad obtained a right of way along the bed of Gore Cañon, not for the purpose of constructing a roadbed but rather to gain control of a natural water reservoir. Of about one hundred dams authorized by Congress since 1879 almost one-half are now controlled by large water-power interests.[1] In some cases control was secured within a few months after the dams were authorized.

Concentration is being effected, not only by means of the acquisition of undeveloped sites, but also by means of the consolidation of companies. Some corporations are assuming very large proportions by absorbing smaller interests. The Ozark Power and Water Company was incorporated in January, 1911, with a capital stock of $5,000. Six months later the capital stock was increased to $875,000, and in March, 1912, it was again increased to $2,000,000. That corporation then became engaged in absorbing all the other power companies in that territory.[2] In July, 1904, the capital stock of the South Pittsburgh Water Company was $50,000. One month later it had developed into a $5,000,000 corporation, and a few months afterward it became a subsidiary of the American Water Powers and Guaranty Company.[3] In May, 1904, the capital stock of the Green Tree Water Company was $5,000. Three months later it was $8,000,000, and a few months afterward the company was made a subsidiary of the American Water Powers and Guaranty Company.[4]

Already the extent of concentration is great. Some companies have consolidated in compact territories. The Montana Power Company, which was incorporated in 1912, owns in fee the properties formerly operated by the Butte Electric and Power Company, Madison River and Power Company, Billings and East Montana Power Company, and Missouri River Electric and Power Com-

[1] Harry Slattery, Secretary National Conservation Commission, *House Record*, 62d Cong., 2d sess., p. 11374.

[2] Rainey, M. C., *House Record*, 62d Cong., 2d sess., p. 11370.

[3] Harry Slattery, Secretary National Conservation Commission, *House Record*, 62d Cong., 2d sess., p. 11374.

[4] *Ibid.*

pany.[1] It owns the entire capital stock of the Great Falls Water Power and Townsite Company and the Great Falls Power Company.[2] It has in operation and under construction 221,000 horsepower, and owns 127,000 undeveloped horsepower.[3] The Montana Power Company and the Amalgamated Power Company, which is affiliated with it, control 94.4 per cent of the water powers of Montana.[4] The balance sheet of the Montana Power Company for December 31, 1914, showed total assets amounting to $84,554,609.[5]

The Utah Securities Corporation has also consolidated in a compact territory. It owns all the outstanding capital stock of the Utah Power and Light Company which controls by stock ownership the Colorado Power Company and the Utah Light and Traction Company.[6] It has developed and under construction 153,000 horsepower.[7] It controls 48.3 per cent of the developed water power in Idaho, 82.2 per cent of the developed water power in Utah, and, together with two other companies, 68.0 per cent of the developed water power in Colorado.[8] On March 31, 1915, its assets were $72,175,994.[9]

Some groups have extended their operations over widely scattered territories. The General Electric group operates in about eighteen states as widely separated as New Hampshire and Washington in the north and Florida and California in the south.

The principal subsidiary companies are active in determining the policies of the General Electric group. The United Electric Securities Company and the Electrical Securities Corporation purchase the bonds of electric lighting, power, and railway plants

[1] Irving Whitehouse Company, Bond Sale Prospectus, Spokane, Wash.

[2] Moody's *Manual*, 1915, p. 410.

[3] *Ibid.*, p. 412.

[4] Letter from Secretary of Agriculture, in *Electric Power Development in the United States*, January 20, 1916, Part I, p. 57.

[5] Moody's *Manual*, 1915, p. 415.

[6] *Ibid.*, p. 1703.

[7] *Ibid.*, p. 1707.

[8] Letter from Secretary of Agriculture, in *Electric Power Development in the United States*, January 20, 1916, Part I, pp. 55, 56, 58.

[9] Moody's *Manual*, 1915, p. 1709.

and issue in return their own collateral trust bonds. The Electric Bond and Share Company purchases securities of power companies, investigates projects, and manages operations. It is clearly evident that at least twenty-nine power companies feel the effects of General Electric influence by corporate ownership of securities, representation on boards of directors, or individual connections of officers.[1]

Of the 4,870,320 horsepower of primary water power in the United States in 1912, 1,447,296 horsepower or 29.7 per cent was subject to General Electric domination.[2]

The General Electric group is associated with many banking institutions which have been directly responsible for the large proportions which it assumes. Its officers and directors hold official positions in some of the largest financial institutions in the United States. The total assets of only four of the most active companies of the group on March 31, 1914, were $172,307,575.[3]

The Stone & Webster group also operates in widely scattered territories. Thirteen states are involved in its activities.[4] These are widely separated and include Rhode Island, Florida, Nevada, and Washington.

Four principal subsidiaries extend the activities of this group. The Stone & Webster Engineering Corporation locates power sites and constructs power plants. The Stone & Webster Management Association manages and operates public-service corporations. The Public Service Investment Company and the Railway and Light Securities Company deal in the securities of public-service corporations. Directly and indirectly this group manages not less than 40 corporations which use power.[5] It operates 62 stations.[6] In 1912 it controlled at least 1,353,886 water horsepower or 27.8 per cent of the primary water power in the United States.[7]

[1] Letter from Secretary of Agriculture, in *Electric Power Development in the United States*, January 20, 1916, Part I, p. 61.

[2] *Ibid.*, pp. 12, 61, and Part II, p. 79.

[3] Moody's *Manual*, 1915, pp. 2579, 2580, 2581, 3466.

[4] Letter from Secretary of Agriculture, in *Electric Power Development in the United States*, January 20, 1916, Part I, p. 59.

[5] *Ibid.*, Part II, pp. 284–485.

[6] *Ibid.*, p. 79.

[7] *Ibid.*, Part I, pp. 12, 61.

The real influences resulting from such concentration are strikingly significant. Concentrated activity has developed organizations possessing dominating characteristics. Those organizations have placed themselves in such positions as largely to determine the costs of the things used as necessities by the people of the nation. Ability to determine power costs makes possible to a large extent ability to determine the costs of articles for which power is used. Ability to determine the costs of manufactured articles largely permits the regulation of the conditions of manufacturing those articles. Since power is such an essential requisite for industry, power combinations have a certain grip on the productive processes of industry which enables them to direct the policies of industrial organizations and to dominate the various kinds of industrial activity.

Combinations have placed themselves in positions to influence, not only the production, but also the distribution of products of industry. Ability to regulate the supply of electric energy furnishes opportunities to control the costs of railway transportation and to influence freight rates. With the increasing cost of coal as its supply decreases and with the increasing transportation demands of the country as business expands, electrified railroads are likely to gain operating advantages over steam roads. So far as they determine rates of freight, water-power combinations can dictate what commodities shall be transported, where they shall be carried, and by whom they shall be hauled. Transportation facilities and rates of freight vitally affect the industrial complexion of the nation.

The positions of power combinations are strong, not only because they can directly influence industrial production and distribution costs, but also because they are able to dominate industrial activity by means of their large financial resources. Intercorporate relations, interlocking directorates, and close connections with banking institutions have given water-power operators a financial strength which enables them to influence the value of securities, extension of credits, and rates of interest. Such a condition permits a comparatively small number of men to dictate what new agricultural and timber lands shall be made available

for use, what irrigation and navigation projects shall be developed, and where industrial expansions shall be made. It permits them to suggest what interests shall receive the benefits resulting from those various kinds of activity. It permits a few men in one section of the country to determine policies which seriously affect other sections of the country. It affords an opportunity for a few men with large financial resources to exert a tremendous influence on the agencies which affect the progress and prosperity of the nation.

These conditions present a paramount issue. They suggest an inquiry as to how far concentration ought to be allowed to continue. Has there already been too much consolidation or would a still larger degree of it promote public interests? This is a question of the first magnitude and can best be answered by learning what motives prompt concentration and how much the public is benefited and injured by it.

The leading motive which prompts concentration of ownership is the desire to secure monopolistic advantages in order to gain control of all business by effectively destroying competition. The possibility exists for the establishment of a most dangerous water-power monopoly. Probably no other monopoly can become more centralized than a water-power monopoly. Such a monopoly may not seem powerful at present, but future danger is possible. The consumption of power is at present small compared to what it is likely to be in the near future when power will be used for the many new purposes to which it can be applied. Its use is entering more and more largely into every activity of life. The stationary power installed in the United States for manufacturing and mining and at central stations has been increasing at an amazing rate since 1870. The opportunity is presented for the establishment of a dangerous monopoly when a few men control the available supply of power for which there is an almost unlimited demand.

Monopoly can be secured by gaining control of water-power sites and power markets. The ownership of water-power sites forms the basis for monopoly. It affords opportunities for monopolistic advantages because natural resources limit the number of water-power sites. When an industry is based upon raw materials,

which are natural resources and limited in quantity, it is likely to lead to monopoly. When the quantities of raw materials are not limited competitors are likely to appear. When a combination acquires power sites it eliminates the possibility of others placing those powers on the market. The International Paper Company, for example, stated in its trust prospectus that competition could hardly prove successful if attempted because its valuable water power could not be easily duplicated or acquired.[1]

Monopoly strength is largely influenced by the location and character of the water-power sites. Some sites are so strategically located as to afford a decided advantage over other sites. This is true when they afford opportunities for an exceptionally cheap development, low production costs, and convenient distributing facilities. The advantage may be so great that competition by the use of less favorably located sites will be eliminated because the developments of those powers would require larger investments. The Pacific Gas and Electric Company is strong largely because its developments occupy the most advantageous positions.

When a combination is not able to eliminate competition by gaining control of power sites it may be able to secure monopolistic advantages by gaining direct control of the power market. The markets which are most largely attracting attention of power companies are those afforded by public-service corporations. Their demands largely determine the power market. The power company which supplies those demands has an assured market. Control of markets makes possible the exclusion of competitors.

Control of water-power sites and power markets can best be secured by concentration because harmonious action among operators is essential to united control. This is now being demonstrated by the activities of combinations which reveal the methods that they employ in forming their associations. In a locality where there are three water-power companies, two of them often combine against the third. In another locality where only two small competing companies operate, one of them sometimes joins with a larger power company operating in other territories in order to secure the larger influence against the competitor. This larger

[1] *Commercial and Financial Chronicle*, LXVII, 177.

company may at the same time be actively engaged in purchasing many smaller companies operating in neighboring territories. The larger companies may then combine to suppress competition. The combinations ultimately effected usually become active in absorbing many other large and small companies.

Not only does the motive to gain monopoly power prompt concentration, but the desire to expand business activities also leads to it. The natural desire to take advantage of business opportunities, which will make possible business expansion, is very noticeable among water-power operators. They desire to make new water-power developments rather than to pay cash dividends. Having realized the attractiveness of that kind of investments, they have withdrawn their capital from less profitable investments to be employed in hydroelectric operations. Satisfactory returns are an incentive to expand business in order to increase the volume of earnings. This is especially true of the business of generating power because it is one of increasing returns.

Water-power operators are also acquiring holdings in order to secure the benefits resulting from future values. Present acquisition for future use has been encouraged because large unearned increments are likely to accrue. Water powers with large future values have been easily and cheaply secured. Water-power operators recently have been able to secure undeveloped sites for much less than their real value. Many sites are so valuable that they were eagerly sought by water-power interests. The men who are in the best position to judge water-power values realize that in a very few years the prices demanded for power sites will be much higher than they are today.

In spite of the evil motives which may prompt concentration and the disadvantages which may result from combination, many benefits result from concentrated activity. Combinations are able to give the best service to industrial enterprises by making power available for them. Much power should be made available.

A large amount of power is wasted at the present time. In 1912, only 4,870,320 horsepower or 17 per cent of the minimum potential water power was used. There remained undeveloped 23,072,680 horsepower, while there was developed 25,577,926

steam horsepower.[1] Use of the unemployed water power would save 373,085,235 tons of coal per year.

Not only is this present waste improper, but the future disadvantage is even more serious. According to the Geological Survey our coal supply will last only 125 years. As the supply of coal diminishes its cost increases because the commercial deposits, which are most easily accessible, are mined first.

Such a waste of water power should not be permitted to continue. It is needless. It is not in harmony with any reasonable policy of conservation. A resource which is not diminished by use should be made productive. Water powers now going to waste can be used to alleviate unsatisfactory economic conditions in many communities. They can be made to serve mankind by enabling industry to increase the volume and lower the costs of products which provide food, raiment, and shelter. This would enable the people of the nation not only to secure more easily the necessities of life but also to enjoy some of the luxuries that tend to elevate the people to higher standards of efficiency and usefulness.

There are great possibilities for the use of water power because it affords a source of cheap power. The vast amount of water power available for development makes possible the generation of electric energy at a low cost.

It is difficult to estimate the exact advantage of water power over steam power because many determining factors must be considered. The advantage would vary with each particular water power. Where coal is cheap the advantage of water power is less than where the price of coal is high. When power can be used twenty-four hours a day the advantage of water power is greater than when power can be used only part of a day. The cost of developing and distributing electric energy varies widely on account of the physical characteristics of sites and the location of markets.

Generally, however, water power does have an advantage over steam power. For conditions as they exist in New England, with an assumed cost of development of $90 per kilowatt for steam power and $150 per kilowatt for water power, it was found that the advan-

[1] Letter from Secretary of Agriculture, in *Electric Power Development in the United States*, January 20, 1916, Part I, p. 12.

tage of water power over steam power ranges from $20.74 to $60.16 per horsepower per year, depending upon the size and efficiency of the plant and the load factor.[1] The New York State Water Supply Commission estimated that the average advantage of water power over steam power, for conditions as they existed in the state of New York in 1908, was at least $12 per horsepower per year.[2] The Water Supply Commission of Pennsylvania found that the production cost of power in large plants was about 0.3 cent per kilowatt hour in hyrdoelectric plants and from one-half to one cent per kilowatt hour in steam plants.[3] In one case where the advantage tended to be low because a steam auxiliary plant was required the Railroad Commission of Wisconsin estimated the advantage of water power over steam power at $6.32½ per horsepower per year.[4] In another case the Railroad Commission of Wisconsin assumed that power generated by water would cost three-fourths of a cent per kilowatt hour less than power generated by steam.[5] In the west where the price of coal is high water power is normally cheaper than steam power.[6]

The generation of cheaper power by water would greatly encourage the use of power by new industries. With the advance in the use of mechanical processes power is more and more coming to be an important item in manufacturing costs. Industrial progress will be determined largely by the amount of available cheap power.

A large amount of cheap power will directly stimulate industry. It will supply those existing demands which are not satisfied either because power is not available or because its price is too high. There is a large demand for cheap power in the metal industries. A most important factor influencing this has been the rapid development of electro-chemistry in recent years. The many new dis-

[1] Henry I. Harriman, president of the Connecticut River Power Company, in *General Electric Review*, May, 1915, pp. 362–63.

[2] New York State Water Supply Commission, *Report*, 1908.

[3] Investigation in accordance with the Inventory of Water Resources act, approved July 25, 1913, P.L. 1233.

[4] Decision *In re Kaukauna Light and Power Company*, rendered December 26, 1911.

[5] *Pullman* v. *Wausau Street Railway Company*, decided April 1, 1910.

[6] Gano Dunn, "The Water Power Situation, Including Its Financial Aspects," *Proceedings of the American Institute of Electrical Engineers*, May, 1916, p. 589.

coveries in that field of chemistry have created a demand for an enormous amount of cheap power for industrial purposes. Nearly one-half of the power at Niagara is used by the electrochemical industries.

Cheap power will help the aluminum industry. Before that industry can assume its largest proportions it must be able to produce aluminum so cheaply that it can be sold at a price sufficiently low to increase largely the demand for its use. By chemical methods aluminum can be manufactured for not less than $1 per pound, but by electrochemical methods it is produced for less than 25 cents per pound.

Cheap power will help the mining industry. How low the ore can test and still afford an opportunity for profitable mining depends upon the cost at which the metal can be secured. There are large piles of waste ores at many mines which contain such a small amount of valuable metal that they cannot be profitably utilized. The recovery of a large percentage of these metals is prevented by prohibitory power costs. In Montana, as water powers have been developed, ores of a lower grade have been made available.[1]

Much cheap power is required to make electric steel which possesses a very high quality and is extensively used for the best kinds of modern construction. It is made in an electric furnace. The most advanced type of furnace ranks among the first of recent industrial achievements. It is a most potent means of securing extraordinary industrial progress.

There is a large demand for cheap power for the fertilizer industry in the United States. That industry is bound to grow to large proportions. It ought even now to be more largely established. Many agricultural districts are wonderfully potential, but fertilizer is required to make them highly productive. The demand for fertilizer is growing. Already it is large. During the fiscal year ending June 30, 1915, the United States imported 577,122 tons of Chilean saltpeter with a value of $16,355,701. With the use of much power nitric acid and nitrates, which compete with Chilean saltpeter, can be made from atmospheric nitrogen. In order to

[1] John D. Ryan, president of the Great Falls Power Company, 62d Cong., 2d sess., Senate Document 274.

manufacture fertilizer at such a low cost as to make its use practicable a large amount of cheap power is necessary.

The manufacture of nitric acid is highly important, not only for fertilizer in time of peace, but also for explosives in time of war. Congress has recently appropriated $20,000,000 to provide for government manufacture of nitrates and other products for munitions of war.

If the United States does not produce large amounts of cheap power these industries will be established in foreign countries in which much cheap power is available. Already they are being established in those countries. Electric furnaces have been established in Norway and Sweden. Canada is active in securing the establishment of such industries. So far as securing raw materials is concerned, those industries would prefer to be located in the United States. So far as marketing their products is concerned, they would prefer to be located here. The high power cost in the United States caused the failure of an attempt to establish an industry for the manufacture of fertilizer by the use of atmospheric nitrogen. Norway's cheap power, which is being offered at from $4 to $6 per horsepower per year, has made that industry a financial success there.[1] Even in very recent years the United States has actually driven that industry from the United States to Canada where cheap power is available. The United States has none of those plants, but fourteen are located in other countries and over $30,000,000 is invested in them. It is reported that American capital is planning to invest about $75,000,000 in Canada for the manufacture of nitric acid and fertilizer.[2] Capitalists from the United States have recently built a fertilizer plant in Canada for making phosphoric acid from phosphate rock. They will secure the phosphate rock from the United States and will largely market their product in the United States.

The establishment of new industries will create much taxable property. This will be a great benefit to the localities in which they are established. Taxes secured from new and prosperous industries will reduce the taxes of other interests in the community

[1] E. R. Taylor, 62d Cong., 2d sess., Senate Document 274, p. 25.

[2] Hugh L. Cooper, *Outlook*, February 9, 1916, CXII, 340–45.

or will create an additional income for more extended improvements. High taxes tend to retard development and progress. In the recent public hearings on water power Governor Spry of Utah said that the increasing expenses of the government made it necessary for the state to increase its earning power by investing in its resources. A large capitalist interested in water-power development in Montana stated that from the standpoint of a water-power operator it would be a benefit to him if no more power were developed in Montana, but that, as a citizen in the state, having many other large interests, he preferred to have more power developments in order to increase the value of his other interests.[1]

There is a great possibility for the use of power in the electrification of railroads. The improved service and lower operating expenses resulting from electrification are causing railroads to want much power. The Chicago, Milwaukee & St. Paul Railway will pay about $550,000 a year for power for 450 miles of its road. The cost of coal for operating steam trains over the same line is approximately $1,750,000.[2] The Butte, Anaconda & Pacific Railway, which has 90 miles of electrified track, has reduced its operating delays 75 per cent, increased its ton miles hauled 8.77 per cent, and decreased its annual operating expenses $268,728.12 or 36 per cent.[3] The New York, New Haven & Hartford road now runs electric trains between New York and New Haven and is electrifying other parts of its system. The Pennsylvania road is engaged in electrification west of Phildadelphia. The Denver & Rio Grande has made preparations for electrification. The Great Northern and Southern Pacific roads have investigated the feasibility of electric motive power for parts of their systems.

The reduced operating expenses resulting from electrification will tend to cause a reduction in freight rates which will greatly influence the industrial development of certain sections of the country. The high freight rates in the western states tend to

[1] John D. Ryan, 62d Cong., 2d sess., Senate Document 274, p. 145.

[2] Testimony of John D. Ryan, director of the Chicago, Milwaukee & St. Paul Railway, before the Senate Public Lands Committee, 1914.

[3] Henry J. Pierce, interview in *Spokesman-Review*, Spokane, November 7, 1915; authenticity verified by H. A. Gallwey, general manager of Butte, Anaconda & Pacific Railway Company.

retard the industrial advance of the West. The vitality of most cities is directly influenced by their freight rates.

The ability to reduce freight rates will better enable the railroads to compete with water transportation through the Panama Canal. The railroads will strengthen their position by their ability to reduce transcontinental freight rates. A low cost of rail transportation from inland to coast territory is also very important. Some inland manufacturers in the western states require a lower rail rate to the Pacific Coast in order to compete with manufacturers in eastern states shipping by way of the Panama Canal. Unless lower rates are secured the volume of business of certain railroad companies and of some inland manufacturers will be reduced.

It is frequently stated that there is no need for more power developments in the West because some western operators have developments which are much larger than their markets require and that markets rather than developments are needed. But should additional developments be discouraged if those developments will produce the fertilizer that we must now import? Probably no water-power operator in the United States is prepared to provide power for fertilizer works. Power developments should be encouraged if they will produce those things for which the United States is now dependent upon other nations.

There is a need for additional power developments so long as American capitalists are going to foreign countries to develop power for the manufacture of products to be shipped back to the United States. The benefits resulting from such new developments should be secured for the United States. The overdevelopment of certain water powers should not be permitted to check hydroelectric operations in the United States.

Overdevelopment is often beneficial. It is a stimulus to industrial progress. It encourages the locating and financing of new markets. A large amount of available power directly encourages the establishment of new industries. Large territories should not be deprived of power developments merely because there are overdevelopments in certain localities.

Concentration makes possible the best service for the public generally. A very large amount of power must be made available

to supply all needs. A combination can operate a plant large enough to satisfy as many demands for service as may be made. It is able to serve not only the largest and most convenient markets but also those markets which it is more difficult to supply because they are inconveniently located and require expensive extensions to distributing systems. It can satisfy the applicants in small towns and rural districts. It can satisfy the demands of growing communities. It can provide for an adequate future supply of power.

Not only is concentrated effort able to provide as much electric energy as is needed, but it is also able to provide a regular and dependable service. A combination is able to offer a more uniform supply because it is able to combine the use of a number of streams whose high-water periods occur at different times of the year; it is better able financially to build storage reservoirs by means of which a regular supply is assured; and it is able to use the advantages of an interconnection of distributing lines. These facts have been recognized by public-service commissions which consider the public-service business in any locality as one which can best be managed by a single large concern.

A large and dependable supply of power can best be made available by a combination because a combination can best provide the large amounts of capital required for hydroelectric operations. Dam construction costs are high and electric equipment is expensive. The expenditure required is often so large that a single capitalist is unable to develop a power site.

A combination of capitalists can better afford to develop a water power when the profits resulting from it are likely to be small. It can borrow money at a lower rate of interest than can the man with a small amount of capital.

When an opportunity is presented for making a very profitable investment a combination may be willing to undertake the development of a power site, even though the returns on the investment will be long delayed. It can afford to wait for returns during a long period required for construction and for developing a market. The man with a limited amount of capital cannot make such a development because he must have an immediate return from his

investment. Some sites will not be made available for use unless they are developed by combinations.

Concentrated effort can make possible not only the best but also the cheapest service because a combination engages in large-scale operation. Its production costs are lowest. Large-scale production naturally tends to such a complete development of a power as to result in the lowest possible production costs. Under small-scale production often only a portion of the possible power is developed. It is an advantage to have developed such a large proportion of the water power as will produce the largest net returns. The business of generating power is one of increasing returns. The larger the production the lower will be the cost per unit of output. As the amount produced increases the production costs become proportionally less because the cost of development per unit decreases as the number of units developed increases. Some of the fixed charges and fixed expenses remain constant, even though the size of the development increases. This is true even to a larger degree in hydroelectric operations than in most other operations because the cost of the initial development does not vary greatly, whether the amount of power developed is large or small. The dam required for developing only part of a power is likely to cost nearly as much as one required to develop it completely.

The maximum efficiency resulting from large-scale production also tends to reduce production costs. Large-scale production affords better opportunities for specialization in the scientific running of plants. It presents more opportunities for applying efficiency methods. It eliminates the waste incidental to small competitive businesses, such as unnecessary duplications in operatives and power-generating equipment.

Lower operation costs are obtained not only in production but also in distribution. Power demand varies during different times of the day. The maximum consumption in one community frequently occurs at a different time from the maximum consumption in another community. The total demand for several communities, all of which can be supplied by a single combination, is more uniform than the separate demands. A water-power development must have a capacity sufficiently large to supply the maximum

demand. To maintain such a development when the demand for a large part of the day is below the maximum is to conduct wasteful operations which involve higher costs. It is important that the margin between the maximum and average demands be small because the maximum demand largely determines the fixed charges and fixed expenses. As the difference between the average and maximum demands increases the costs of operation increase.

Another reason why a combination can distribute more cheaply is that it avoids the duplication of distributing lines which are necessarily maintained by small competitive concerns. Public-service commissions now generally recognize the fact that the duplication of electric distributing systems in a town is an economic waste. With its distributing systems connecting several developments a combination is able to supply a customer from the nearest or otherwise most advantageous source of supply. In territories occupied by several small operators a consumer frequently receives electric current from a distant development, even though one may be located near him. In Spokane two power companies distribute very largely in the same territory. One of them recently informed the public that it would be necessary to reduce the cost of the service or reduce the service. This is a striking example of how a great saving in distributing costs could be effected by combination. The distribution of a large amount of electric energy over a large territory is made possible as a result of recent discoveries for the transmission of electric energy. It is now possible to transmit it two hundred miles without much waste.

Combinations have already demonstrated their ability to furnish cheap power. A large western manufacturing concern which owns an undeveloped power site has not developed it but is purchasing electric current from a combination which sells it at a price that is less than would be the interest on an investment required to develop the site. Combinations are supplying small cities in California with power that is cheaper than that obtained by many eastern cities which have local power stations. The city of Spokane which is now purchasing power from a combination appropriated $5,000 to investigate the feasibility of developing a

power site for its requirements of electric energy. The special investigating committee made an unfavorable report.

The present tendency of electric power and light prices is downward. In some instances the well-equipped combination is making a constant effort to cheapen the source of its supply and to reduce its distributing expenses so as to reduce its price and broaden its market. A large western operator stated that he desired to double the amount of power generated even though he realized that he would be forced to sell power cheaper.[1] A combination is able to realize a larger return by supplying a large market at a low price rather than by supplying a small market at a high price.

The present rapid concentration of water-power ownership and control, which has already resulted in the formation of large combinations, emphasizes the growing danger of a strong monopoly. While concentration of ownership and control of water powers is prompted by the desire for private capital to secure private gain, yet many advantages result from unified activity which makes it possible for concentrated effort to provide large enough amounts of power to supply adequately all demands, to furnish such good service as will satisfy consumers, and to furnish it so cheaply that many can afford to use it.

Such a condition strikingly suggests the need for a wise water-power policy which will protect the public against the menace of monopoly but which will not destroy the advantages resulting from concentration. Oppressive monopolies should be prevented. The public can be protected against present monopolistic activity in public utilities by regulating the conditions of service and the prices paid for it. It can prevent the growth of monopoly strength in the future by properly using the resources which it still controls.

Regulated concentration need not be discouraged so long as it is best able to make possible a beneficial use of water powers. Efforts should be expended to encourage such use of wasting water powers as will make them highly productive for the public good. Interests that attempt to develop water powers should be given an incentive to invest capital and should be assured that they will not be deprived of a reasonable interest return on their investment.

[1] John D. Ryan, 62d Cong., 2d sess., Senate Document 274, p. 141.

Just as there is a danger in too little regulation, so there is a danger in too much regulation. The former does not protect public interests. The latter checks industrial progress. The adoption of a repressive policy and the imposition of prohibitory conditions on water-power operators will prove to be an impediment to business. This nation cannot afford to adopt a policy that will injure economic vitality.

Water-power activity has been temporarily checked on account of unsettled national policies and lack of definite action by Congress on water-power legislation. Definite legislation is needed so that immediate action can be taken to formulate corrective water-power policies.

Just as that industry which enjoys the cheapest power is leader in its field, so, other things being equal, that nation will be leader in the manufacturing world which has available the largest amount of power at the cheapest price. When the United States properly uses its vast water-power resources its industrial progress will be assured and the nation will be a leader in the manufacturing world.

HARLEY W. NEHF

SPOKANE, WASHINGTON