



**of the Administrator of
the Bonneville Power
Administration**

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the Interior for the Fiscal
Year ended June 30, 1944

Bonneville Power Administration

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I. WAR AND PEACE

FEDERAL development of the tremendous water resources of the Columbia River was conceived by the Seventy-fifth Congress as a peacetime project for conservation and utilization of Pacific Northwest resources. During wartime, this program has been modified to meet the requirements of the Nation's first and biggest job—that of mobilizing its resources to win the war.

Under the impact of war the Bonneville Power Administration has telescoped 10 years of normal growth into a brief 5 years. It has delivered 6,472,326,000 kilowatt-hours for war needs during the fiscal year 1944, and has become one of the three largest power systems in the country, with a present energy output of approximately 10 billion kilowatt-hours per year. It has constructed a high-voltage, high-capacity transmission system which has grown from nothing in 1939 to 2,518 circuit miles as of June 30, 1944, involving an investment of about \$75,000,000. This system is marketing power from Bonneville-Grand Coulee generators which have increased in rated capacity from less than 100,000 kilowatts in 1939 to 1,316,400 kilowatts in 1944.

This forced growth has been possible largely because of the Administration's policy of developing Northwest power resources well in advance of immediate demands or specific markets. The value of this policy has been demonstrated time and again during the war emergency as mushrooming industries have steadily increased their production of critically needed war materials with Bonneville-Grand Coulee power.

During the fiscal year 1944, 5 Northwest aluminum reduction plants used Columbia River power in the production of nearly 600 million

pounds of aluminum, or approximately one-third of the Nation's entire output. Part of this aluminum ingot took final form in approximately 30,000 airplanes—again almost one-third of the entire national production for the year. Bonneville-Grand Coulee power was instrumental in turning out 258 ships, including 48 escort carriers, 62 tankers and fleet oilers, 32 Victory cargo ships, and 116 Liberty cargo ships. Less spectacular, but equally important, was the output of magnesium for planes and incendiary bombs, calcium carbide for ship welding, and ferrosilicon for steel—all from plants using Columbia River power. Thus, the Bonneville Power Administration has made a significant contribution to the Nation's ability to produce, a factor which has been vital to the work of winning the war.

Hydroelectric power from the Columbia River has established its right to be termed one of the Nation's most powerful tools of war production. It will play an equally vital role in the post-war development of the Pacific Northwest as a tool for the production of national and regional wealth. The power that today is flowing from Bonneville and Grand Coulee power plants over a vast region-wide network of high-tension transmission lines to huge war plants, will turn the wheels of the region's expanding industrial empire when the war is won.

With Allied victories on every battlefield during the past year casting a growing shadow of complete and devastating defeat over Axis hopes of world domination, attention began inevitably to shift from war to post-war problems, even while the Nation still was engaged in full war production. In the Pacific Northwest post-war thinking and planning has been dominated by a growing realization of one fundamental fact—the vast hydroelectric power resources of the Columbia River Basin hold the key to the future development of the region.

THE CONSERVATION PROGRAM

Multiple-purpose dams on inland waterways of the Nation are a most important means of carrying out the Federal Government program of conservation of natural resources. Bonneville Dam provides the means for impounding and controlling the waters of the Columbia River so that the river can be navigable for oceangoing vessels 180 miles inland, thus reducing transportation costs, prices for many products, and opening new markets for products of the Pacific Northwest. Behind Grand Coulee Dam is stored water for the reclamation and irrigation of 1 million acres of arid but fertile lands. Electric power produced at these Columbia River power plants further utilizes the inexhaustible water resources of the region by converting them into an energy form useful to the people for the production of more goods and

services to improve living standards, and to conserve other sources of energy, such as coal, wood and oil, which are subject to depletion and which should be conserved as much as possible for higher economic uses.

In carrying out these peacetime conservation policies, electric power produced at Bonneville and Grand Coulee Dams must first be used to meet the requirements of navigation, flood control, and irrigation. The remaining surplus power is marketed by the Bonneville Power Administration according to the basic policies laid down by Congress in the Bonneville Project Act of 1937.

REGIONAL LEADERSHIP

Since the enactment of these policies, the Bonneville Power Administration has worked toward and attained a position of recognized leadership in the development of the Pacific Northwest. The Administration in its 7 years of growth has fostered and encouraged Federal and State cooperation in the programming of regional developmental activities.

One of the most significant steps in this direction in the fiscal year 1944 was the formation on July 19, 1943, of the Northwest States Development Association, which is composed of the Governors of Idaho, Montana, Oregon, Washington, and Wyoming, and is aided by a technical committee of people responsible for the engineering and general planning functions in these States. The purpose of the Association is to further the balanced development of the Pacific Northwest and the Columbia Basin, with special emphasis on maximum utilization of the water resources of the region through irrigation, improved navigation, hydroelectric power development and flood control.

In its initial meeting the Association resolved that " * * * it shall be a further duty and responsibility of the Association to avail itself of the services and facilities of governmental, private and public agencies to the end that duplication of effort and consequent wasteful expense shall be avoided in the making of studies, the programming of activities and the carrying on of research."

Emphasizing the importance of the Pacific Northwest as a nerve center of industrial and commercial contact with the tremendous potential markets of the Far East, the association's initial report on a Columbia Basin program states: "It is believed that the rapid advance in Northwest development and production must continue. This advancement must be supported by a progressive and dynamic regional and national post-war reconstruction program. Post-war progress on the Pacific coast and in the basin will be especially great if the national reconstruction program is accompanied by world cooperation and trade. Confidence in the Northwest and its future are based on its geographic location, its great resources, and its people.

"The basic development projects of the Pacific Northwest—begun before the war—have paid tremendous dividends in the war effort. They will continue to pay dividends after the war. The present stage of development is not sufficient to meet either war or post-war needs; continuing and progressive development is necessary."

THE REGIONAL PLAN

Following general endorsement by the Department of the Interior of the Bonneville Power Administration's proposals for a basin-wide program, representatives of the Administration met with the Five State Governors' Association and presented its program for consideration. This program included the Hungry Horse project in Montana, the Cabinet Gorge and Albeni Falls projects in northern Idaho, the Foster Creek and Snake River projects in Washington, the Umatilla Dam on the Columbia River and the Detroit project in Oregon.

On December 17, 1943, the Association issued its advance program report, which included all of the projects recommended for consideration by the Bonneville Power Administration, as well as a number of additional projects involving irrigation, navigation, and flood-control improvements. The program involves a total expenditure of approximately \$600,000,000 in war emergency and post-war projects.

Gearing its own plans to the multiple-purpose projects outlined in the Five-State Governors' report, the Bonneville Power Administration set up an advance construction program involving approximately \$100,000,000 in new transmission lines and substations designed to coordinate existing and proposed dams and load centers in a region-wide transmission grid system.

In round figures the combined programs outlined by the Northwest States Development Association and the Bonneville Power Administration will add about 1 million acres to the 3½ million acres of land now under irrigation in the region, and will provide improved water supplies for several hundred thousand more. It will increase regional power capacity by about 2 million kilowatts—adding about 60 per cent to the total regional capacity through new plants and upstream storage. The combined effects of the program will be broader and more diverse development; the establishment of new industries; new opportunities for employment—for business—for private and public enterprise and for investment.

In addition to increasing materially the real wealth of the region and the Nation, the program will have the effect of bringing about a greater maturity in the Northwest regional economy, particularly through a more advanced development and use of resources, as well as supplying a base for substantially larger population. It follows that public investment will induce at least as much more wealth—in

land, improvements, plant and communities—a prospective increase of some \$1,500,000,000.

PUBLIC WORKS AND REEMPLOYMENT

The immediate post-war program of asset-building, self-liquidating public works will produce some 50,000 construction jobs for returning servicemen and demobilized war workers. In operation the program will produce more than 100,000 continuing new jobs in agriculture, industry, and service, with an accompanying increase of some \$200,000,000 in annual income for the region. A program of the kind suggested will conceivably provide, if continued during the next 2 decades, a base for new regional population of at least 2 million. This will mean, averaging 4 persons to the farm home, 200,000 people on 50,000 new farms; 800,000 people dependent upon 250,000 new industrial jobs, and approximately 1,000,000 people dependent upon 350,000 new service jobs.

Testimony presented by the Bonneville Administrator before the Senate Committee on Postwar Economic Policy and Planning and before the House Committee on Irrigation and Reclamation during the past fiscal year outlined clearly the Administration's fundamental status as a regional developmental agency. Both reports stressed the importance of a balanced and unified program of development in the Columbia River drainage basin as one of the major factors in providing for maximum postwar employment in the Pacific Northwest.

In accordance with the Presidential Executive Order 9384 of October 4, 1943, and to facilitate and coordinate Bonneville Power Administration consideration of a unified advance program, a special committee on advanced planning, programming, and budgeting was formed within the Administration on November 20, 1943. The functions assigned to the committee were the coordination of the Administration's programs and plans with various governmental and regional interests, effectuating necessary technical staff assignments, review and coordination of data and reports prepared by the staff in accordance with such assignments, and presentation of unified recommendations to the executive committee of the Bonneville Power Administration for consideration and review.

The advisory committee was directed to place particular emphasis upon the formulation of unified basin-wide power system development plans for both the wartime and the post-war period. The committee was also directed to give particular attention to the coordination of the administration's advance plans and programs with those of other agencies of the Department, as well as other Federal, State, and local governmental agencies and interests.

During the fiscal year 1944, the committee has successfully brought together those concerned in various advance programming efforts in

the joint consideration of system extension projects; a long-range system development program and a 3-year and a 6-year advance construction program. The committee has also made preliminary studies for the potential use of surplus war materials, equipment and plant by Bonneville Power Administration, public power distributors and industries in the region.

PACIFIC NORTHWEST OPPORTUNITIES

Closely related to the committee's work and a significant contribution to advance regional planning was the publication by the Bonneville Power Administration of the Pacific Northwest Opportunities report. The report, although of a preliminary nature, presented comprehensive flow charts and detailed information on a wide variety of industrial and agricultural possibilities in the Pacific Northwest, together with pertinent comment on raw materials, power supply, and geographical particulars.

Publication of the report met with immediate and widespread acclaim. Nation-wide press comment, as well as complimentary letters from leaders of industry and business, educators and other professional people, members of Federal, State, and local governmental agencies, indicated that the report was not only filling an urgent need for information of this type on the Pacific Northwest but was serving as a definite stimulus to interest in the potentialities of the region.

Pointing out the purpose of the report as well as the purpose of the Bonneville Power Administration program, the preface of the report says: "The underlying aim for the whole region and for all the agencies that serve it is to create a stronger and better balanced economy by raising it further from its status of a mere colonial producer of raw materials. The wastefulness of unused rich resources must be changed to wealth, productively used. The wantonly expensive system of shipping raw materials 3,000 miles east and resulting finished products 3,000 miles back to the west must be eliminated. A more reasonable economy will, it is hoped, result from this study, from similar studies by others and by construction programs."

Referring to the place of power in the program, the preface states: "Hydroelectric power is an outstanding resource in the Pacific Northwest. It is a product of the river-development project. It is the means of enlarging the benefits of all the other phases of the project. It is, besides, the principal key to the development and use of other regional resources. Power irrigation and drainage pumping facilitates reclamation. Power widens the usefulness of both farmer and crops to an indefinite horizon. Power draws minerals from the earth; becomes an essential ingredient in electro-manufacturing and cuts down the cost of other manufacturing. Power supplies terminal, storage, and distributing service in commerce. Power fosters the growth of

many diverse industries and, available everywhere, distributes them throughout the region. Power raises the level of living in city and country. Power is the invisible magic that flows in abundance from river development and leads to regional development."

Further presenting the value of the relationship of various programs and the need for cooperation, the preface says: "Both power development and regional development, so closely related, are matters of deep concern to a number of Federal agencies, States, communities, and private enterprise. All plans must be formulated on a joint or cooperative basis if they are to be comprehensive and realistic. This presentation of a Bonneville Power Administration program could hardly be complete or clear without some indications of other closely related programs for regional development. Similarly, the programs of other agencies cannot be complete or clear without recognition of the related power program of Bonneville.

All the basic plans must be brought together and properly correlated and the interest and enthusiasm of all agencies must be assured for a really effective program for regional development.

The report offers a constructive contribution to regional planning and development programs for future transition from the current war period to peace.

Several sections are devoted to the industrial opportunities offered in the fields of railroad electrification, farm utilization of power, electric steam generation, and electric house heating. In addition to the manufacturing and distribution possibilities offered, each of the foregoing represents a considerable power load building potential.

ADVANCE MARKETING STUDIES

Continuing studies are being carried on to elaborate the material contained in the report. As an example, tests and investigations of electrically heated houses were participated in throughout the year by the administration's utilization staff. Activities were centered at Longview, Wash., where a substantial number of privately-owned homes have been successfully heated by electricity for the past 3 years. During the calendar year 1943 an average of 11,000 kilowatt-hours of energy costing \$73 per home was consumed for heating service in the Longview homes. Information gathered at Longview and submitted to the U. S. Army Engineers was the basis for selection of electric heat for another project of 1,800 houses in this region. The reduction of war loads will stimulate activity by power distributors to expand the domestic market, and facts indicate that electric house heating will triple annual domestic energy consumption. It is estimated that 25,000 houses should be electrically heated in this region within 10 years, representing a heating load of approximately 125,000 kilowatts and marketing 275 million kilowatt-hours annually. Negotiations

have been carried on during the year with the War Production Board to release the materials for electric heaters to be used in new permanent-type houses in the Northwest.

FUEL CONSERVATION

The possibilities discussed in the report for the use of hydroelectricity in the generation of steam as a fuel-oil replacement have passed the study phase and are approaching commercial reality. The markets opening for the sale of power for this use have been vastly accelerated by the requirements for fuel oil in the prosecution of the war.

A major user of fuel oil for steam generation for some time has been the pulp and paper industry, although other and smaller industries are now consuming increasing quantities due to the depletion of other forms of fuels. The estimated amount of heavy fuel oil consumed in Washington and Oregon alone during fiscal 1944 was 13 million barrels. Of this, some 440,000 barrels were consumed in power generation by electric utilities, leaving a balance of approximately 12,790,000 barrels consumed by industry. In heating value 440,000 barrels is the equivalent of 15,400,000 kilowatt-hours. War's demands, higher production cost, and the expanding use of oil as a raw material for manufacture are all factors tending to bring steam generation by means of electric boilers into close competition with other forms of heat production. This is especially true when consideration is given to the substantial amounts of secondary power available which can be sold at a lower cost than is provided by the Bonneville firm power wholesale rate of \$17.50 per kilowatt-year. Based on recent inquiries of the pulp and paper industry and data collected from field investigations, it has been estimated that if all present oil consumption by this industry for the generation of processed steam were replaced by electric power, a market of 450,000 kilowatts of secondary power would be created.

As the foregoing examples indicate, it becomes obvious that wider use of hydroelectricity for domestic and industrial heating purposes as well as for such power consuming purposes as railroad electrification will induce substantial savings in exhaustible wood, coal, and oil supplies, for which science is constantly finding new and higher uses.

CUT-BACKS AND CONVERSION

Late in December 1943 the Administration began to be confronted with threatened cut-backs in production of the northwest war industries it was serving, particularly in the case of aluminum plants. These cut-backs emphasized the need for immediate provision for additional advance marketing studies, in order to be better prepared for remarketing power released by war industries when curtailments occur. The Administration's 1945 budget had been prepared on the assumption that the war would require full war production throughout the fiscal

year 1945. However, some curtailments in production began in December 1943 and as yet no action had been taken on the advance planning budget, which provided for marketing studies to meet situations of this nature. It was concluded, after consultation with representatives of the Department and endorsement by the Bonneville Advisory Board at a meeting held on March 9, 1944, to present an immediate request to the Bureau of the Budget and the Congress for a supplemental appropriation for this purpose to be added to the administration's 1945 fiscal year budget.

The Bureau of the Budget and the President recommended a supplemental appropriation for this purpose of \$254,000. While this recommendation did not reach the House in time for action on the measure, the House committee had indicated general sympathy to the proposal and after hearings the Senate committee and the Senate approved addition of this amount to the 1945 budget. However, in conference the amount was compromised and the sum of \$127,000 was finally approved for this purpose.

In addition to endorsing the supplemental appropriation for advance marketing studies, the Bonneville Advisory Board at its meeting of March 9 recommended reinstatement of priorities for Grand Coulee Unit No. 7 and endorsed the general program for upstream storage development as worked out with the States of Idaho and Montana. Proceedings of this meeting reiterated in large part the findings of the Advisory Board at its earlier meeting held October 11 and 12, 1943.

REGIONAL ADVISORY COUNCIL

Another major development of the year was a decision to proceed with appointment of a group of regional consultants with whom the Administrator could confer regarding regional policy and the developmental program. Arrangements were finally completed for designation of the regional consultants with the endorsement of the Secretary of the Interior and the Advisory Board. The first meeting of the group, comprising 20 regional consultants from the 4 States of Oregon, Washington, Idaho, and Montana, was held in Portland on March 31, 1944.

A general program report was presented by the Bonneville staff outlining the objectives of the Administration and the plans suggested for developmental activity. The remainder of the meeting was devoted to review and critical study of the Pacific Northwest Opportunities report.

A second meeting of the group was held on June 5 and 6, at which time such specific phases of the program as industrial load building and electric house heating were discussed. It was determined that extension of the consultant's deliberations might be carried on by

smaller groups in the localities represented and their findings made subjects for discussion at periodic meetings of the major regional group.

II. SHIFT FROM CONSTRUCTION TO OPERATIONS PROGRAM

The fiscal year 1944 marked a turning point in the history of the Bonneville Power Administration. After 7 years of intensive construction activity the Administration had completed a basic transmission grid system comprising more than 2,500 miles of high-voltage lines. During the year the Bonneville powerhouse was brought to completion by the United States Army Engineers with the addition of generators 9 and 10, and the sixth, seventh, and eighth generators were installed by the Bureau of Reclamation in the west powerhouse at Grand Coulee Dam.

With completion of these major generating and transmission facilities, and with further construction, excepting certain emergency projects, curtailed by the war, there has been a sharp swing toward the operating, research and marketing phases of the Administration's activities. Rapid expansion of facilities to meet the needs of war industries, the steady and accelerating demand of the armed services upon personnel, and other exigencies of the emergency made it necessary to maintain great flexibility within the Administration. Rapid adaptability to quickly changing conditions became a real necessity. Toward this end a general realignment of the Bonneville organization was effected by Administrative Order No. 59, dated November 4, 1943.

ADMINISTRATION REALIGNMENT

The order gave organizational emphasis to the power system operations by establishing a Division of Operations and Maintenance, which formerly was one of five sections in the Engineering Division, and by combining the remaining four sections of the former Engineering Division into a Division of Engineering and Construction. Both new divisions are now included in the Branch of Engineering and Operations, under the supervision of the chief engineer. The net result is a strong, efficient engineering organization, streamlined and well adapted to the major tasks of operations, maintenance and construction which lie ahead.

Similarly, the former Market Development section, which was one of five sections in the System Planning and Marketing Division, was advanced in status to the Division of Industrial and Resources Development. Other functions of the former marketing division were combined in the Division of Power Sales and Service. The two new divisions, which are figuring importantly in preparations for post-war activities, are included in the Branch of Power Management.

A new Branch of Fiscal and Administrative Management was established under the supervision of a controller to embrace a Division of Finance and Accounts, including all budgetary, financial, and accounting functions, a Division of Administrative Services to embrace service functions, and an Organization and Procedure Staff to conduct management studies.

Finally, the executive committee, composed of the branch managers, general counsel, and administrative staff, was formally established to guide and coordinate matters of policy and programming, with responsibility for current administration being delegated largely to the branch and division chiefs.

The new plan of organization was resolved through analyses made by staff members of the administration in cooperation with members of the Department of the Interior, taking into consideration the three-fold nature of the Bonneville Power Administration as an operating utility, a government business organization and a regional service agency.

III. WARTIME OPERATIONS

During the fiscal year 1944, maximum hourly generation supplied by the Bonneville and Grand Coulee plants was 1,355,000 kilowatts as contrasted to 841,000 kilowatts during fiscal year 1943.

The comparison is indicative of the pressure of regional war needs on the administration's transmission system. As the war has progressed it has become necessary to operate all facilities at capacity, and in many instances with heavy overloads, to supply these needs. For example, the Grand Coulee generators have operated continuously for extended periods of time with approximately 20 percent overload and Bonneville generators with approximately 10 percent overload. During the greater part of the year both plants have operated without reserves.

The low water months of this year marked the first period when the entire flow of the Columbia River was utilized through the Bonneville generators. From September 14, 1943, until April 5, 1944, with minor exceptions of a few hours' duration, no water was spilled at Bonneville Dam. During this period, too, the natural flow at Bonneville was augmented, in amounts as high as 28,000 second-feet, by storage water released from Grand Coulee Reservoir. Although the scheduling of such releases was vastly complicated by conditions along the river which affected the arrival time and quantity delivered over wide limits, the operation was highly successful in increasing the generating capability of the Bonneville plant and relieving the necessity for transmitting large blocks of Grand Coulee power over lines that were already heavily loaded.

WARTIME POWER LOADS

Transmission facilities, also, have operated at capacity throughout the year, and in a number of instances, under conditions of extreme overload. A noteworthy example is the No. 1 Covington-Coulee 230,000-volt line which has carried, for weeks at a time, over 210,000 kilowatts of power, often reaching peaks of 230,000 kilowatts, an amount greatly in excess of its normal operating limit of 175,000 kilowatts. Transformer banks in many of the system's substations have been repeatedly loaded beyond rated capacity. This condition has required the installation of forced-air-cooling, portable fans and temporary or semipermanent water sprays in order to permit continuous overloads as high as 60 percent above normal ratings in some instances.

Transmission costs have been reduced during the year, in spite of the strains placed on personnel and equipment. Total transmission expense has increased only 12.8 percent over the fiscal year 1943, while the transmission expense per kilowatt-hour delivered has decreased 33.4 percent. Unit operating and maintenance costs have also shown a decrease.

By operating all facilities at maximum capacity during the past fiscal year, the Bonneville Power Administration has been able to meet not only all power demands of its own war customers but to supply other utility systems in the Northwest Power Pool with 1,810,602,507 kilowatt-hours for meeting requirements of their own systems. This was more than double the previous year's deliveries to other utility systems in the Northwest Power Pool.

THE NORTHWEST POWER POOL

But the Administration's contribution to the effectiveness and success of the Northwest Power Pool during fiscal year 1944 cannot be measured entirely in terms of kilowatt-hours delivered. The Administration's far-sighted policies of establishing interconnections with adjoining utilities and providing transmission and generating facilities in anticipation of war and peacetime needs have contributed immeasurably to the present strength and capability of the power pool. The western group of utilities, in particular, would have been hampered greatly in providing power to wartime loads had the Administration's policies not been followed. The policies were formulated in consultation with the War Production Board and voluntarily placed into effect in advance of Order No. L94 of the War Production Board which applied to all utilities of the United States. Even without curtailment of oil-fired generation, the individual capabilities of practically every utility would have been inadequate to serve its loads

without assistance, directly or indirectly, from the Bonneville-Grand Coulee system.

Three interconnections with other utilities were added during the fiscal year, two at 115 kilovolts with the Pacific Power & Light Co. at Vernita, and Pasco, Wash., and one at 13.2 kilovolts with the Northwestern Electric Co. at J. D. Ross substation. The first two, which stem from the acquisition of all Pacific Power & Light Co. property in the vicinity of Hanford, Wash., by the United States Army, replace the Hanford interconnection as a point of delivery to the company's main system. This interconnection continues in effect, however, as a point of delivery to the Washington Water Power Co.-Pacific Power & Light Co. combination via the 115-kilovolt lines acquired by the Army.

The third interconnection was made at the request of the Northwestern Electric Co. to supply additional hydro energy to that system for displacing fuel-generated energy in the Postland area. Preparations for a fourth interconnection with the Portland General Electric Co. at St. Johns substation at 11.5 kilovolts were also under way at the close of the year. Both of these installations are considered temporary, pending completion by the Portland General Electric Co. of another interconnection with the Administration's 115-kilovolt system near Harborton (West Portland), Oreg.

Approximately 50 percent of the electric energy consumed in the 5 northwest States during the past fiscal year was generated at the Bonneville and Grand Coulee power plants and distributed over the Federal transmission system. At the end of the year the peaking capacity of the Administration's system was approximately 50 percent of the combined 5-State hydro generating capacity, and 44 percent of the total generating capacity. The use of Columbia River energy for displacing oil-fired steam energy in the Seattle and Portland areas saved approximately 3,500,000 barrels of critical fuel oil during the year. Without these contributions by the Administration, the effectiveness of the power pool would have been seriously impaired.

Tabulations of energy receipts and deliveries which follow indicate the scope of the Administration's contribution to the effectiveness of the power pool's operation through the use of interconnections during this fiscal year. It should be noted in the tabulation, "Power Pool Operations," that the amount of energy delivered to the adjoining utilities for their own use is listed separately. The amounts scheduled in the column designated "Other" include energy transferred to the Bonneville Power Administration customers and energy losses in connection with such transfers.

Bonneville-Grand Coulee generation (kilowatt-hours)

	Fiscal year 1943	Fiscal year 1944
Bonneville plant.....	2,801,480,400	3,488,873,992
Grand Coulee plant.....	2,818,955,729	5,751,520,210
Total.....	5,618,436,129	9,240,394,202

Power pool operations—Scheduled interchange¹

Agency	Scheduled to BPA (kilo- watt-hours)	Scheduled from BPA (kilo- watt-hours)	
		For own use	Other
Puget Sound Power & Light Co.....	13,085,000	339,671,000	169,826,000
Tacoma City Light.....	122,672,000	222,018,000	129,006,000
Seattle City Light.....		220,382,000	
Washington-Pacific System.....		227,548,347	137,115,853
Portland G. E. Co.....	24,000	800,983,160	63,310,840
Total.....	135,781,000	1,810,602,507	499,258,693

¹ The other members of the Northwest Power Pool—Northwestern Electric Co. and power systems in Utah, Montana, and Idaho—are not directly interconnected with the Bonneville-Grand Coulee system.

IV. POWER SALES

The Bonneville Power Administration continued to supply power to a major share of the Pacific Northwest's war loads during the past fiscal year, approximately 89 percent of all power generated at Bonneville and Grand Coulee dams going either directly to the Administration's war customers, or to other utility systems in the region to help them meet their war loads.

By June 30, 1944, the Administration had in effect 91 executed power and exchange contracts, with a total over-all contract demand of 1,054,612 kilowatts. This represented an increase of 143,860 kilowatts during the fiscal year. On a contract basis, these demands were divided as follows:

Industrial sales of 894,600 kilowatts; military establishments 23,250 kilowatts; cooperatives 9,170 kilowatts; public or peoples' utility districts 48,200 kilowatts; municipalities, 5,725 kilowatts; and privately owned utility companies 73,667 kilowatts. In addition two municipalities and two private utilities are being served under exchange contracts.

THE PUBLIC POWER MARKET

Three new public-owned power agencies signed contracts during the year, and six new contracts were executed with existing public-agency customers of the Bonneville Power Administration. This brought the total of "public agency" contracts in force at the end of the fiscal year to 54 with a total contract demand of 63,095 kilowatts as compared with a total of 59,685 a year ago. While this increase in contract demand is comparatively small, a better indication of

public-agency growth is gained by a comparison of power consumption figures for the two years. Continuing the upward trend of previous years, the sale of power to publicly owned and operated power distribution agencies, excluding Tacoma and Seattle, by the Bonneville Power Administration increased 60.2 percent, rising from a total of 176,723,021 kilowatt-hours in fiscal 1943 to 283,081,561 kilowatt hours in fiscal 1944.

Public utility districts led the field in increased power use with total 1944 purchases from the Bonneville Administration of 214,923,990 kilowatt-hours at a cost of \$607,350, as compared with 1943 figures of 123,518,776 kilowatt-hours at a cost of \$364,546. Sales to co-operatives rose from 27,467,193 kilowatt-hours to 37,671,071, while revenues increased from \$122,839 in fiscal 1943 to \$162,756. Sales to municipalities, exclusive of Tacoma and Seattle, climbed from 25,737,052 in 1943 to 30,486,500 in 1944, and revenue received increased from \$99,212 to \$113,256.

The cumulative list of public agency contracts follows:

Contracts with public agencies as of June 30, 1944

Name of purchaser	Contract demand in kilowatts	Date of execution
I. Public or peoples' utility districts:		
Central Lincoln 1	(*)	Feb. 25, 1942
Clark County, Wash. No. 1	10,250	Aug. 1, 1942
Clatskanie 3	800	Mar. 4, 1942
Columbia River 4	(*)	Dec. 18, 1942
Cowlitz County, Wash. No. 1	5,000	May 16, 1944
Grant County, Wash. No. 2 4	370	June 12, 1942
Grays Harbor Co., Wash. No. 1	3,000	Nov. 1, 1943
Kititas County, Wash. No. 1	200	July 23, 1943
Klickitat County, Wash. No. 1 6	7575	June 3, 1942
Lewis County, Wash. No. 1	400	May 1, 1942
Nehalem Basin 4	(*)	July 9, 1942
Northern Wasco County 4	4,000	Oct. 25, 1940
Pacific County, Wash. No. 2	980	Sept. 8, 1941
Skamania County, Wash. No. 1 8	925	Apr. 9, 1942
Stevens County, Wash. 4	(*)	Oct. 8, 1943
Tillamook County 4	2,000	May 15, 1940
Union County 4	(*)	Mar. 2, 1942
Wahkiakum County, Wash. No. 1	700	Feb. 17, 1943
Whatcom County, Wash. No. 1 4	16,500	May 15, 1942
Yakima County, Wash. No. 1 4	2,500	July 9, 1941
Total	48,200	
II. Municipalities:		
Canby, Oreg. 9	300	Dec. 22, 1939
Cascade Locks, Oreg.	200	Feb. 14, 1939
Centralia, Wash.	300	Feb. 13, 1940
Drain, Oreg. 10	250	Mar. 14, 1941
Ellensburg, Wash.	2,000	Apr. 1, 1942
Eugene, Oreg.	(11)	Aug. 20, 1940
Forest Grove, Oreg. 9	750	Nov. 7, 1939
Grand Coulee, Wash.	525	Mar. 6, 1943
McMinnville, Oreg.	1,000	Jan. 13, 1940
Monmouth, Oreg.	400	May 1, 1942
Seattle, Wash.	(11)	May 6, 1940
Tacoma, Wash.	(11)	Mar. 5, 1940
Total	5,725	

See footnotes at end of table.

Contracts with public agencies as of June 30, 1944—Continued

Name of purchaser	Contract demand in kilowatts	Date of execution
III. Cooperatives:		
Benton-Lincoln Electric Cooperative, Inc.	400	Oct. 9, 1942
Benton Rural Electric Association, Inc. ¹²	325	June 4, 1942
Big Bend Electric Cooperative, Inc. ¹	260	June 11, 1942
Blachly-Lane County Cooperative Electric Association ¹³	50	Oct. 7, 1941
Clearwater Valley Light & Power Association, Inc. ³	700	June 17, 1942
Columbia County Rural Electric Association	300	Dec. 1, 1942
Coos Electric Cooperative ⁴	(2)	Feb. 29, 1944
Douglas Electric Cooperative, Inc. ¹⁰	625	July 1, 1942
Idaho County Light & Power Association, Inc. ⁵	160	June 8, 1942
Inland Empire Rural Electrification, Inc. ⁵	1,400	May 28, 1942
Kootenai County Rural Electrification Association ⁵	210	June 9, 1942
Lincoln Electric Cooperative, Inc.	700	May 20, 1942
Nehalem Valley Coop. Electric Association ¹²	100	July 1, 1943
Nespelem Valley Electric Cooperative, Inc.	160	June 25, 1943
Northern Idaho Rural Electrical Rehabilitation Association, Inc. ⁵	400	Apr. 29, 1943
Okanogan County Electric Cooperative, Inc. ⁵	120	June 8, 1942
Pend Oreille County Elec. Cooperative, Inc. ⁵	200	May 1, 1943
Salem Electric Cooperative Association	700	Apr. 26, 1944
Stevens County Electric Cooperative, Inc. ⁵	310	June 2, 1942
Umatilla Electric Coöperative Association ¹²	1,350	Aug. 22, 1942
Wasco Electric Cooperative, Inc.	200	Dec. 1, 1942
Total	8,670	
IV. Irrigation districts:		
Vera Irrigation District ⁴	500	Apr. 4, 1944
Grand total	63,095	

¹ Operating but at present not served by B. P. A.² No contract demand specified.³ Operating but at present has only an emergency service connection with B. P. A.⁴ Not yet in operation.⁵ Served via W. W. P. Co.⁶ Served (at Condit point of delivery) via P. P. & L. Co.⁷ Total of three points of delivery, only one of which is energized or constructed, viz: Condit, 100 kilowatts; North Dalles, 125 kilowatts; Goldendale, 350 kilowatts.⁸ Served via P. P. & L. Co. at White Salmon River point of delivery, but directly by B. P. A. at North Bonneville and Bonneville dam delivery points.⁹ Served via P. G. E. Co.¹⁰ Served via C. O. P. Co.¹¹ Interchange.¹² Served via P. P. & L. Co.¹³ Not energized; completion of line to connect with Eugene substation deferred for duration.

PROGRESS OF PUBLICLY OWNED AGENCIES

The trend toward post-war thinking and planning was evidenced during the year by the increased activity on the part of the Northwest's publicly owned and operated power distribution agencies. A significant move during the year was the concerted effort on the part of the city of Seattle and the public utility districts in the Puget Sound Power & Light Co.'s service area to purchase the company's distribution properties on a system-wide basis. The public agencies requested the Bonneville Power Administration to participate by acquiring the major generating and transmission properties, and by serving as negotiating agent for the transaction.

In February 1943, the public utility districts and the city of Seattle authorized the Bonneville administrator to act as negotiator for purchase of the properties to be acquired by the public utility districts and the city. The Secretary of the Interior also authorized the administrator to negotiate for the purchase of the company's major

generation and transmission facilities, contingent on congressional approval and appropriation of funds.

An offer of \$90,000,000 for the Puget properties was submitted on behalf of the public utility districts, the city of Seattle, and the Bonneville Power Administration to the company's board of directors on May 18, 1944. The offer was rejected on April 13, 1944, on the grounds that it was not made by an agency giving proof that it had the legal power to acquire such properties and evidence of its ability to finance the acquisition.

V. CONSTRUCTION PROGRESS

The Branch of Engineering and Operations continued to prosecute vigorously its curtailed wartime construction program during the year. In spite of handicaps imposed by wartime restrictions, the critical shortage of skilled manpower, and manufacturing delays, all energization dates were met promptly and, in many instances, well in advance of the customers' requirements.

Transmission-line facilities placed in service during the year included Spokane-Trentwood Line No. 2, Willamina-Grand Ronde Line, Boyer-Tillamook Line, Salem Alumina Line, Longview-Columbia Way Line No. 2, and Bradford Island Crossing No. 4.

New substations were placed in service at Tillamook and the Salem Alumina plant; switching stations were placed in service at Pasco and Willamina; and the Earlington switching station was removed and reconstructed at South Renton.

Major additions to substations during the year included: Transformers at Spokane, Tillamook, and Bayview; a temporary transformer at the Salem Alumina plant; transformer cooling fans at Midway and St. Johns; shortwave radio stations at Covington and Midway; construction of 230-kilovolt line terminal facilities at Midway for the Hanford No. 1 and No. 2 lines; 230-kilovolt and 115-kilovolt switchgear additions at Midway; installation of synchronous condensers at Spokane and Troutdale; and installation of static condensers at Alcoa.

Major projects still under construction at the close of the fiscal year included a second 230,000-volt, 183-mile line from Grand Coulee dam to Covington, Wash., near Seattle; a second 230-kilovolt transformer bank at the Midway substation, and condenser installations at two other major substations.

The following tabulation shows, by comparison with fiscal year 1943, the system additions constructed during fiscal year 1944. Generating facilities installed at Bonneville and Grand Coulee by the United States Engineers and the Bureau of Reclamation, respectively, are included for completeness.

Facilities placed in service

Type	Installed at end of fiscal year 1943	Fiscal year 1944		Installed at end of fiscal year 1944
		Added	Removed	
Generation (kilovolt-amperes):				
Grand Coulee (including house unit).....	484,000	324,000		808,000
Bonneville.....	410,400	108,000		518,400
Total.....	894,400	432,000		1,326,400
Transmission lines (circuit miles):				
230 kilovolts.....	1,053.2			1,053.2
115 kilovolts.....	1,058.5	45.6		1,104.1
69 kilovolts and lower.....	323.0	37.6		360.6
Total.....	2,434.7	83.2		2,517.9
Substation facilities:				
Transformation (kilovolt-amperes).....	2,050,579	179,000	22,500	2,207,079
Static condensers (kilovolt-amperes).....	18,890	12,500		31,390
Synchronous condensers (kilovolt-amperes).....	182,500	70,000		252,500
Substations (number).....	43	2		45
Switching stations (number).....	8	3	1	10

VI. FINANCIAL STATUS

The financial position of the administration is indicated by the accompanying balance sheet for June 30, 1944. This statement has been prepared from cost records maintained by the administration in accordance with the uniform system of accounts prescribed by the Federal Power Commission for electric utilities operating under the Federal Power Act. The balance sheet reveals an investment of \$74,-842,588 in electric plant before deducting the depreciation reserves of \$3,239,330, leaving a net of \$71,603,258. The plant investment includes only the transmission lines, substations, and related facilities. No amount is included in the plant account for the generating facilities at the Grand Coulee and Bonneville projects inasmuch as these projects are under the jurisdiction of other agencies. Information supplied by the Bureau of Reclamation and the United States Army Engineers in regard to the investment in generating projects as of June 30, 1944, is given below. The data exclude interest during construction and are subject to account review.

Item	Bonneville Dam	Grand Coulee Dam	Total
Joint purpose facilities.....	\$38,471,999	\$137,783,405	\$176,255,404
Direct power facilities.....	36,106,635	37,494,424	73,601,059
Direct navigation facilities.....	5,490,895		5,490,895
Direct irrigation facilities.....		5,266,182	5,266,182
Total.....	80,069,529	180,544,011	260,613,540

The tenth and last generating unit at the Bonneville Dam was installed in December 1943. The estimated remaining investment required to complete this project was only \$2,400,000 as of June 30, 1944. At the Grand Coulee project the ultimate investment is estimated at \$487,000,000, of which \$280,800,000 is direct investment for irrigation works.

Bonneville Power Administration balance sheet, June 30, 1944

Assets and other debits

Utility plant.....		\$74,842,588
Long-term note receivable.....		128,000
Emergency fund.....		\$500,000
Current and accrued assets:		
Cash—disbursing officers.....	\$623,009	
Accounts receivable:		
Power customers.....	1,522,028	
Other.....	192,787	
Accrued utility revenue.....	2,001,307	
Materials and supplies.....	2,253,913	
Other current and accrued assets.....	375,225	
Total current and accrued assets.....		6,968,269
Deferred debits.....		652,786
Total revenue receipts deposited.....		36,457,168
Less:		
Emergency fund.....	\$500,000	
Cost of Federal power—preliminary.....	\$13,913,891	
Interest expense.....	\$5,671,786	
Operating expense expenditures.....	\$8,980,648	
Total deductions.....		(29,066,325)
Total assets and other debits.....		90,382,486

Liabilities and other credits

Congressional appropriations.....		\$122,920,758
Less:		
Operating expense expenditures.....	\$8,980,648	
Unrequisitional appropriations.....	32,667,066	
Total deductions.....		(41,647,714)
Donations and other Federal aids.....		5,003,118
Federal investment.....		77,276,162
Current and accrued liabilities:		
Accounts payable.....	\$320,106	
Other current liabilities.....	77,660	
Total current and accrued liabilities.....		397,766
Deferred credits.....		27,826
Depreciation reserves.....		3,239,330
Contributions in aid of construction.....		175
Surplus.....		9,441,227
Total liabilities and other credits.....		90,382,486

Figures in parentheses indicate a deduction.

¹ Received pursuant to contract of sale of certain plant to Public Utility District No. 2 of Pacific County, Wash.

² Created from revenues in accordance with sec. II of the Bonneville Act.

³ Computed at the assumed rate of \$0.00075 per kilowatt-hour pending completion of cost allocations and financial agreements as to cost of power.

⁴ Imputed interest on Federal investment

⁵ Expended from appropriations for operations.

The balance sheet indicates that revenue receipts have been deposited in the United States Treasury in the amount of \$36,457,168. These receipts are deposited in a special account, except a very small portion representing miscellaneous revenue covered directly into the Treasury, from which a portion has been or will be allocable to the reclamation fund and the remainder has been or will be covered into

the Treasury to the credit of miscellaneous receipts. Upon the completion of accounting analyses and financial negotiations now under way with the Bureau of Reclamation and the Corps of Engineers, War Department, the accounts of the Administration will reflect the application of revenues in much the same way as private industries apply revenue to meet operating expenses, including the cost of power produced at the two Federal dams, interest on the power investment, and repayment of the power investment through an amortization schedule. Inasmuch as these analyses and agreements have not been completed, a consolidated actual financial statement is not available; but the following pro forma statement for the fiscal year 1944 indicates the administration's approximate financial position.

Bonneville Power Administration pro forma statement of consolidated income (partially estimated), fiscal year 1944

Revenues.....		\$20, 893, 363
Operating expenses:		
Bonneville Power Administration....	\$3, 377, 487	
Bonneville Dam project.....	382, 600	
Grand Coulee Dam project.....	993, 329	
Shasta Units: Rental and special costs.....	1, 000, 000	
	<hr/>	\$5, 753, 416
Depreciation:		
Bonneville Power Administration....	1, 119, 429	
Bonneville Dam project.....	439, 100	
Grand Coulee Dam project.....	700, 000	
	<hr/>	2, 258, 529
Total operating revenue deductions.....		<hr/> 8, 011, 945
Net operating revenue.....		12, 881, 418
Income deductions (interest):		
Bonneville Power Administration....	\$1, 846, 057	
Bonneville Dam project.....	1, 100, 000	
Grand Coulee Dam project.....	2, 195, 000	
	<hr/>	
Total income deductions.....		5, 141, 057
Net income from power operations.....		<hr/> 7, 740, 361

This pro forma statement is based upon information that is now available as to the costs of operating the two generating projects and as to the allocation of the joint investment at these projects to power purposes. In the event the ultimate allocations differ from presently used assumptions, the indicated power cost will be affected. In addition, final figures will reflect adjustments due to the inclusion of interest during construction, and determination of final depreciation and amortization policies. Despite the tentative character of the statements, it is believed that the results are fairly indicative of the answers that may finally be developed.

The statement for fiscal 1944 reflects the actual revenue, operating expenses, depreciation and imputed interest for the Bonneville Power Administration, together with estimates for the expenses, depreciation, and interest at the two dams allocable to power. The statement also reflects estimates of the costs at the dams for operation, depreciation on power facilities including an allocated share of joint items, and imputed interest on the power investment, both direct and joint. The statement thereby indicates the consolidated result of operations, which is a net income of \$7,740,361 for the fiscal year and is available for amortizing or repaying the investment.

Expenses shown do not include any amounts for the amortization of special war investments in transmission and feeder line facilities although \$1,000,000 is allowed in each of the fiscal years 1944 and 1945 for special costs in connection with the installation of two generating units from the Shasta project as a war measure.

Although revenue for fiscal year 1944 exceeded \$20,000,000, a very substantial proportion of the present revenue is derived from service to war plants and establishments. Of the 1,010,262 kilowatts of total contract demand in active executed contracts, 733,600 kilowatts are in industrial contracts subject to cancellation and an additional 40,850 kilowatts are in very short-term industrial contracts. At the Administration's basic rate of \$17.50 per kilowatt-year these cancellable and short-term industrial contracts involve annual revenue of \$13,552,875. Under industrial contracts having cancellation provisions the total amount of cancellation or termination payments, assuming cancellation of all the contracts effective as of July 1, 1945, would be approximately \$9,200,000, which amount has been set up as representing in part the cost of remarketing the power made available by such contract cancellations.

The Bonneville Act and Executive Order 8526 place upon the Administration the responsibility for marketing the power at rates which will make the developments at Bonneville and Grand Coulee financially self-liquidating. The high rate of revenues during the war period, when facilities are operating at extreme overloads and without reserve facilities, has resulted in a surplus that may very well prove to be the medium through which the administration's financial responsibility will be met during the immediate post-war reconversion period when it will be necessary to develop peacetime markets to use the power that has been going into war production. A portion of this surplus should in effect be used now for advance marketing work; the balance will serve as a reserve for post-war adjustments.

VII. ADVANCE TRANSMISSION PROGRAM

Contemplated plans for future transmission line construction based on regional studies made by the Administration are extensive. It is

proposed that the main 230,000-volt transmission grid be extended in the immediate post-war period to tie into the Bonneville-Coulee system new generating plants such as those planned for the Umatilla, Hungry Horse, Cabinet Gorge, and Detroit projects. In addition, new 230,000-volt facilities are proposed for the north Puget Sound area in order to deliver more energy to pulp and paper mills and to meet the demands of expanding industrial growth anticipated in that area.

The over-all transmission capacity of the main system into the Portland area will be increased with new points of delivery. Extensions and reinforcements are planned for the lines into the Willamette Valley. Also planned are extensions into Union County, Oreg., to compensate for power deficiencies in the central Oregon districts.

Contemplated additions to the main transmission grid include lines to Clallam and Jefferson Counties in Washington State to increase the power supply on the Olympic Peninsula now limited by lack of transmission facilities. New lines are planned for Stevens County and the Metaline Falls district of Pend Oreille County to provide for the expansion of the mining industries in the area.

Reinforcement of the various substations and feeder lines of the Bonneville system is planned to help relieve overloaded conditions of facilities and to provide the necessary reserves for normal peacetime service.

These extensions will bring to the outlying districts of the Pacific Northwest a supply of electric power for domestic, agricultural, and industrial uses at the lowest rates available in the nation. To determine the developmental possibilities in these and all other sections of the region, the administration is carrying on a program of county-wide economic surveys. Ten of these have already been completed for counties in the States of Washington and Oregon. A considerable portion of the \$127,000 fund appropriated by Congress for market development activities will be devoted to the expansion and acceleration of these studies in preparation for post-war programs.