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Decision No. 40128

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

ORIGINAL

In the Matter of the Application of PACIFIC GAS AND ELECTRIC COMPANY, a corporation, for an order of the Public Utilities Commission of the State of California granting to applicant a certificate, under Section 50 of the Public Utilities Act, declaring that the present and future public convenience and necessity requires the construction of the power plants and projects mentioned herein, including power houses, dams and reservoirs, and the use of all lands and water rights which may be used or useful in connection therewith; and requires the construction of the transmission lines described in this petition.	Application No. 15042 (First Supplemental)
In the Matter of the Application of PACIFIC GAS AND ELECTRIC COMPANY, a corporation, for an order issuing to applicant a certificate under Section 50 of the Public Utilities Act of the State of California declaring that public convenience and necessity require the construction, operation and maintenance by applicant of the steam-electric generating plant, transmission lines and related facilities herein generally described.	Application No. 28158
In the Matter of the application of PACIFIC GAS AND ELECTRIC COMPANY, a corporation, for a certificate under Section 50 of the Public Utilities Act of the State of California, declaring that the present and future public convenience and necessity require or will require the construction, operation, maintenance and use of its proposed ROCK CREEK and CRESTA hydro-electric power plants to be constructed on the North Fork of the Feather River in the Counties of Butte and Plumas, California, together with the other electric facilities and properties herein mentioned.	Application No. 28159

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R. W. DuVal for Pacific Gas and Electric Company,
J. J. Deuel and Edson Abel for California Farm Bureau Federation,
John J. O'Toole, Dion R. Holm, and Paul L. Beck for City of San Francisco,
E. D. Murray for Edward Hyatt, State Engineer.

HULS, COMMISSIONER:

O P I N I O N

These related Applications by Pacific Gas and Electric Company(1) seek new and amended certificates from this Commission that the present and future public convenience and necessity require or will require the construction, maintenance, and operation of additional plants and facilities for the production and transmission of electric power and energy.

By Decision No. 20804 issued February 20, 1929, in response to the original Application No. 15042, Pacific was granted a certificate to develop hydroelectric resources on the Mokelumne River and its tributaries in Amador and Calaveras Counties. Portions of the project so certified at that time have been completed and integrated with Pacific's other power sources. This included the installation of the Salt Springs Reservoir impounding 131,000 acre feet of water, Salt Springs Powerhouse with an installed capacity of 11,000 kva, Tiger Creek conduit consisting of about 20 miles of tunnel and flume with a peak capacity of 625 second feet, Tiger Creek Powerhouse with an installed capacity of 60,000 kva, and Tiger Creek Afterbay Reservoir with a capacity of 2527 acre feet.

Further down stream Pacific then owned and still operates Electra Powerhouse erected about 1902 by a predecessor company with an estimated installed capacity of 20,000 kw. Water for this plant is taken out of the Mokelumne River at or just below Tiger Creek Afterbay in two canals known as the Upper and Lower Standard canals. These waterways are a combination of earth and rock ditches and timber flumes about 20 miles long, and have an aggregate capacity of some 200 second feet. The upper canal discharges directly into a penstock and the lower

(1) Hereinafter referred to as Pacific.

empties into Lake Tabeaud which has a capacity of 1158 acre feet. A short tunnel connects this forebay with another penstock.

In this First Supplemental Application No. 15042 Pacific proposes to increase the storage capacity of Salt Springs Dam, install new storage on Bear River and develop the power head between that reservoir and the Salt Springs Plant by installation of the Bear River Unit, install a new plant at the Electra Plant site and a new plant to be known as West Point intermediate between Electra and Tiger Creek to more fully develop the potential head between Tiger Creek and Electra. This construction will supplant the present Electra Plant and associated penstocks, together with the Upper and Lower Standard canals and permit their abandonment.

Application No. 28158 deals with the installation of a 75,000 kva steam electric generating station to be known as Kern Steam Plant on a site approximately 3 miles west of Bakersfield in Kern County. The construction of two hydroelectric generating plants on the North Fork of the Feather River in Plumas and Butte Counties is the subject of Application No. 28159. The Rock Creek project, having a proposed installed capacity of 126,000 kva, is to be located below Belden. The Cresta project has a proposed installed capacity of 75,000 kva directly down stream with the plant site a short distance up stream from Camp Creek.

System Demands

Pacific, like other electric utilities in California, has experienced a very substantial growth in power demand throughout the period of the war, and contrary to popular anticipation, no postwar relaxation of these demands has as yet developed. Since additions to the plant capacity during this period have necessarily been held to bare essentials, customary capacity margins to meet adverse dry year conditions have been largely absorbed. The reported 1939 peak demand is 1,060,000 kw and this demand increased to an August 1946 peak of 1,739,800 kw, which only slightly exceeded the December peak of 1,739,100 kw. It is estimated that this growth will continue at a rate of from 100,000 to 125,000 kw per year during the next five years, indicating a 1951 peak of 2,250,000 to 2,375,000 kw.

Projected Capacity

On the Mokelumne the new Electra Plant containing three 33,000 kva generators will use water from the tailrace of the West Point Plant conducted to Lake Tabeaud through some 8 miles of 12 foot by 15 foot 6 inch tunnel having a peak capacity of 975 second feet. The present Lake Tabeaud tunnel will be enlarged to 12 feet in diameter and will discharge into 114 inch penstocks. Water from these penstocks will drive three 38,000 hp horizontal double overhung impulse wheels direct connected to the generators. The plant will have an estimated effective head of 1,223 feet. The West Point Plant of somewhat similar character will take water from the Tiger Creek Afterbay through 2½ miles of 12 foot by 15 foot 6 inch tunnel, discharging into a single penstock. The conduit will have an estimated peak flow of 575 second feet and the plant will have an estimated effective head of 293 feet. Water from the penstock will drive a vertical Francis turbine rated at 17,000 hp direct connected to a 15,000 kva generator. Salt Springs Reservoir will be increased in capacity to 140,412 acre feet by the installation of 13 radial gates 11 feet high, which were provided for in the initial construction but not heretofore erected. Storage above Salt Springs on Deer Creek proposed in original Application No. 15042, but not installed, will be transferred to Salt Springs Reservoir. The Bear River project will consist of reservoir storage created by the installation of a 260 foot high main dam and a 45 foot auxiliary dam, and will have an estimated capacity of 46,000 acre feet. Two and one-half miles of 8 x 8 foot tunnel will carry the water to the head of a 5 foot penstock which will deliver a peak flow of 200 second feet to a horizontal single impulse wheel rated at 38,000 hp direct connected to a 33,000 kva generator. The estimated effective head on the generator is 1,960 feet.

The Rock Creek Project will consist of a reservoir in the North Fork of the Feather River having an estimated capacity of 2,300 acre feet created by a 115 foot concrete dam erected in the vicinity of Opopee Creek. From this reservoir 6½ miles of 26 foot tunnel will convey an estimated peak capacity of 3,000 second feet to the head of the penstock. Water from the penstock will drive

two 73,500 hp vertical Francis turbines direct connected to 63,000 kva generators. The effective head on the plant is estimated to be 481 feet. Rock Creek Plant will discharge into the Cresta Forebay which will have a capacity of 2,000 acre feet created by the installation of 113 foot concrete dam in the river just below Swamp Creek. Water from the reservoir will be carried to the head of the penstock in almost four miles of 27 foot tunnel which will have an estimated peak capacity of 3,500 second feet. Water from the penstock with an effective head of 254 feet will drive two 46,500 hp vertical Francis turbines each direct connected to 37,500 kva generators.

The Kern Steam Plant is designed for the initial installation of two 450,000 pound per hour, 1,500 pound pressure, 915° F. boilers, which will drive a 60,000 kw, .8 power factor, turbo generator.

Necessary transmission facilities will involve the construction of 13 miles of 60 kv transmission line from the West Point Plant to the Electra Plant for connection to the existing 60 kv system. No additional transmission facilities will be required to connect either the Bear River unit or the new Electra Plant to the existing transmission network since adequate lines are presently in existence adjacent to the plant sites. Short tap lines with a voltage of 230 kv will be necessary to connect the Rock Creek and Cresta Plants to the existing single 230 kv circuit between Bucks Creek and Big Bend and to an additional 230 kv circuit which is to be erected between Bucks Creek powerhouse and Bellota substation, a distance of approximately 100 miles. Connections at 110 kv and 70 kv are proposed to connect the Kern Steam Plant with the existing Midway steam, Bakersfield steam, and Kern oil stations, as well as to existing 70 kv circuits in the territory south of the plant site.

Estimated Production

Based upon the analysis of average water conditions during the 20 years from 1921 to 1940, the following table indicates the annual peak capability and the estimated annual production of each of the projected plants.

Plants	Peak Kw	Million Kwhr
Bear River	29,000	132.5
West Point	13,000	82.5
Electra	87,000	327
Rock Creek	110,000	494
Cresta	68,000	318
Total Hydro	307,000	1,354.0
Kern Steam	71,000	528.8

Project Costs

The estimated capital costs involved in the construction program as submitted can be summarized as shown in the following table. Cost estimates are predicated upon July 1946 price levels, and as such are subject to revision to reflect current price trends. Unit costs per kva of installed capacity and per kw of peak capacity have been derived and are shown at the bottom of the table. Testimony indicates that since before the war, costs have materially advanced, the increases being estimated at approximately 50% for steam capacity and 100% for hydroelectric installations. It was pointed out, however, that the unit cost for the initial installation at Kern Steam Plant is somewhat higher than the ultimate expected average since provision is being made for the possible addition of a 100,000 kva generator.

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Item	Kern Steam	Rock Creek	Cresta	Bear River	West Point	Electra
	M$	M$	M$	M$	M$	M$
Lands & Rights	162	60	30	113	14	33
Buildings	1,935	1,205	1,050	26	328	759
Equipment	7,789	18,295	14,580	8,141ϕ	2,658	10,622
Indirects	1,214	3,540	2,840	1,470	540	2,051
Overhead	1,790	3,700	3,000	1,550	560	2,135
Total Plant	12,890	26,800	21,500	11,300	4,100	15,600
Total Lines	1,006	*	*	None	*	None
Kva Capacity	75,000	126,000	75,000	33,000	15,000	99,000
Kw Capability	71,000	110,000	68,000	29,000	13,000	87,000
Cost Plant						
Per Kva	$172	$212	$287	$342	$273	$158
Per Kw	182	244	316	390	315	179

Excludes $330,000 cost of raising Salt Springs Dam.
ϕ Includes cost of lower Bear River Reservoir.
* Included in equipment above.

Annual Cost

Testimony shows that after careful consideration of the economics involved in selecting potential power sources in relation to not only the company's own needs, but also other potential sources throughout the State, together with an evaluation of the construction conditions which control the erection time tables, the projects for which certificate is herein sought appear to be the most feasible. Testimony was offered to show that the projected hydroelectric developments will produce energy at costs somewhat below the estimated cost of producing equivalent amounts of energy in steam generating stations. The comparison shown below is predicated upon costs evaluated at terminal substations.

Item	Mokelumne Project	Feather River Project	Total Hydro
Peak Kw	97,600	160,200	257,800
Million Kwhr	433	731	1,164
Capital Cost M$	33,720	57,800	91,620
Annual Cost M$	3,171	5,392	8,563
Annual Steam Cost M$			
$1.25 fuel	3,320	5,500	8,820
1.50 fuel	3,670	5,910	9,680
2.00 fuel	4,050	6,720	10,770

Construction Schedule

The following table shows the tentative completion schedules for the capacity additions projected or proposed on Pacific's system during the next four years and the accumulated increase in dry year dependable capacity resulting from the program.

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		Dry Year Dependable Capacity Thousand Kilowatts	
1946 Resources		August	December
Total		1752	1759
Addition 1947 to 1951	Date		
Hydro			
* Pit No. 1 Forebay	Aug. 1947	32	28
* Potter Valley	Aug. 1948	4	2
* Electra 2 units	Aug. 1948	39	39
1 unit	Dec. 1948	29	29
West Point	Dec. 1948	13	13
Colgate	Aug. 1949	18	12
Cresta	Aug. 1950	68	68
Rock Creek	Dec. 1951	110	110
Total Additional Hydro		313	301
Steam			
Eureka	Aug. 1947	9	9
Kern	Aug. 1948	71	71
Station "P", S.F.	Dec. 1948	200	200
New Steam (Site Pending)	Aug. 1950	100	100
Total Additional Steam		380	380
Purchased			
Southern Calif. Edison	Jan. 1948	-100	- 75
USBR - Shasta 3rd unit	Aug. 1947		
4th unit	Dec. 1947		
5th unit	May 1948		
Keswick 1st unit	Nov. 1947		
2nd unit	Dec. 1947		
3nd unit	Feb. 1948		
Total Bureau of Reclamation		300	200
Total Additional Purchase		200	125
Total Resources at End of Program		2645	2565

* Addition over present capacity of 25,100 kw (Aug.), 28,500 kw (Dec.) at Pit 1; 18,500 kw at Electra; 5,000 kw (Aug.), 7,000 kw (Dec.) at Potter Valley; and 4,700 kw (Aug.), 10,500 kw (Dec.) at Colgate.

It will be noted that the estimated dry year dependable capacity in 1951, if the projects shown are completed on schedule, is estimated to be 2,645,000 kw. This figure when compared with the estimated peak of 2,375,000 kw resulting from the maximum rate of 125,000 kw annual increase indicates a margin of approximately 10%. Testimony likewise shows that the company engineers believe a minimum reserve available to the system should be equal to the sum of the capacity of the largest line and largest generating unit. For the Pacific System this is approximately 275,000 kw.

A hearing was held on the above-numbered Applications on March 3, 1947, after due notice to the Federal Power Commission, California Farm Bureau Federation, State Engineers' Office, United States Bureau of Reclamation, and the Cities of San Francisco, Oakland, Berkeley, San Jose, Sacramento, Stockton, Fresno, and Bakersfield, as well as the Southern California Edison Company Ltd. No opposition to the granting of the certificates as requested was presented at the hearing. Pacific presented evidence to show that it was in receipt of or had applications pending before both the Federal Power Commission and the State Division of Natural Resources for permits and licenses necessary for the occupancy and use of the necessary natural resources to develop the projects. In carrying out the projects Pacific will likewise be expected to abide by and comply with all other requirements of law to the end that the construction, maintenance, and operation of the projects herein proposed will best serve the public interest. Based upon the facts presented in support of its Application of which the foregoing Opinion must necessarily be only a brief resume, it is found as a fact that public convenience and necessity require the construction, operation, and maintenance of the plants and facilities hereinafter specified in the Order following this Opinion.

O R D E R

A public hearing having been held, evidence presented, the matter being fully considered, and finding that present and future public convenience and necessity do or will so require, therefore

IT IS HEREBY ORDERED that Pacific Gas and Electric Company be and it is hereby granted a certificate of public convenience and necessity authorizing it to construct, operate, and maintain the plants and facilities more fully described in the following named Applications:

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1. Application No. 15042 (First Supplemental) including (a) Bear River Unit (b) Salt Springs Unit (additional) (c) West Point Unit (d) Electra Unit.

2. Application No. 28158, including (a) Kern Steam Plant (First Unit) and transmission lines described therein.

3. Application No. 28159, including (a) Rock Creek Unit, and (b) Cresta Unit.

This Opinion and Order is ordered filed as the Opinion and Order of the Public Utilities Commission.

The effective date of this Order is 20 days from and after the date hereof.

Dated at San Francisco, California, this 8th day of April, 1947.

Harold P. Huls

Justus F. Craemer

Ira H. Rowell

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Commissioners