FUELS OF WESTERN CANADA*

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THE principal fuels of Western Canada are coal, natural gas, petroleum, electricity, peat and wood. Coal is, of course, much the most important fuel of Western Canada, and ranges from the lignite of the prairies to the semi-anthracite of the Rocky Mountains. * * * In Western Canada, electric energy in large quantities for use as fuel is not economically available at the present time except in certain favored localities in southern Manitoba and southern British Columbia.

In Manitoba, there are on the Winnipeg River two developed powers and seven undeveloped powers ranging from 9,900 to 57,300 h.p. at 75 per cent. efficiency on a 24-hour basis and assumed minimum flow of 12,000 sec.-ft. With a regulated flow of 20,000 sec.-ft., these powers would range from a minimum of 12,300 h.p. to a maximum of 95,500 h.p. The total power with unregulated river (12,000 sec.-ft.) is 249,300 h.p. and with regulated river (20,000 sec.-ft.) is 418,500 h.p.

The Grand Rapid of the Saskatchewan has 32,600 h.p. with an assumed minimum flow of 4,500 sec.-ft. It is not improbable, however, that the flow sometimes falls to about 3,500 sec.-ft.

There are large powers on the Nelson, Churchill and Athabaska rivers, at Fort Smith Rapids on the Slave and at Vermilion and Peace Canon on Peace River, but detailed information respecting the low-water flow of these rivers is not available. In some instances, low banks and lack of concentrated fall would make development very costly.

In British Columbia there are many important water powers. Some of the principal powers near centres of population or possible large commercial developments are:—

On the Kootenay, at Bonnington Falls, 125,000 h.p., and at Lower Bonnington, 22,000 h.p., at Stones Byers, 50,000 h.p.; on the Pend d'Oreille, near Waneta, four powers ranging from 32,000 to 73,000 h.p., at Long Rapid on the Columbia, 30,000 h.p.; 52,000 h.p. at upper site on Stave River and 52,000 at lower site; 30,000 h.p. in Nahatlach River; in Adams River, 30,000 h.p.; Bridge River tunnel, 70,000 h.p.; south fork Quesnel River, 90,000 h.p.; Campbell River, a possible 100,000 h.p.; Jordan River, 25,000 h.p. at present and 38,000 h.p. ultimate; Coquitlam Lake, 84,000 h.p.; Bear Mount Canon on the Cheakamus, 40,000 h.p.; Powell River, ultimate development, 32,000 h.p. It has been estimated that there is 200,000 h.p. in the Fraser between Yale and Lytton and 100,000 in the Thompson River Canon but owing to the railways in these canons, it is doubtful whether these powers can be developed.

With anthracite coal at $10 per ton and burned at 50 per cent. efficiency and with electric energy at one cent per kilowatt-hour, the coal will yield 14,000 B.t.u. for one cent as compared with 3,412 B.t.u. from the electric energy for one cent. This demonstrates that, on this basis, heating by electric energy would be four times as costly as with coal. The 2,100,000 inhabitants of Western Canada would require not less than 10,500,000 electrical horse-power for heating alone.

As the hydro-electric energy already developed in Western Canada aggregates about 359,000 h.p. (76,000 in Manitoba, 33,000 in Alberta and 250,000 in British Columbia), it would require 29 times this amount to heat the homes in Western Canada. Again, as the total electric energy already developed in the whole of Canada is only about 1,800,000 h.p., it would require nearly six times this amount to replace the fuel used in the Prairie Provinces and British Columbia.

Again, the total water power in the Prairie Provinces is about 3,500,000 h.p., and in British Columbia, 2,500,000 h.p.* Even assuming that it would be possible to utilize the powers in the northern portion of the Prairie Provinces and British Columbia and the numerous small powers, the aggregate would still be 4,500,000 h.p. short of the heating requirements of that region.

Peat

During the last half century, numerous attempts have been made in Canada to manufacture a commercial peat fuel. In 1910, Dr. E. Haanel, director, mines branch, stated that, up to that time, the attempts "have been failures and very little peat fuel is at present available.

"The chief cause of most of these failures has been in the ignorance of the nature of peat on the part of those who have engaged in the production of peat fuel. In several instances the bogs chosen for the work have been unsuitable for the purpose in view. A proper investigation of the bog previous to the commencement of operations was seldom made; consequently, methods entirely unsuitable for the utilization of the bog in question have been employed, and the result has been failure. These failures, involving as they did considerable loss of capital, have created a profound distrust of everything connected with peat and the utilization of peat bogs."

Peat, as found in nature, contains about 10 per cent. combustible matter and 90 per cent. water, the removal of this exceedingly high proportion of water constituting the great problem for the peat engineer. Dr. Haanel states that it has been "demonstrated, once and for all, that the water content of raw peat can not be reduced much below 80 per cent. by pressure alone, and the process of wet carbonizing, upon which large sums have been expended, has not, up to this time, proved a success. In fact, it may be safe to make the statement that any process for the manufacture of peat-fuel which depends upon the employment of artificial heat for the evaporation of the moisture will not prove economic. The only economic process in existence at the present time is that which utilizes the sun's heat and the wind for the removal of the moisture."

A. Anrep, mines branch, Department of Mines, has investigated eighteen bogs in Manitoba. He reports that there are bogs in the Winnipeg River district containing 1,860,000 tons of peat fuel, 25 per cent. moisture.

With its enormous coal resources, however, Western Canada will, for many years, depend upon coal and wood for heating and cooking. At the present time, the high labor cost, alone, is sufficient to render peat manufacture an unprofitable enterprise.

In Western Canada, to meet the abnormal conditions created by the war, peat may be prepared and stored on a small scale by farming communities and villages where such are situated near peat bogs. Such fuel supply would not only increase the fuel supply, particularly during the autumn and spring, but would release railway cars that are urgently needed for other purposes.

*Excerpts from paper delivered August 9th, 1918, at the Saskatoon meeting of the Engineering Institute of Canada.

*This is exclusive of 400,000 horse-power for power possibilities on rivers like the Fraser, Thompson, Skeena and Naas, where, because of the proximity of railways or possible interference with the salmon industry, economical development is, at present, debarred.