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POWER DEVELOPMENT IN SASKATCHEWAN.*

By E. Hanson, A.A.I.E.E., M.I.Mun.E., City Electrical Engineer, Saskatoon.

THE city council of Saskatoon passed a resolution some time ago urging the provincial government to take steps to investigate the Churchill River with a view to the development of electrical energy for distribution throughout Saskatchewan.

This resolution brings up again the question of water power development and distribution throughout this province on a basis similar to that on which it is carried out by the Hydro-Electric Power Commission of Ontario.

Even if it is found possible to obtain power from the Churchill River, such an investigation, to be of any permanent service to the province as a whole, must include data as to the stream flow, storage possibilities; etc., covering a period of, at least, ten years.

In the meantime this country is passing through a period in its history, when help of any description is urgently required, and will permanently affect the prosperity of the province.

The situation in Saskatchewan, as I see it, is this: The trend of colonization is westward; our railways are situated in the southern half of the province; the distance from our markets, both for buying and selling, is very great; no other means of transportation being possible but by rail, freight rates are, naturally, high; in many cases, prohibitive. Labor, owing to the relatively high cost of living, is also expensive; therefore, to encourage the development of our province and the establishment of industries, there remain only two solutions to the problem of decreasing the cost. Of these two, navigation and cheap power, I shall deal only with cheap power.

There does not seem to be a clear understanding in the minds of many people as to the limitations of water power, and the difference between, say, this province and the province of Ontario, which is a typical example.

In Ontario the manufacturing centres are situated at, or very close to, the centres of power development, thus making possible the distribution of power on a large scale for industrial and municipal purposes; whereas, the nearest possible source of water power development in Saskatchewan is situated on the Churchill River, 161 miles north of Prince Albert, which is the nearest city. These 161 miles pass through virgin territory, having almost no settlers. This, apart from any other consideration, would mean 'expensive development, owing to the distance of transmission away from the nearest railroad point.

The distance from the source of power to the various centres from which power would be distributed, is so great that, for economical purposes, a very high transmission voltage would be necessary. This introduces trouble, and other troubles peculiar to extra high tension voltage.

The object of water power development on a large scale in any province is to foster industries. Now, the chief industrial centres of Saskatchewan are Regina, Saskatoon, Moose Jaw, North Battleford, Prince Albert and Yorkton. The distances between these points are as follows: Moose Jaw is 42 miles west of Regina; Regina is 160 miles south of Saskatoon; Yorkton is 103 miles northeast of Regina; Prince Albert is 87 miles north of Saskatoon; Battleford is 80 miles west of Saskatoon; Prince Albert is 161 miles from the nearest point on the Churchill River. A total of 633 miles of transmission line.

*Paper read before the Utilities Engineering Society, Saskatoon, June 14th, 1916. These distances are taken "as the crow flies," thesefore the estimates which follow are only approximate.

The estimated average cost for the aforementioned extra high tension, say, 150,000 volts, and of sufficient capacity, would be about \$10,000 per mile. This, I think, is a very fair estimate, and it must be remembered that 161 miles are entirely out of touch with any railway facilities, so that haulage and labor on that end would be extremely high. The mileage, at \$10,000 per mile, would make a total expenditure of \$6,330,000, which, at 10 per cent. for interest and sinking fund, would leave \$633,000 as an annual charge against revenue, to be borne directly by the above-mentioned cities in proportion to their average maximum demand, which would be as follows:— Saskatoon, 2,500 kw.; Regina, 2,500 kw.; Moose Jaw, 1,250 kw.; Yorkton, 150 kw.; North Battleford, 450 kw.

The Department of Mines at Ottawa has issued a map showing the coal fields of Saskatchewan.

The investigation from which this map has been developed shows that we have vast fields of lignite in this province and, with very few exceptions, those have never been developed to any extent.

One of these lignite fields extends from the international boundary, passing Moose Jaw within fourteen miles, and within thirty miles of Regina. Another field of Belly River coal formation extends from the international boundary in Alberta, going north from Lethbridge and Medicine Hat, crossing our provincial boundary and extending north to within thirty-five miles of Battleford. The eastern edge of this field is within fifty miles of Saskatoon.

I might mention in passing that this field is the same as that from which we get the coal which we have been burning with very satisfactory results in our power house for the last two years. It is supplied from Lethbridge.

It is estimated that there are billions of tons of this lignite lying untouched and undeveloped.

S. M. Darling, in his report on the carbonizing and briquetting of lignite, covering an investigation carried out by him for the government of Saskatchewan during 1914, on the Souris River coal field in the vicinity of Estevan, states that power can be produced for \$8 per horse-power year (at the switchboard).

I have gone into this report thoroughly, and have no doubt but that such is the case, and find that, besides making possible the generation and distribution of cheap power, it solves the problem of cheap heating for out-oftown dwellers, as it could be sold for about \$2.25 per ton in any part of the province.

Mr. Darling also points out that in the development of this power, the straw which is produced in this province from our agricultural activities, and which is at present wasted by being burned, would, with cheap power available, form the basis of a paper industry. In addition to all this, there are the by-products from the tar and ammonia compounds. The very fact of the numerous industries which the development of this lignite in Saskatchewan would make possible, seems to me an unanswerable argument in favor of the development of these fields as quickly as possible.

Now, I will endeavor to show that the development of these lignite fields, with the necessary transmission lines, making a network throughout the province, covering the greatest part of its settled portion, will be very much cheaper in the initial cost; also very much cheaper in the cost per kilowatt, at least for a great many years to come, until such time as the province has been developed to the stage where development of water power from the north can be tied in with the then ex sting transmission lines.