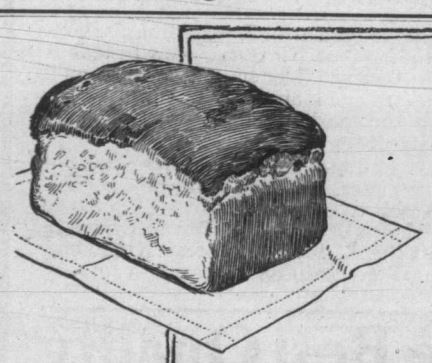

THERE IS A NIAGARA OF POWER AT OUR VERY DOOR.

The Greatest Problem of the World Today is Power—How to Obtain Cheap, and Yet Cheaper Power — Dr Cutten, President of Acadia College, Tells the Halifax Commercial Club Where Unlimited Power Waits to be Harnessed—At Cape Split, in Minas Channel.

Halifax, February 4—At this time in the history of our Province, and particularly in the history of Halifax, when the great question of hydro-electric power is commanding so much of the attention of those who are responsible for the welfare and progress of our country, the paper, "Nova Scotia's Greatest Water Power and Its Relation to Halifax," read by President G. B. Cutten, of Acadia University, at the Commercial Club luncheon yesterday, was most appropriate and acceptable. The St. Julien room of the Halifax Hotel was crowded and the overflow had to take their lunch in the main dining hall, returning to special chairs in the St. Julien room in time to hear Dr. Cutten.

The exact nature of Dr. Cutten's paper was not generally known. It was therefore a very pleasant surprise when the president announced that his paper was an outline of a project to harness the two million horsepower that was contained in the tidal flow at Cape Split at the mouth of the Minas Basin. There was some criticism of the paper at the conclusion by Mr. McColl, who seconded, and also by Controller Mackeen who moved the vote of thanks all of which was pleasantly answered by Dr. Cutten, who welcomed the criticism.

It is an enormous project and one that cannot be given too much attention.

Dr. Cutten's paper was as follows:

All thoughtful Nova Scotians, who have an interest of the province at heart are at present much interested in water power. We all recognize, I think, that the future prosperity of the province depends upon it. This is especially true, when we consider post bellum conditions and the great struggle for industrial supremacy which will then take place.

Probably no land of its size in the world is richer in variety of minerals than is our province, and with the coal and iron so easily available Nova Scotia should be the New England of Canada, **teeming with factories of all kinds.**

Unfortunately other provinces have financial advantages of us as far as our coal is concerned, and so long as that is true we must look for some other power and particularly some cheaper power. Water power is the direction toward which we naturally turn.

It is true that the water-powers in Nova Scotia have not been fully developed on account of our plentiful supply of fuel, and it is interesting to enquire the exact amount of water-power we have in Nova Scotia. The commission of conservation (Report of 1910) estimates the possible development of water-power in Nova Scotia to be only 54,000 h. p., much of which would not be available for a few months in the summer. A little more detail of the commission's report might be of interest. In Nova Scotia there has been developed about 20,000 h.p. of water power. Of this 12,650 h. p. are used for pulp and paper mills, 2,700 h. p. for electric light, 350 h.p for gold mining, and the remainder, about 4,000 h. p. for saw and grist mills.

In New Brunswick, 13,000 h. p. has been developed from water power. Of this 56 per cent is for use in small lots for saw, grist and pulp mills, and the remainder is used for electric plants. Of the latter, there is one development of 3,800 h. p. largely for use in the State of Maine.

In Prince Edward Island there are a few small developments of from 5 to 50 h. p. One electric plant develops 44 h. p. The total development is about 500 h. p., and that is about the limit of possibility.

At the present the total water-power in the maritime provinces is 34,500 h.p. The steam development in Nova Scotia alone, outside of Sydney, is about 30,000 h. p. The posssible development of water-power in Nova Scotia is 54,000 h. p. which would not be sufficient to carry throughout the whole year the total installation of steam and water power, which was then estimated by the commission at 49,724 h. p, not including Sydney.

That is if all the inland water-power of Nova Scotia were developed, it would not provide power for the present need, and it would leave no opportunity whatever, for future industrial development. It is of local interest to note that Halifax County alone had then installed 9,913 h. p., which is more than four times the amount of power which the commission estimates any one of the present projected hydro-electric schemes could supply continuously.

Recently an advertising booklet of the water-power branch of the interior department has come to hand in which the estimates of the promoters of the various waterpower schemes are given, without verification by the government. For example, they speak of the Gaspereau possibility as being estimated by some firm of engineers as capable of 8,000 h. p. development as against the government estimate of 1,945 h. p. and the J. G. White company estimate of 5,370 h. p. Even allowing for all glowing estimates of the power development of Nova Scotia, the total will not reach more than 55,000 or 60,000 h. p. and will entail a great many expensive developments at out of the way places, in nearly all cases far from the industrial centres of the province and, of course, out of the question so far as New Brunswick and Prince Edward Island are concerned. For beneficial results all would have to be controlled by one operating company.

The large New Brunswick developments are from 200 to 400 miles away from St. John and other industrial centres.

Unfortunately the commission did not take note of Nova Scotia's best water-power, nor did it give us an estimate of the possible power development. Unfortunately also, I am at this time unable to supply the deficiency in full. I can say this much however, within a radius of three miles of one point in Nova Scotia water-power to the amount of 2,000,000 h. p. is available. I refer to a certain point on the Bay of Fundy and to the power of the tidal flow there. The remainder of the time at my disposal will be taken up with a discussion of the possibility of utilizing this power.

What use has in the past been made of tidal power has been entirely through the means of large reservoirs, one of which is kept at high tide level and empties through power gates to the other kept at low tide level. This means is not satisfactory for continuous power unless the reservoirs are very large to prevent loss of head between tides and the dams correspondingly expensive. For the Bay of Fundy this method does not seem to be feasible because of the cost and the necessary interference with navigation. It is our proposal to use the tidal current flow rather than the head, in solving the problem.

An examination of the rate of tidal flow in the Bay of Fundy shows a remarkable variation. The general rate in the middle of the Bay is between one and two knots. The maximum at Digby Gut is four knots. The highest rate is in Minas Channel, where the maximum rate is between eight and ten knots, i.e. between nine and eleven and one-third miles per hour, a rate of flow far surpassing the current of the swiftest streams, and equalled by tidal current at only two other spots on earth.

When we consider that the power increases as the cube of the rate of current flow, this very high rate assumes larger proportions. It is evident, then, that if any development of tidal power is to take place in a favorable location, it must be at the Minas Channel.

I wish here to make a personal explanation. A little over a year ago at the maritime forward movement meeting in Amherst, I made the statement that it would pay the governments of the maritime provinces to offer a prize of $1,000,000 to the person who would invent a workable motor for the utilization of Bay of Fundy tides. This statement was much quoted and discussed. Needless to say, the government did not rush at this suggestion. The matter, however, would not be driven from my mind, and I continued to consult with Professor R. P. Clarkson, Ivan Curry professor of engineering at Acadia University, and together we have been working at the problem. The solution which I am to present to you is the result of his inventive genius.

In the first place let me remind you of certain difficulties connected with the development of tidal power. For four periods in every twenty-five hours the tidal flow stops, and these periods do not recur at the same time every day. Some form of storage is therefore necessary. Storage batteries are prohibited on account of cost. A supplementary plant to operate at these times would have to be large enough to carry the peak load and therefore might as well be operated all the time

In the second place the flow is not only entirely stopped for four periods in every twenty-five hours, but the tidal height is constantly changing and the rate of flow varies considerably. It would be difficult to adjust any direct connected machinery depending on tidal height or rate except to the lowest efficiency.

In the third place, any scheme of tidal power development must not interfere with navigation.

A power plant, then, for even a favorable tide like the Bay of Fundy must be so adjusted as to give continuous, regular and sufficient power, with low cost of installation and operation, and at the same time not interfere with navigation.

A visit to Cape Split reveals one of the grandest views in Nova Scotia. Perpendicular cliffs rise abruptly over three hundred feet. A detour of two miles is necessary before one can ascend the cliffs. Even one unacquainted with engineering easily recognizes that an ideal hydro-electric plant would be a reservoir containing an inexhaustable supply of water located at the top of this cliff and feeding to hydraulic turbines placed at the base of the cliff, these turbines discharging directly into the sea

This would do away with flumes penstocks and tail races which are usually the most expensive parts of a water-power. Everything is most favorable for such a plant here, and everything is provided except the

(Continued on Page 6)