Canadian Water Power Developments during 1935

By Dr. Brysson Cunningham

THE series of reports¹ recently issued by the Dominion Water Power and Hydrometric Bureau indicate that, during the year 1935, there was steady progress in the development of water power in Canada, resulting in a substantial addition to the aggregate power installation, which on December 31 last reached a total of 7,909,115 horse power, as compared with 7,547,035 horse power at the close of the preceding year. The accompanying table shows the distribution of power among the provinces of the Dominion. It is pointed out that while the increase in generating

latter installation, which has been already described in NATURE², comprises very important control works on the St. Lawrence River, with the diversion of an authorised quantity of 53,072 cu. ft. per second from the river flow. These control works have now been completed. The MacLaren-Quebec Power Company has added a fourth 30,000 horse power unit to the High Falls installation on the Lièvre River, bringing it up to its total ultimate capacity of 120,000 horse power.

It is, accordingly, evident that the activities of the various companies and authorities engaged in hydro-electric exploitation continue unabated, but there is still ample scope for further development, since it is reliably estimated that Canada has an aggregate available water power totalling 20,347,400 horse power under conditions of ordinary minimum flow, and 33,617,200 horse power ordinarily available for six months of the year. Even these figures are probably understatements, for on the basis of the actual water-wheel installation throughout the Dominion, there is a realised excess of 30 per cent over the calculated quantities, so that it may confidently be stated that the actually recorded resources of the Dominion admit of a turbine installation of some 44,700,000 horse power, of which only about 18 per cent has so far materialised. Yet, even this relatively small percentage places Canada with its 722 horse power per 1,000 inhabitants in an outstanding position amongst the water power using countries of the world. The provinces of Ontario and Quebec jointly possess more than 81 per cent of the total developed power, representing, in Quebec, a proportion of 1,258 horse power per 1,000 inhabitants, and in Ontario, 712 horse power per thousand.

It is interesting to note the uses to which the power is put. Almost 88 per cent of the total hydraulic development is utilised in central electric stations, and represents more than 95 per cent of the main generating equipment of the industry which, in turn, generates more than 98 per cent of the total electricity produced for sale in Canada and for export. Although not specially remarkable in size or power, the view in Fig. 1 is interesting as an example of a recent development at Sault Ste. Marie, on the St. Mary River, Ontario. The installation is of 28,050 horse power

Available and Developed Water Power in Canada, January 1, 1936.

Province	Available 24-hour power at 80 per cent efficiency		Turbine installation (h.p.)
	At ordinary min. flow (h.p.)	At ordinary six months flow (h.p.)	
British Columbia	1,931,000	5,103,500	718,497
Alberta	390,000	1,049,500	71,597
Saskatchewan	542,000	1,082,000	42,035
Manitoba	3,309,000	5,344,500	392,825
Ontario	5,330,000	6,940,000	2,560,155
Quebec	8,459,000	13,064,000	3,853,320
New Brunswick	68,600	169,100	133,681
Nova Scotia	20,800	128,300	116,367
Prince Edward Island	3,000	5,300	2,439
Yukon and Northwest Territory	294,000	731,000	18,199
Total	20,347,400	33,617,200	7,909,115

capacity is noteworthy, there is even greater significance in the continued growth of the demand for power, as reflected in the monthly records compiled by the Dominion Bureau of Statistics, which indicate a steady increase, month by month, over the figures for the previous year, amounting in general to more than 11 per cent. This increase, it is stated, is not confined to any one part of the Dominion but extends from the Atlantic to the Pacific.

Among the chief installations inaugurated in 1935 were three additional units of 66,000 horse power each at the Canyon station of the Ontario Government on the Abitibi River, bringing the station up to its full capacity, as designed, of 330,000 horse power, and the addition of two 50,000 horse power units at Beauharnois, on the St. Lawrence River, by the Beauharnois Light, Heat and Power Company, bringing the number of units at that station up to eight, with an aggregate capacity of 400,000 horse power. This

and belongs to the Great Lakes Power Company. Another channel of absorption is the pulp and paper industry, Canada's predominant manufacturing activity, which has hydraulic installations of 605,346 horse power and a motor installation for operation by hydro-electricity aggregating more than 1,029,000 horse power, or a combined mechanical installation of more than 1,634,000 horse power. In addition, the industry purchases large quantities of electricity from the central

industry in Canada. A particularly notable feature is the large volume of lower grade ore which can be, and is, profitably mined as a result of the low cost of power. In the latest Annual Report issued by the Dominion Bureau of Statistics on the mineral production of Canada, it can be seen that the Dominion produces, normally, about 90 per cent of the world's supply of nickel, 60 per cent of its asbestos, nearly 35 per cent of its cobalt, 12 per cent of its gold and lead, 10 per cent of its

FIG. 1. Sault Ste. Marie development, St. Mary River, Ontario. 28,050 horse power. Great Lakes Power Co., Ltd.
By courtesy of the Canadian Official News Bureau, London.

electric stations for use in electric boilers. Fig. 2 shows a development of 56,250 horse power at Smoky Falls on the Mattagami River, belonging to the Spruce Falls Power and Paper Company Ltd.

Water power is also a valuable aid to the mineral industries, and indeed its importance in this respect can scarcely be overstated. The convenient location of ample supplies of hydraulic power economically adjacent to mineral fields and centres of mining activities, and the consequent low price generation of power have been dominant factors in the successful development of the mining

silver, 15 per cent of its zinc and 13 per cent of its copper, besides being one of the major producers of the platinum metals and of aluminium, radium and uranium. Moreover, there is a wide field among the rocks of the great Laurentian Plateau or Pre-Cambrian Shield for the further exploitation of mineral deposits, remarkable alike as regards variety and extent, and this area contains nearly 60 per cent of Canada's available water power, an endowment which is highly favourable to economic development. The Report of the Water Power Bureau affirms that "so far as information is available, there is no present or

prospective mineral area, with the exception of some of the coal fields of the middle plains, where hydraulic energy cannot be made available as demand arises".

One of the most enterprising administrative organisations of the Dominion is the Quebec Streams Commission, which continues to maintain efficiently the desired regulation of flow on all the controlled rivers by means of its extensive system

regard to the regulation of operations, and the levying of rates and other matters connected with the production and distribution of electrical energy in the Province.

With these evidences of the energetic exploitation of its resources of water power, so realistically described in French as *la houille blanche* (white coal), it can be seen that Canada is more than counterbalancing its deficiency in natural fuel. At

FIG. 2. Smoky Falls development, Mattagami River, Ontario, 56,250 horse power. Spruce Falls Power and Paper Co., Ltd.
By courtesy of the Canadian Official News Bureau, London.

of storage reservoirs in various parts of the province. The Commission now controls seventeen reservoirs, some of them of very considerable size. During the year under review, important legislation was passed by the Quebec Provincial Government extending the powers and activities of the Commission to the actual development and utilization of water power sites, the operation of hydro-electric installations and the production and transmission of hydro-electric energy, as also its purchase from other central electric stations and its re-sale to municipalities and other consumers. A new Commission, the Quebec Electricity Commission, has been created with wide powers in

a moderate estimate of equivalence, the present hydro-electric installations, on the record of their output for 1935, are shown capable of effecting a saving in coal of 19 million tons per annum, and since owing to the lack of geological coal deposits, the highly industrialised Provinces of Ontario and Quebec are under the necessity of importing supplies, it is obvious that the substitutionary power is of the highest importance to their commercial welfare.

¹ Hydro-electric Progress in Canada in 1935. Paper No. 1871. Water Power Resources of Canada, and Hydro-electric Progress in 1935: A Review of the Year's Activities. By the Hon. T. A. Crerar, Minister of the Interior. Paper No. 1879. (Ottawa: Dominion Water Power and Hydrometric Bureau, 1936.)

² NATURE, 131, 788 (1933).