

should be encouraged to locate where hydro power is available.

Water power must be depended upon very largely to serve the industrial fuel-power situation in the "acute fuel area" of Canada.

The relation between developed water power and the coal production and consumption in the various provinces is represented on Plate 2. It is interesting to note that in the "acute fuel area" there is about as much water power developed, so far as coal value is concerned, as there is coal consumed. It is portentous that the bulk of our water power production at the present time is within the "acute fuel area," and it is reassuring to know that our largest and most important potential water powers are located within transmission range of present congested industrial districts within the "acute fuel area."

### Canada is Exceedingly Fortunate in the Extent and Location of Her Water Powers

When considered in retrospect, the production of hydro power in Canada has undoubtedly been an industrial achievement and an engineering triumph worthy our nation. In the short space of about twenty-five years, there has been developed and put in use, nearly 1,800,000 water horse-power. A tabulated statement (see Plate No. 3) of the water power development in other countries, compiled recently from all available data, shows the universal importance of this resource and indicates the splendid comparative position Canada enjoys in both potential and developed water power. The present per capita power development in Canada is larger than all other countries except Norway. It is the same with respect to our known undeveloped water power. No country enjoys to a greater degree the benefits of cheap, dependable hydro power, and no country has had these benefits more universally applied for municipal, industrial and domestic use. That Canada is recognized as one of the great water power countries in the world is due largely to:

- (1) The nature and extent of our water resources—abundance and seasonable distribution of rainfall; the regimen of our rivers—upper waters well forested with large lakes, suitable for regulation—rivers flowing through valleys with well concentrated falls.
- (2) The fortunate location of the waterfalls with respect to existing commercial centres, and related raw materials.
- (3) The consistent endeavors of governments, Dominion and provincial, in having water powers thoroughly investigated and intelligently administered.
- (4) The business acumen and foresight of the capitalist, and the professional skill and courage of the engineer, in blazing the trail of pioneer water power development and use.
- (5) The almost universal adaptation of electric energy for municipal, industrial and domestic purposes.

### Fortunate Location of Water Powers

The outstanding feature of the water powers of Canada is their fortunate location with respect to existing commercial centres. Within economic transmission range of practically every important city from the Atlantic to the Pacific, except those in the central western prairies, there are clustered water power sites, which will meet the probable demands for hydro power for generations. The following table, prepared by the Dominion Water Power Branch, indicates, reasonably accurately, the provincial distribution of the developed and undeveloped water powers within the settled portions of the Dominion.

Province.	Power available.	Power developed.
Ontario .....	5,800,000	789,466
Quebec .....	6,000,000	520,000
Nova Scotia .....	100,000	21,412
New Brunswick .....	300,000	13,390
Prince Edward Island .....	3,000	500
Manitoba .....	3,500,000	76,250
Saskatchewan .....		100
Alberta .....		32,860
British Columbia .....	3,000,000	269,620
Yukon .....	100,000	12,000
Total .....	18,803,000	1,735,598

### Small Portion (Not 10 Per Cent.) of Canada's Available Water Powers Developed

In general, the use of water power in Canada may be briefly described as follows:—

(a) For municipal, including domestic and ordinary industrial purposes, about 78 per cent. of total developed or 1,348,490 horse-power.

So far as these uses are concerned, further requirements will probably be met for some years by additional installations at, and increased storage for, existing plants. In certain centres, however, as for instance the Niagara power zones, growing requirements can only be met by new water power developments.

(b) Pulp and paper, about 14 per cent. of total developed or 248,075 horse-power.

Further pulp and paper plant requirements can probably be met for some time by additional installations to present plants, although the tremendous growth of this industry will necessitate the development of new water powers in different parts of the Dominion. There are now 54 pulp and paper plants scattered throughout Canada and several new plants have been under serious contemplation, some of which would be in use now had it not been for the difficulty of financing due to war conditions.

On account of the isolated nature of the industry—away from commercial centres—power requirements for pulp and paper need not conflict with other demands upon hydro power.

(c) Electro-chemical and similar processes, about 8 per cent. of total developed, or 140,000 horse-power.

While the United States have achieved almost a world supremacy in electro-chemistry, this industry in Canada is of very recent growth. It has, however, expanded at an enormous rate, entailing recent extensive additional installation in present plants, and requiring in the near future the development of additional water power sites. Our propinquity to the United States, and our abundance of essential raw material will compel the migration to the Dominion of many new electro-chemical plants of importance and value.

The products of the electro-chemical industry are extremely diversified. They include aluminum, silicon, calcium-carbide, cyanamid, ferro-alloys, graphite, carborundum, chlorine, etc., many of which are indispensable in the arts and in manufacture. Without aluminum the modern high-speed scout airplane would not exist; without electro-chemical abrasives and ferro-alloys manufacturing processes would be lengthened many-fold. Our industrial supremacy in times of peace is dependent upon these products to a very considerable extent.

One of the most important electro-chemical processes is the fixation of nitrogen. About 30,000 h.p. is used for this purpose at Niagara by the American Cyanamid Com-