

COMPARISON BETWEEN HEATING BY FUELS AND ELECTRICALLY

Bulletin Shows Electricity impracticable for House Heating Owing to Cost and Power Required.

PRACTICAL VIEW

The heating of houses by the use of fuel and by electricity is the subject of a bulletin prepared by A. S. L. Barnes, assistant engineer of the staff of the Hydro-Electric Power Commission of Ontario, and issued by the Honorary Advisory Council for Scientific and Industrial Research. The writer of the bulletin shows that electrical heating of houses is not practicable in existing conditions, as the following extracts indicate:—

"The fuel problem to-day is so serious that technical men all over the country are looking at it from every aspect; the more efficient use of coal in furnaces, the manufacture of gas from coal, peat, etc., the briquetting of lignite coal and peat, and the possibilities of electric heating have all been receiving careful attention for some time.

"Unfortunately, some engineers and a few other persons, who ought to know better, have been giving out hints that sooner or later electricity would come to the rescue and solve the heating problem completely. Unquestionably, in some of the more temperate regions of the world such comparatively small amount of heating as is required may be supplied through the medium of electricity, but the situation in Canada is altogether different.

"The climate of the greater part of this country is so severe in the winter that even the immense potentialities of its water-powers, if fully developed, would be altogether inadequate to cope with the demand for power for electric heating if this were fostered to any considerable extent.

"An attempt is here made to eradicate, if possible, from the popular mind this idea that electricity is destined to take the place of coal or other fuels for the heating of houses, offices, etc., on an extensive scale; and, at the same time, to indicate in what manner electric energy may be most usefully and economically applied for heating purposes.

ADVANTAGES OF ELECTRIC HEATING.

"Undoubtedly electric heating approaches more nearly to the ideal than that obtained by any other means. Electric heaters can be designed for operating at any desired temperature, i.e., they may be arranged to work at a high temperature and give off radiant heat like a fire, or they may be designed for operation at a low temperature like a hot-water or steam radiator, and give up their heat by convection; that is, the heat is convected (or conveyed), by setting the particles of air in motion, to various parts of a room. There is no dust, smoke, smell, or noxious gas from an electric heater, no soot, ashes, or dirt of any kind, and it does not vitiate the atmosphere by using up the oxygen; the heating can be under complete and ready control by the turning of a switch, thus decreasing or increasing the number of heating elements in service or shutting off the current entirely; automatic control by means of thermostats is, of course, possible. Electric heaters can be obtained in portable form, and there is less risk of fire from electric heating than from any other method.

COST WOULD PROHIBIT.

"The difficulties in the way of electrical house heating on a general scale are shown by a comparison of costs of coal and electricity, and by figures showing the power which would be required for general electrical heating.

"Power at an average rate of 10.5 horse-power would be required through-

out the entire season. Electricity is sold by the kilowatt hour, and a kilowatt equals 1.34 horse-power, therefore if the price per kilowatt hour be, say, 1 per cent, the price per horse-power hour would be practically 0.75 per cent, so that the season's bill on this basis, if electricity were used, would be 53,920 by 0.75, which equals \$3.97, the net amount would be 10 per cent less, viz., \$3.57. People would not care to pay so large a bill for heating an 8-roomed house for a single season. The power required would be another difficulty. For example, there are about 80,000 homes in the city of Toronto; if each of these is to be heated and a demand of, say, only 12 horse-power per home must be met (probably a very conservative figure as an average for large and small homes) no less than 960,000 horse-power must be supplied for homes alone—no factories, no offices, no works, no street cars, no houses, even, will get any lighting or power from this, it is all required on the coldest days for heating homes alone, and more will be needed in proportion as the population increases. The great Chippewa scheme at Niagara Falls only contemplates developing 300,000 horse-power for the present, and the total generated at Niagara 780,000 horse-power, and the entire maximum demand for all Toronto at present, including all power, lighting, and traction purposes is only in the neighbourhood of 125,000 horse-power.

"It may be added that the 6,000,000 horse-power, which represents the estimated total possible development of Ontario water-powers, is not sufficient to supply merely the existing homes of Ontario with electric energy for heating alone, exclusive of all other domestic, commercial and industrial requirements."

GROSS EARNINGS OF ELECTRIC RAILWAYS

The following table shows the gross earnings of the electric railways of Canada from 1901 to 1918, as published in the annual report of the Department of Railways and Canals:

Year.	Gross earnings.
1901	\$ 5,768,283
1902	6,486,438
1903	7,233,677
1904	8,453,609
1905	9,357,125
1906	10,966,871
1907	12,630,430
1908	14,007,049
1909	14,611,484
1910	17,100,789
1911	20,356,952
1912	23,499,250
1913	28,216,111
1914	29,691,007
1915	26,922,900
1916	27,416,285
1917	30,237,664
1918	24,299,890

The operating expenses of these railways in 1918 were \$17,535,974.63, and the rate of operating expenses to gross earnings was 72.17.

Owing to the non-availability of statistics of the Montreal Tramways and two other units, they are not included in the above.

CONTRACTS AWARDED BY ORDER IN COUNCIL

The Department of Public Works, Ottawa, has awarded the following contracts under Order in Council:—

St. John, N.B.—Alterations and additions to Post Office fittings. Contractors: John Flood & Sons, of St. John, at \$1,950. Order in Council dated July 15, 1919.

Midland, Ont.—Renewals to Governments wharfs Nos. 1 and 2. Contractor: Wm. Henry McArdle, of Midland, at \$3,291.30 (unit prices). Order in Council dated July 15, 1919.

Portage du Fort and Bryson, Que.—Painting of bridges. Contractors: Canadian Sand Blast Company, Limited, of Montreal, at \$4,950. Order in Council dated July 15, 1919.

Halifax, N.S.—Alterations and additions to fittings in Post Office. Contractors: Thomson & Theakston, of Halifax, at \$9,790. Order in Council dated July 22, 1919.

INCREASING TENDENCY TO MARKET OWN LIVE STOCK CO-OPERATIVELY

Rapid Growth of Movement Among Farmers of Dominion to Market Their Live Stock Themselves.

STRONG IN WEST

"More than seven thousand cars of live stock were marketed co-operatively by the farmers of five provinces in Canada last year, and this system is only commencing. This augurs well for the live stock industry, which is entering upon a period of unprecedented development. The world is very short of its live stock needs. Canada, according to official statistics, has only six head of cattle to the hundred acres of land used for farming purposes, whereas the United States and Australia have eight, Italy ten, France twelve, Great Britain and Germany sixteen, Denmark twenty-five, and Holland twenty-nine head. Canada's position in the ranks of hogs and sheep is also very low as compared with many other countries. The hope of continued prosperity in Canada depends on the success of the farming industry, and it is recognized that live stock is at the very base of agricultural welfare," it is stated in a leading article in the July issue of the *Agricultural Gazette of Canada*, edited by Mr. J. B. Spencer, B.S.A., and published monthly by the Department of Agriculture.

MOVEMENT GREATER IN WEST.

"The co-operative marketing of live stock has made greatest progress in the Prairie Provinces," the article continues. "Dotted over the country from Winnipeg to the Rockies, local live stock shipping associations are in operation. Many of these are associated with the grain growers' movement, but in Saskatchewan more especially stock marketing associations incorporated under the Agricultural Associations Act are doing business on an extensive scale. In Ontario from two hundred to two hundred and fifty organizations are shipping. Many of these organizations had their origin in farmers' clubs, while others began under the auspices of the United Farmers' Association. In Quebec the Cheesemakers' Agricultural Co-operative Association markets all classes of commercial live stock, while the live stock associations handle breeding stock. In the provinces farther east co-operative marketing has been applied more especially to sheep and lambs. It is fair to assume that at a comparatively early date much of the live stock in Canada will be marketed by the farmers themselves, who through the system will become familiar with the methods and principles of marketing and will thus be encouraged to so improve and finish their animals as to reap the full value of their efforts."

GEODESY DEFINED IN SURVEY PUBLICATION

Science of Surveying Extended to Large Tracts of Country

"Geodesy is the science of surveying extended to large tracts of country, having in view not only the production of a system of maps of very great accuracy, but the determination of the curvature of the surface of the earth and eventually of the figure and dimensions of the earth. This last, indeed, may be the sole object in view, as was the case in the operations conducted in Peru and in Lapland by the celebrated French astronomers, P. Bouguer, C. M. De La Candamine, A. C. Clairaut and others, and the measurement of the meridian arc of France by Michain and Dalambre had for its determination the true length of the 'Metre' which was to

be the legal standard length of France. "The basis of every extensive survey is an accurate triangulation, and the operation of geodesy consists in the measurement, by theodolites, of the angles of the triangles, the measurement of one or more sides of these triangles on the ground, the determination by astronomical observations of the azimuth of the whole network of triangles; the determination of the actual positions of the same on the surface of the earth by observations, first for latitude at some of the stations, and secondly for longitude and the determination of altitude for all the stations. The azimuth and longitude must always be observed at the same station, thus providing a Laplace determination to control the twist of the triangulation. For computation the points of the actual surface of the earth are imagined as projected along their respective plumb lines on the mathematical figure which is given by the stationary sea level and the extension of the sea through the continents by a system of imaginary canals.

"For many purposes the mathematical surface is assumed to be a plane; in other cases a sphere of radius 6,371 kilometres (20,900,000 feet); in case of extensive operations the surface must be considered as a compressed ellipsoid of rotation, whose minor axis coincides with the earth's axis and whose compression, flattening or ellipticity is about 1/298."

The above is taken from a bulletin entitled "Standards of the Geodetic Survey of Canada," by Mr. F. A. McDiarmid, and issued by the Geodetic Survey, Department of the Interior.

Regina Tender.

Sealed tenders addressed to the undersigned, and endorsed "Tender for Paving Lane Adjoining P.O. Building, Regina, Sask.," will be received until 12 o'clock noon, Monday, August 18, 1919, for paving lane adjoining Post Office Building, Regina, Sask.

Plans and specification can be seen and forms of tender obtained at the offices of the Chief Architect, Department of Public Works, Ottawa; the Clerk of Works, Regina, Sask.; and the Resident Architect, 802 Lindsay Building, Winnipeg, Man.

Tenders will not be considered unless made on forms supplied by the Department and in accordance with the conditions contained therein.

Each tender must be accompanied by an accepted cheque on a chartered bank payable to the order of the Minister of Public Works, equal to 10 p.c. of the amount of the tender. War Loan Bonds of the Dominion will also be accepted as security, or War Bonds and cheque if required to make up an odd amount.

By order.

R. C. DESROCHERS,
Secretary.

Ottawa, July 25, 1919.
Department of Public Works,

Expenditure on Canals.

The total expenditure on the Dominion canals for the twelve months ended March 31, 1918, was \$3,327,556.55, comprising \$1,781,957 charged to capital, \$111,552.28 charged to income, \$859,119.25 for staff, and \$574,927.95 for repairs, the last two items being charged to revenue, as stated in the annual report of the Department of Railways and Canals.

Employed on Railroads.

In 1918, 143,493 persons were employed on Canadian railways, and the wages and salaries paid to them amounted to a total of \$152,274,953, according to the annual report of the Department of Railways and Canals.

Cost of Railway Fuel.

In 1913 the average cost of the fuel consumed by Canadian railways was \$3.07 per ton, and in 1918 it was \$5.17 per ton, according to statistics compiled by the Department of Railways and Canals.

War Savings Stamps pay 4½% compounded half-yearly.