This is a matter for both the Provincial and Dominion Governments. The Dominion Government should increase and extend their facilities for securing, recording and tabulating the rainfall and snowfall in every section of Canada. The Provincial Governments may very properly be expected to rate the flow of the various rivers and streams of the Provinces, and it is also as important that this rating should be carried on during different seasons and throughout several years, otherwise they will be valueless.

This is a matter for engineers. They, more than any other class of citizens, appreciate the value of such records. They, better than anyone else, can discuss this matter and make plain the necessity of the work. Engineering societies might very properly take the initiative and urge the necessity of the work.

PRODUCER GAS PLANTS vs. ELECTRIC POWER.

The cost of power production through the agency of producer gas plants and other prime movers under the conditions obtaining in Ontario is dealt with fully by the recent report of the Hydro-Electric Commission.

The general summary states that users of small amounts of power will be best served by electricity where it can be obtained at a price per electric horse-power not exceeding by more than 15 per cent. to 25 per cent. the cost per brake horse-power developed by gas, gasoline or oil. Users of large amounts of power where the load fluctuates, says the report, will be justified in paying for electric power 30 per cent. more than the cost per brake horse-power obtained from gas, gasoline, etc. The summary adds that where the cost of producer gas power per brake horse-power does not work out 15 per cent. below the cost of hydro-electric power per electric horse-power it will be advisable to use the latter.

Many pages of the report are taken up with tabulated statistics. It is found that with a 500 horse-power producer gas engine running full load for 3,000 hours a year (ten-hour day), the power costs $21.86 per horse-power per year. Under the same conditions, with a 100 horse-power engine, the cost is $27.32 per horse-power per year; with a 50 horse-power, $30.66; and with a 10 horse-power, $64.70. If the conditions are changed so that the engine works 6,600 hours a year, the cost would be with 500 horse-power $36.40 per horse-power per year; with 100 horse-power, $45.54; 50 horse-power, $51.32, and 10 horse-power, $107.09.

The cost varies as the load varies, however. and in the report is a statement showing the cost when the engines are running at 75 per cent. of rated capacity. For the ten-hour day under such a load with a 500 horse-power engine the cost of the power used would be $27.43 per horse-power per year; 100 horse-power, $34.62; 50 horse-power, $39.58, and 10 horse-power, $84.37. Working 6,600 hours a year at the same load the figures are: 500 horse-power, $45.22 per horsepower per year; 100 horse-power, $56.76; 50 horse-power, $65.56; 10 horse-power, $138.61.

Cost Includes.

This cost includes fixed charges, maintenance and repairs, labor, anthracite coal at $5 a ton, oil, waste, and sundries. The fixed charges include interest on capital, invested at 5 per cent.; depreciation in machinery, 6 per cent.; depreciation on buildings, 2 per cent.; insurance and taxes, 2½ per cent., and repairs on building, 2 per cent.

The total capital cost, including building, etc., for a 500 horse-power producer gas engine is placed at $35,162, while for a 10 horse-power engine it is $1,867. The maintenance account for 500 horse-power for a ten-hour day a year is placed at $618.24; labor, $1,200; and oil, waste, etc., $750. The fuel bill, of course, varies considerably with the load factor, though not proportionately. For a ten-hour day, the engine running at full load, the yearly fuel bill is given as follows; 10 horse-power, $93; 30 horse-power, $261; 50 horse-power, $390; 100 horse-power, $750; 300 horse-power, $2,250; 500 horse-power, $3,750.

The report's figures regarding the yearly cost per horse-power for gasoline power is in most cases about double that of producer gas, while the prices regarding natural gas and steam vary greatly according to the cost of fuel, etc.

Reliability.

In reference to reliability of producer plants the report says:—

"Although the producer gas plant has not been long in commercial existence in this country as compared with other prime movers, there is no reason to anticipate that satisfactory results cannot be obtained with it where it is used within its proper limits. To ensure these results it is necessary that a producer plant be suited to the conditions under which it works, that the type is selected and the plant installed under the supervision of a competent person independent of the selling agents, and that a trained man be placed in charge of it. A power user to-day would not be justified in investing in a producer gas plant unless the estimated saving in the total cost of power was sufficient to compensate him for an unreliable service. The producer gas plant compared to the steam plant is new, and the later plants give a more reliable service than the original types, so that in the future it may be anticipated that a type of producer gas plant will be evolved which will admit of comparison with the steam engine or electric motor on the basis of reliability under ordinary working conditions. An examination of a large number of plants for the purpose of this report has shown that the average reliability of the producer gas plant at present is not sufficient to admit of any comparison with that of the steam engine or electric motor."

Mr. F. T. Stocking examined eight producer plants in Canada. Four of these he found abandoned and four giving a measure of satisfaction. Two of the four, however, were owned by firms interested in producer plants. Mr. Stocking says:—

Faulty Accounting.

"The system of accounting as employed by small users of power has no doubt led to the impression that the gas producer engine is about to become the chief means of securing power in progressive manufacturing establishments. Costs of attendance and fuel are considered to be the only factors worthy of consideration when comparing the economic value of different prime movers. The charges against capital, repairs, failures of power and numerous minor expenses are usually placed in the background or entirely overlooked. The question of load factor is also little understood by the average power user. Costs are usually based on the full load conditions, which, in the ordinary factory, obtain for only a short time, while for the remainder of the day a very much smaller load is being carried. In the majority of cases, the average day load throughout the year is less than half of the maximum for that year. The overload capacity of the average gas engine is almost nothing. In buying an engine, some margin must of necessity be left for unusually busy days, for a poorer grade of coal than the ordinary, and for at least some slight addition to the load in the future; hence, the gas engine in the ordinary factor is compelled to carry an average load of less than one-half its rated capacity. (This statement would be considered erroneous by the majority of people, but it is nevertheless true)

There are some special cases where the load can be maintained almost constant for the whole year, but these are very exceptional. It follows, therefore, that the average gas power user is paying for his power just double what he considers to be the case. This neglect of considering the effect of load factor on the costs has led, more than anything else, to an optimistic view of the gas producer question.

Location Important.

"Another erroneous impression which the public appears to hold is that a small gas producer (since it requires no smoke stack) may be placed in almost any part of a building