

sequently can be released in order to augment shortage of power resulting from low-water conditions at, say, the Muskoka or Saugeen plants.

In the districts just referred to we thus find the feasibility of co-ordinating at least six hydro-electric plants and two steam-electric plants. In addition, if future requirements so warrant, it is contemplated to install frequency changers so that the Niagara system of the commission,—the transmission lines of which run close to the systems above referred to,—may also be brought into parallel with them.*

From the foregoing illustration we perceive how widespread is the movement to attain the efficiency possible by intelligent co-ordination; and also, how diverse are the basic factors admitting of combination. No doubt in future, more than in the past, those installing new electric systems, or remodelling older systems will ensure that designs are adopted which will facilitate the taking advantage of the benefits resulting from possible paralleling with other systems.

Conclusion

Now, the burden of many of the comments and illustrations above given is this: On the principle that a "penny saved is a penny made," there should be careful investigation of some of the outstanding typical conditions under which coal at present is being consumed in Canada, whether in the home, in the institution, in the office building, in the small manufactory or in the larger industrial plant. If authorities have found, for example, through the enforced utilization of insulation upon steam piping, heaters, etc., or by the shutting down of uneconomical plants, or the substitution of efficient for inefficient apparatus, or the repair of apparatus, or in other ways, that very substantial savings of coal may be effected, then such economies, according to some reasonable scheme of administration, should be made compulsory in Canada. It is not the intention here to suggest any unreasonable procedure in connection with these matters. Certain economies involving radical changes may not be made fully effective except over, possibly, a five or a ten-year period. In other instances, however, substantial economies can immediately be effected to the benefit of the coal consumer, to the transporter and to the country as a whole. These, then, should receive prompt and best attention. Why, for example, should Canada be compelled—especially under conditions of coal shortage—to provide for the obtaining and transportation year after year of, say, ten tons of coal per annum to a certain consumer, if, through the wise expenditure of a few extra dollars, either in initial outlay for better apparatus or by effecting certain changes in existing equipment, the individual would only require to be supplied with seven or eight tons? The days for the widespread use of anthracite coal are numbered. Doubtless, in relatively few years its use will be authoritatively restricted. Bituminous coals and lignites will be subjected to by-product and other manufacturing processes with the object of producing a satisfactory and clean-burning fuel. Canada cannot and must not ignore the march of progress in these fuel problems, nor in effecting economies by the prevention of needless fuel and power wastes.

*For valuable résumé of activities of the Commission, consult "Electric Power Generation in Ontario on Systems of Hydro-Electric Power Commission," by Arthur H. Hull, in "Proceedings of American Institute of Electrical Engineers," January 1st, 1919; also published in *The Canadian Engineer*, issues of December 12th and 19th, 1918.

The Water Power Committee, appointed by the Conjoint Board of Scientific Societies of Great Britain, will soon issue an additional report, giving particulars which have been obtained since the publication a couple of months ago of the preliminary report. Sir Dugald Clerk, chairman of the committee, has informed *The Canadian Engineer* that it will be some time, however, before the final report of the committee is presented.

NATIONAL HIGHWAY COMMISSION

For Administration of a National Highway System, is Advocated by the Committee of the American Road Builders' Association

In Canada, organization of provincial departments, legislation and national functions differ from those in the United States in such manner that many matters that are problems for the states, present no difficulties to our provinces. On the other hand there are many similar and even identical problems to be solved. While the following report, which was presented last month to the American Road Builders' Annual Congress, at New York, by a strong committee, refers only to the United States, it contains much that applies with equal force to Canada.—EDITOR.

HIGHWAY transportation has changed so radically within the last ten years, due to the development of the passenger automobile and the motor truck, that the highway and highway-transportation problems of ten years ago have little relation to those of the present. Our highway plans of the future must be based upon the potentialities of the motor vehicle. It is necessary, therefore, to throw off the limitations of past traditions and to plan for the future with a vision commensurate with the prospective development of motor carriage.

While indications of this new era in highway transportation, with its attendant problems, have been apparent to thinking men for five or more years, the public did not grasp the revolutionary character of the change until the war threw upon the highways the burden of relieving the industrial distress brought about by the inability of our railways to care for the enormous war traffic. As a result of this experience, the public now recognizes that motorized highway transportation is an essential factor in our economic life. Consequently plans that would have received no attention as late as the year 1916, are readily approved at the present time.

The development of our highway systems was entrusted originally to the townships, but their inability to handle the problem satisfactorily became apparent more than a generation back, and control of the principal roads passed to the counties. It remained with them until the advent of the motor vehicle. It soon became apparent that if the motor vehicle was to be used to maximum advantage, road systems extending under uniform control across county boundaries were necessary. For that reason, we have had in the last ten years a marked development of state highway systems. So important did the problem become, that in 1916 the plan was inaugurated whereby the Federal Government itself appropriated money to aid and encourage the states in the organization of strong state highway departments and the adoption of adequate state highway systems.

Enormous Motor Traffic

To-day highway traffic cuts across not only county boundaries but state boundaries as well; the passenger car and the motor truck have entered very extensively into interstate commerce. Conservative estimates place the passenger traffic of automobiles at 45 billion passenger-miles per annum, and the freight carriage at 6 billion ton-miles per annum. These figures are very conservative, considering that there are 6,000,000 motor vehicles in service, of which 500,000 are commercial cars, ranging from the light delivery wagon to the heavy truck.

To provide adequately for this traffic and to allow the nation to benefit to the maximum from the potentiality of the motor vehicle, it is necessary to provide properly built and maintained highway routes that cut across state lines, tying the principal cities of the nation together and connecting the interior with the seaboard. Such a system, adequate to the needs of present and future through motor traffic, can be secured only by the most perfect co-ordination between all of the states of the Union, or by the Federal Government undertaking the construction and maintenance of those routes.