WASTE.

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THERE are few subjects which occupy such a prominent position in the discussions relative to our Imperial economy as waste, and there will be no problem that will demand such concentrated attention in the immediate future. Commissions have been appointed by different governments to investigate this matter in connection with the natural resources, commerce, etc. Waste does not necessarily mean the wanton abandonment or destruction of things which can be put to any other use by changing their character. It includes inefficient production, inadequate foresight, lost motion in machinery or operation, redundant labor, etc. Waste is not confined to any particular profession, craft or business; it obtains, in a more or less degree, in almost every sphere of activity, and therefore cannot be attributed, specifically or entirely, to any special reason for it is the outcome of our national methods. Waste, however, has in the past occupied the attention and energy of men, for cities have been built on the profits derived from utilized waste, decaying industries have been revived by the recovery of products from what was previously dumped as waste. Waste gases have been converted into power on a huge scale. But there remains an immense field for further development along these lines. Engineers are probably more concerned in this problem, inasmuch as they, in the aggregate, handle more materials, control more work and spend more money than others, and to them the public must look for the practical application of discoveries by chemists, metallurgists, etc. The subject will be considered from the engineer's viewpoint.

Power is an important factor in connection with most undertakings. Where power cannot be derived from water then it is necessary to obtain it by other means, and, if possible, on the co-operation principle. Ontario is, in a large measure, enjoying the benefits of cheap power which is generated and distributed under a comprehensive communism. With adequate conservation and utilization of the available water power of the province, it is possible for the towns and cities collectively to accomplish that which would be impossible for them to do individually, and further, the cost of the energy is much less by this communistic plan than it would otherwise be. In other words, waste has been reduced. Moreover, waste has also been minimized by "the construction of storage reservoirs scientifically located and operated," for this "is the most effective and only practical method of controlling flood waters in winter and increasing the flow of the stream during the summer droughts" (Walter McCulloch). Although water power is an attractive proposition, there are some conditions and features which render such schemes unremunerative with the result that, although the United States have at command an available energy of 36 million horsepower, possibly five-sixths of it now runs to waste. The water power available in Canada is estimated at about 25,000,000 horse-power but only 2,000,000 of it is now harnessed. There is, therefore, ample scope for development in this direction.

Take another line of thought. Dr. Frank D. Adams stated in an article published in *The Canadian Engineer* of February 18th, 1915, that "less than 1 per cent. of the coal resources of the Dominion are situated in Nova Scotia and New Brunswick, while 87 per cent. lie in Alberta," and that as much coal is wasted as is extracted owing to the methods adopted and that "this waste amounts to very many tens of millions of tons." Furthermore, the Commission of Conservation stated that "Canada's dependance on the United States for its supply of anthracite coal is a point strikingly indicated in the report issued by them on the 'Conservation of Coal in Canada.' Practically all of the most populous portion of Canada lying between Montreal, Que., and Moose Jaw, Sask., relies solely on the United States for its supply of anthracite coal."

It is clear "that Canada should carefully husband her coal resources and, so far as possible, check all wasteful methods of mining and handling coal. With this end in view, the report suggests greatly needed changes in the form of coal-mine leases, the provisions of which should be carefully enforced by a competent engineering authority. This would go far towards preventing the careless practices followed at present in many coal mines. In addition to this, it is urged that the government should carry on investigations with a view to determining the suitability of slack and low-grade coals for use in gas producers for generating power, and their adaptability for the manufacture of briquettes for domestic use. By utilizing these inferior products in this way, not only would there be less waste, but the value of the public coal lands would be considerably increased."

The lignite coal fields of the West are mined to a very insignificant extent. There are about 20,000 million tons of lignite lying in the prairie provinces which are not wasted but are not adequately utilized. This coal is most suitable for gas producers and some day huge central power plants will be located at the mine mouths to generate electrical energy for transmission to many parts of the provinces. Meanwhile, fuel is transported from the United States and from distant west Canadian coal mines at considerable cost, constituting another form of waste. Whilst many Canadian works have relatively efficient power plants, the majority cannot be placed in this category. Consequently central plants would be productive of great savings. It is worthy to note that there is a movement in Britain for great conservation of waste heat. The following is a cutting from the Engineering Supplement of the London Times for April 28th, 1916:

"The growing attention that is being paid to methods of utilizing the large quantity of surplus heat which is a by-product of our manufactures is a hopeful sign. The public discussion on the question which has just taken place at Sheffield was remarkable for the fact that it attracted the attendance of representatives of the iron and steel trades and scientific men, as well as those associated with gas, electricity, and colliery undertakings. The suggestion that there should be established a government department to control the supply of power and electric current on national lines is a somewhat drastic one, and a very strong case would have to be made out before it would be likely to find acceptance. But the proposal to harness all the waste energy of the South Yorkshire coal field and employ it in the form of gas or electricity in the iron and steel trades of the district is certainly attractive, the broad lines of the scheme being that the individual manufacturer in the Sheffield district should cease to provide his own power plant in favor of drawing supplies from a huge central station which would generate current from the waste energy available in the local coal field. It is suggested that if this plant met with general acceptance it would be possible to supply manufacturers over a wide area in the West Riding with current for power purposes at the low rate of .25d. per unit. There are many directions in which economies can be effected in manufacturing operations, and the provision of a source of cheap power supply would be least among them."