

Water-power versus Steam-power

In quoting figures on our utilized water-powers, it is customary to compare them with the cost of an equivalent amount of power produced from coal. This does not do full justice to our water-power, as many of the industries using it could not operate if compelled to use steam-generated power, while possibly the greater portion of those remaining would use imported coal, thus transferring to other countries the money value of the fuel used for power, which latter now remains in Canada.

The extent to which future utilization of our water-powers will enter into the industrial development of Canada will be measured by the energy and foresight of the various governments, particularly the federal authorities. In the past, we have relied too much upon the experience and investigations of other countries, trying, with more or less success, to adapt them to our conditions. In many cases, investigation work in connection with our water-powers and their utilization has been left to private interests; this has resulted in the acquirement by interested parties of a better knowledge of conditions than is available to those appointed to administer them for the public. Government engineers have often been handicapped by the lack of previous government investigation, as opposed to the thorough knowledge acquired by the engineers of parties interested in a proposed water-power project.

Systematic Water-power Investigations

The importance and necessity of further extending the systematic water-power investigations already initiated is fully realized. In organizing this work of investigation and research it will, no doubt, be under direct government control and guidance, but the splendid facilities offered by the laboratories of our universities and other institutions must also be utilized. The award of scholarships for research work on water-power development and industrial utilization would result in further valuable information.

The director of the research laboratory of one of the largest manufactories of electrical apparatus in the United States recently stated that, after the war, in many countries, a much more methodical and extended interest in, and support of, research will probably be found than existed before. The war has awakened renewed activity in the British Empire and elsewhere. The British Board of Education is putting forth a "scheme for the organization and development of scientific and industrial research," through a committee of the Privy Council and an advisory council, the latter to advise the committee of the council on

- (1) Proposals for instituting specific researches.
- (2) Proposals for establishing or developing special institutions or departments of existing institutions for the scientific study of problems affecting particular industries and trades.

(3) The establishment and award of research studentships and fellowships.

Australia also proposes to establish an Institute of Science and Industries whose functions are:—

- (1) To consider and initiate scientific researches in connection with, or for, the promotion of primary or secondary industries in the Commonwealth.
- (2) The collection of industrial scientific information and the formation of a bureau for its dissemination amongst those engaged in industry.
- (3) The establishment of national laboratories.

(4) The general control and administration of such laboratories when established.

(5) To promote the immediate utilization of existing institutions, whether federal or state, for the purposes of industrial scientific research.

(6) To make recommendations from time to time for the establishment or development of special institutions or departments of existing institutions for the scientific study of problems affecting particular industries and trades.

(7) The establishment and award of industrial research, studentships and fellowships, to include either travelling fellowships or fellowships attached to particular institutions.

(8) To direct attention to any new industries which might be profitably established in the Commonwealth.

(9) To keep in close touch with, and seek the aid of, all Commonwealth and state government departments, learned and professional societies, and private enterprises concerned with, or interested in, scientific industrial research.

(10) The co-ordination and direction of scientific investigation and of research and experimental work with a view to the prevention of undesirable overlapping of effort.

(11) To advise the several authorities as to the steps which should be taken for increasing the supply of workers competent to undertake scientific research.

(12) To recommend grants by the Commonwealth Government in aid of pure scientific research in existing institutions.

(13) To seek from time to time the co-operation of the educational authorities and scientific societies in the states with a view of advancing the teaching of science in schools, technical colleges and universities, where its teaching is determined upon by those authorities.

(14) To report annually and from time to time to Parliament.

Government Action re Research

The Japanese government has, during the past year, appropriated for a laboratory for physical and chemical research \$1,000,000, to which the Emperor has added \$500,000. The Canadian government has recently created an Advisory Council on Industrial and Scientific Research. Water-powers and their allied industries will, no doubt, be given the attention they deserve.

Water-power investigations may be divided into two classes, differentiated, in general, under the following heads:—

(1) The conversion of water-power to hydro-electric or other energy.

(2) The use or application of the converted energy to the best advantage under local conditions.

Under the first of these would come reconnaissance surveys, records of stream flow, evaporation, precipitation, and other climatic observations. Results of surveys and other information regarding undeveloped sites should be made available to the prospective power user. Recording the flow of streams should be extended to all rivers of importance, particularly those on which large water-powers might be developed. These records, when covering a period of seven years or more, are most essential in establishing the value and capacity of any water-power; without them, no competent engineer could recommend any expenditure of capital on an installation to develop the maximum power during the low-water season or at