During the succeeding eighteen months the National Research Council was thoroughly organised, and throughout this period rendered the greatest service to the nation in directing and conducting investigations connected with the prosecution of the war and with national welfare. Its activities were not confined to research alone, but a very important division occupied itself with general relations. Information was collected from foreign sources and distributed to those workers who had need of it. Large questions of reconstruction, education, and foreign relations were handled from the scientific and industrial aspects.

The technical divisions of the Council were as follows: Military; engineering; physics, mathematics, astronomy, and geophysics; chemistry and chemical technology; geology and geography; medicine and related sciences; agriculture, botany, forestry, zoology, and fisheries. Under these heads a large number of members were co-opted to deal with special subjects.

As will be seen, this very complete system enabled the National Research Council to bring under its direction practically everyone available whose capacity for research work was a national asset.

So successfully did the Council carry out the programme assigned to it that on May 11 of last year the President requested the National Academy to perpetuate the National Research Council in order that it might be available not only for war-time problems, but also for the large issues of peace.

The six paragraphs in which the President sums up the duties of the National Research Council are the clearest exposition possible of the relations of research and research workers to national efficiency, but they also point out what are the obligations of the nation towards stimulating investigation in the United States. Stress is laid on co-operative work, but it is pointed out that co-operation must be of such a type as to ensure individual initiative.

It is especially noteworthy in the President's order that collaboration of the scientific and technical branches of the Government, both military and civil, with the National Research Council is required. The nominations, however, to the Council from the Government bureaux are made by the president of the National Academy of Sciences. They are then designated by the President of the United States to take their place on the National Research Council. In this way the Government representatives are men whose scientific qualifications are vouched for by the president of the National Academy of Sciences.

Thus it is that the national direction of research work in the United States has become vested in a body of men whose conduct of research work during the war period of that country has shown that they are competent to handle the great problems which go with peace and reconstruction. The scheme is a wise one, because it calls for the closest co-operation between the Government

and the research worker, but leaves the decision as to the methods of attack in the problems involved in the hands of experts.

The financing of investigations under the National Research Council was carried on with funds which aggregated 54,096*l.* for the fiscal year 1919. These were derived from the Rockefeller Foundation, the Carnegie Institution, and the President's Fund.

Two important developments have taken place since the foundation of the Council. The first is the result of the Rockefeller Foundation entrusting to the Council the sum of 100,000*l.* for expenditure within a period of five years for research in physics and chemistry in educational institutions in the United States. The primary feature of the project is the initiation of research fellowships. This will open a scientific career to a larger number of able investigators, and will meet an urgent need of the universities and industries. It is expected that fifteen to twenty fellowships will be available during the coming year.

The second development brings the Council into the closest touch with the scientific and technical societies of the United States. By a recent decision of the Council the majority of the members of a division must be representatives elected by the leading scientific societies. In the division of chemistry and chemical technology, for example, nine members are elected by the Chemical Society, one each by the Electrochemical and Ceramic Societies, and one by the Institute of Chemical Engineers. Only six members are chosen by the Council itself.

There can be no doubt that this programme, in which the direction of national research work is placed in the hands of capable men of science, in which ample opportunity is afforded younger men of originality to develop their genius, and in which the head of the State and his advisers have actively attested the vital necessity of original investigation in any scheme of national efficiency, initiates an era of scientific productiveness for the United States far greater even than the important output to which we were accustomed before the war.

C. G. L. WOLF.

WATER-POWER DEVELOPMENTS.

THE prominence which has recently been given to the latent possibilities of power in streams, at present, from an industrial point of view, running to waste, has had the effect of stimulating public and professional interest to such a degree that reports and articles on the subject are now being published in close sequence, and we are appreciably increasing our knowledge of the conditions prevailing in appropriate regions, and of the measures which are desirable for exploiting such sources of power. The Royal Swedish Waterfalls Board is losing no time in developing the mountainous supplies of Lapland. The Canadian water-power departments are equally active as regards the hydrometric survey of Canada. Our own Government has taken the

welcome step of appointing a Board of Trade Committee to investigate the water-power resources of Great Britain and Ireland. Apart from State-controlled undertakings, we have the activities of unofficial bodies like the Water-power Committee of the Conjoint Board of Scientific Societies, the second report of which lies before us. It is a useful statement of information gleaned from inquiries in various parts of the world, but principally within the British Empire, since the publication in July, 1918, of the first report, which was summarised in *NATURE* of September 19, 1918. It dwells particularly and justifiably on the great strides which are being made in Canada. A perusal of this report in conjunction with a paper on "Science and Industry in Canada," read by Prof. J. C. McLennan before the Royal Society of Arts on March 4, certainly leads to a feeling of admiration for the energetic manner in which the Dominion has set about compensating itself for the shortage in its available coal supply. Although Canada takes second place in the list of the world's coal-fields, yet, owing to their geographical distribution and the difficulties of production, she has at present to rely to a very considerable extent on supplies from the United States.

The total estimated water-power of Canada is stated by Prof. McLennan to aggregate 18,800,000 h.p., divided somewhat as follows:—

	Per cent.	H.P.
Ontario	31 ...	5,800,000
Quebec	32 ...	6,000,000
Manitoba, Saskatchewan, Alberta, and North-West Territories ... }	18	3,500,000
British Columbia	16 ...	3,000,000
Remainder of Dominion	3 ...	500,000

According to a census completed in February last by the Dominion Water-power Branch, the total hydro-electric power actually developed is 2,305,310 h.p., which is roughly 12 per cent. of the total available. Of this quantity, rather under one-tenth is exported to the United States, despite the fact that it is badly needed by Canadian industries in order to meet their increasing requirements. We have therefore the singular situation of Canada exporting electric power, of which she has none to spare, to the United States, and importing in return coal, of which she has abundant, but unworked, supplies. This artificial and uneconomical exchange is causing no little concern in responsible circles, because, if the United States should see fit to restrict its coal exports on the perfectly reasonable ground that the whole output is required internally for the domestic manufacture of raw material, those provinces in Canada (comprising the most populous manufacturing districts) which are remote from the Dominion coal-fields would suffer most, although they are rich in hydro-electric possibilities. Under Federal law no inconsiderable portion of the energy generated may be diverted to the United States. Take the Niagara Falls, for instance. Of 388,500 h.p. generated on the Canadian side in 1917, no less than 125,000 h.p. was exported to the United

States, in addition to 265,000 h.p. developed on the American side itself. It is a delicate question, calling for delicate handling; fortunately the relations between the two countries are of the friendliest description.

Some of the largest Canadian installations, either completed or in hand, are Chippewa, 300,000 h.p.; Ontario Power Co., 210,000 h.p.; Shawinigan Falls, 200,000 h.p.

Developments in Australia are not nearly so marked; indeed, there is little additional information forthcoming. The chief electrical engineer of New South Wales estimates that 300,000 h.p. is continuously available from eighteen schemes already investigated. The chief of these are the Snowy River (137,400 h.p.) and the Clarence (100,000 h.p.).

There is little also to record from South Africa. In New Zealand there is some activity over a scheme by which 130,000 h.p. will be developed at three important sites on North Island.

The report of the Committee of the Conjoint Board concludes with an admonition to the engineers of Great Britain to be ready to take their part in inevitable and impending enterprises of great magnitude in hydro-electrical engineering. The Committee utters a warning that Canadian, American, and Continental engineers will continue to exercise a controlling interest in such projects unless an effort be made to contest the situation. It also directs attention to the lack of facilities at British universities for giving the necessary specialised scientific training to those seeking to enter this field of engineering, and it points to the example set by Cornell University, U.S.A., in laying itself out to meet the demand which is bound to arise for a training of this description.

BRYSSON CUNNINGHAM.

CHEMICAL SCIENCE AND THE STATE.

IT may still be doubted whether the public generally has any clear idea as to the occupation of the chemist and the purposes to which his work is directed. Usually he is confused with the dispenser of medicine, the pharmacist, who displays in his window the familiar globes of coloured water. By way of variety and as soon as his services were urgently required for purposes connected with the war he was classed by officials in the War Office with the *labourers* in the Arsenal at Woolwich, and he was paid at the same rate. It has, however, been gradually forced on the attention of the official classes that it is only the skilled scientific chemist who is qualified to devise and manufacture explosives, dyes, and drugs of the modern type, and that he alone can provide poison gases in warfare and their antidotes.

The Institute of Chemistry, of which the offices and laboratory are situated in Russell Square, W.C., was founded in 1877, and chartered in 1885. It is a body of professional men, all of whom have passed through a course of study and training extending over several years, with additional experience gained in practice as analysts and consult-