refer to the problem of keeping administrators adequately informed. The extent to which administrators seek, or are given, advice varies greatly in different countries, and at different times in the same country. In times of crisis advice is readily sought, often when it is too late; at other times it may not be sought at all, and if offered, it may be disregarded. The meeting, said Prof. Munro, gave an opportunity of ensuring that scientific opinion was heard in high quarters, and he hoped that the meeting would state the strongest case it could to that end.

Finally, Prof. Munro and many others referred to the need for the education of transporters, warehouse-keepers, millers, wharfingers and the general public. A few countries have done a good deal in this direction, and Denmark gave an example by showing an entertaining film illustrating how bad hygiene and ill-kept buildings encourage infestation. At the other extreme there are the backward countries, mainly in the tropics and sub-tropics. The delegate from Siam gave examples of the formidable problem of educating peasant farmers in pest control. It was, however, pointed out that there is much ignorance to be combated even in the more advanced countries, where it is still common to find farmers and traders who believe in spontaneous generation.

Delegates visited the Ministry of Agriculture and Fisheries Infestation Control Division building, the Pest Infestation Laboratory at Slough, a large-scale grain drying plant, an exhibition of food pests at the British Museum (Natural History) and a number of demonstrations on pest control methods.

The Proceedings of the meeting are to be published by the Food and Agriculture Organisation.

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FUEL ECONOMY CONFERENCE OF THE WORLD POWER CONFERENCE

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THE Fuel Economy Conference of the World Power Conference was opened at The Hague on September 2 by His Excellency Dr. G. W. M. Huysmans, Netherlands Minister of Economic Affairs, who was introduced by Mr. G. J. T. Bakker, chairman of the Conference. Dr. Huysmans welcomed the representatives of thirty-three countries, and told them that the critical world shortage of fuel gave additional importance to the deliberations of the Conference. It was hoped that the exchange of views on many aspects of fuel economy would be helpful to all the nations, and that the personal contacts made at the Conference would lead to collaboration in the future. The official delegates from Great Britain and France thanked the Dutch authorities for their hospitality, and looked forward to profitable discussions.

The opening speeches were followed by a lecture on "Atomic Energy for Peaceful Purposes", given by Prof. G. J. Sizoo. He pointed out that estimates of the economics of energy production by atomic fission, or of the size or nature of fission plants, are

purely speculative, and often optimistic. In his opinion, atomic fission would probably become a supplementary source of energy, rather than a replacement of other sources. The alternatives of peaceful or aggressive use presented a challenge to mankind.

The first technical session of the Conference was a discussion of reports from nineteen countries on "Fuel Economy since 1939". These reports indicated the need for the direction of all fuels to the uses for which they are most suitable, to avoid many operational troubles and to provide higher efficiencies. The British report was appreciated for the account of ways by which the public have been informed of the more efficient use of fuels. A resolution was passed asking the International Executive Council of the World Power Conference, in consultation with the national committees, to consider the collection of target values for energy consumption per unit of product or effort, for discussion and publication. This resolution was later approved in principle by the International Executive Council.

Subsequent sessions were more specialized in character, as indicated by the following examples.

One session was concerned with liquid fuels, the subject of seven papers. The papers and the discussion showed the great interest in home production of liquid fuels from indigenous sources such as shale, oil sands, tar oil and wood. The commercial development of indigenous sources is, of course, dependent on the cost of imported fuels, and the quantities available for import. Dr. W. H. Zaaier directed attention to the difficulty in several European countries of preparing motor spirit with a sufficiently high octane number, and suggested that production plants would have to be modernized to meet this demand.

In a session concerned with domestic appliances, the main subject of discussion was the desirability of having quality marks stamped on such appliances. These quality marks would be defined by standard specification of performance and design, and in consequence domestic appliances would be more efficient, and should be cheaper, due to the standardization of parts. It was felt that co-operation between appliance manufacturers and gas companies would be the best way of sponsoring advancements in the design of gas appliances. Co-operation is needed also between the gas and electricity industries, to avoid the production of undesirable appliances purely for competitive purposes.

The use of fuels for transport purposes was discussed in another session. Papers from Sweden and France showed the wastefulness of steam traction compared with electrical traction, the former requiring 2.5-3.25 times the amount of coal needed by the latter for the same load. In the United States Diesel traction is being favoured, particularly for branch line and shunting operations.

The session concerned with industrial and agricultural appliances received the largest number of contributions, twenty papers being submitted for discussion. These papers dealt with a variety of subjects, such as the use of low-grade fuels in various types of boilers and other furnace plant, the recovery of heat from waste liquors, the development of the gas turbine, and the significance of convection and radiation in heating by gas. It was stated that Britain alone had been frank in publishing operational troubles with power station boilers, and this frankness had been made possible by the collaboration of power station engineers and boiler manufacturers on the

British Boiler Availability Committee. Contacts with other countries were sought by this Committee, for the exchange of information and experience, and it was suggested that the structure of the Committee was worthy of emulation in many countries.

Four papers were submitted to the session concerned with the character of national fuel reserves, from Great Britain, Canada, the United States and France. The British contribution explained how the Coal Survey Section of the Fuel Research Organisation (Department of Scientific and Industrial Research) had helped in the production and preparation of coal, and in its storage, distribution and utilization.

Great interest was shown in the session concerned with atomic energy, although few members were able to offer contributions. It was thought possible that two kinds of fission furnace may be developed, one to use uranium 238, involving the preliminary conversion of this substance into fissile material such as plutonium, the other to use directly fissile material, such as plutonium, uranium 235 and 233. The second type of furnace would be much smaller than the first, but the material used by the first would be much more plentiful. Only 1/139 of the uranium in the earth's crust is directly fissile. If it became possible to use natural uranium, 170 tons per annum would satisfy the energy requirements of the world. Dr. W. Lulofs considered that as the world's supply of uranium would not be inexhaustible, it might be necessary to look for further sources of energy. For example, he wondered if it would be possible to build up helium from hydrogen, setting free a considerable amount of energy. Dr. J. D. Cockcroft replied that physicists had given such matters considerable thought, but with regard to the example cited, the necessary extremely high temperature is, as yet, prohibitive of progress. Several speakers considered that there had been over-optimistic views all over the world regarding the early development of atomic energy for industrial use. It is clear that many difficult problems have still to be solved before that hope can be realized; and at this stage the prospect is that atomic fission will have little, if any, financial advantage over present methods for the production of energy. It would, of course, set free very large amounts of fuels for other uses.

Other sessions considered developments in coal mining and coal preparation, economy measures in the production of gaseous fuels, the transport of gas, the transmission of electricity, and space heating. Several papers directed attention to the advantages arising from district heating in suitable towns.

The Netherlands National Committee, and an associated Committee of Ladies, arranged various technical and non-technical excursions. Facilities were provided for visits to the refineries and laboratories of the Bataafse Petroleum Maatschappij at Pernis, Delft and Amsterdam, the Philips works at Eindhoven, and the various works associated with the Netherlands State Coal Mines near Lutterade. Appreciation was expressed by all the members for the excellent organisation of the Conference and the arrangements made for the visits to works, laboratories, and places of general interest. The exchange of views and experience on the urgent question of fuel economy was felt to be most valuable and a real contribution towards the goal of economic recovery. The Conference had an even greater value in showing the benefits that can arise from a meeting of representatives of the countries of the world in a friendly spirit.

OBITUARY

Sir Albert Howard, C.I.E.

BOTANISTS, agriculturists and many others will learn with regret that Sir Albert Howard died in London on October 20. He was born in 1873 and educated at the Royal College of Science and at St. John's College, Cambridge, where he was a foundation scholar. Here he worked under Marshall Ward, who was then attracting a brilliant group of students to some of the newer aspects of botanical science, and after taking first-class honours in the Natural Science Tripos in 1898, he proceeded in 1899 to the Imperial Agricultural Department for the West Indies, then newly established with the purpose of applying science to the difficult problems raised by the threatened collapse of the sugar-growing industry there. In 1903 he returned to England to succeed F. Escombe as head of the Botanical Department of the South Eastern Agricultural College, Wye, Kent. He was not, however, entirely happy at Wye, and left in 1905 to become Imperial Economic Botanist to the Government of India, where for the first time he found full scope.

In the same year Howard married Gabrielle Louise Caroline Matthaei, of Newnham College, who was already well known for her investigations on vegetable respiration and assimilation, and they worked together for nearly twenty years at Pusa in so close a collaboration that no one knew which part was hers and which was his. Their first work was on wheat, and they were fortunate in having available an important collection of varieties brought together by W. H. Moreland and grown continuously on the Cawnpore Experimental Farm by J. Haymon, the first deputy director of agriculture, and by Bryce Burt. At that time there was a considerable export of wheat from India to England, and the Howards sought varieties giving better yields than those commonly grown, and possessing more 'strength' as defined by the English millers. Fortunately, one or both of the Howards had the artist's eye for picking out the varieties likely to do well and those that would not, and their final selections and crosses proved remarkably successful, particularly Pusa 4 and Pusa 12 in the United Provinces and the North West Frontier Province. An account of this work was given in "Wheat in India, its Production, Varieties and Improvement" (1909), and a general summary of all their work up to 1929 in "Crop Production in India" (Oxford University Press).

While at Pusa the Howards in 1912 started a Fruit Experiment Station at Quetta, a district long known for fruit-growing; it was, however, abandoned in 1919. It was re-started in 1933, but no records of the older work could be found, nor were the surviving varieties suitable for the new conditions.

In 1924 the Howards left Pusa for the new Institute of Plant Industry, Indore, established to provide a farm for Bernard Coventry, agricultural adviser to the States in Central India. The general principle underlying their administration was that the crop was to be treated as a unit and studied in relation to the field and the village; there was to be no division of the scientific work into departments. A joint book, "The Application of Science to Crop Production", was published in 1929. Unfortunately, in 1930 Mrs. Howard died, and the long and fruitful partnership came to an end. Howard himself left India in 1931; he was knighted in 1934.