glyceride structure of fats and oils on the quality of margarines and shortenings. Large-scale processing and pilot-plant-scale operations are carried out. There is also a group working in the field of mycology, which is concerned with the production of new chemicals, antibiotics, alkaloids and amino acids.

Section 2.—Research in the Atomic Energy Field*

Recent Developments and Prospects.—The first major fruits of Canadian atomic energy research now appear close at hand. The Hydro-Electric Power Commission of Ontario is constructing a multi-unit nuclear electric generating station at Pickering near Toronto. Each unit will generate 500 megawatts (1 megawatt = 1,000 kilowatts) and beginning in 1970 it is planned to bring into operation the first four units at yearly intervals. Estimates indicate that the power will be generated for less than 4 mill/kwh. (0.4 cents per kilowatt hour) and will be competitive with that from other available types of thermal generating station. The Quebec Hydro-Electric Commission is also entering the nuclear field with a 250-megawatt prototype nuclear generating station of advanced design. Like the earlier CANDU (Canadian Deuterium Uranium) reactors, the design employs natural uranium as the fuel and heavy water as the moderator but the heat will be carried from the fuel by boiling ordinary water instead of by heavy water at a pressure sufficient to prevent boiling. The design is distinguished by the title CANDU-BLW-250 (Canadian Deuterium Uranium-Boiling Light Water-250 megawatts).

The first nuclear power demonstration (NPD) reactor, CANDU-PHW-20 (Pressurized Heavy Water-20 megawatts) at Rolphton, Ont., gave very good service in 1964, achieving a capacity factor of 82 p.c., exceeding the target of 80 p.c. Moreover, in December 1964 and January 1965, when the target was 96 p.c., a capacity factor of 98 p.c. was achieved. Construction of the 200-megawatt station at Douglas Point on Lake Huron should be completed in 1965.

Canadian heavy water power reactors are also under construction in India and Pakistan. To meet the prospective large demand for heavy water, two production plants are being constructed in Canada by private industries and the purchase of a total of 2,500 tons of heavy water has been underwritten by the Federal Government.

Although nuclear power is expected to restore the world market for uranium, the major build-up is expected in the 1970's. The high energy yield from the fission of uranium is the key to economic nuclear power. The yield is so high that the cost of the raw uranium is a very minor component of the cost of electric power. It is about 5 p.c. of the total and may be contrasted with 50 p.c. or more paid for coal in some large conventional generating stations. The largest component in the over-all economy of nuclear power systems is reactor plant construction and a minor (10 p.c. to 15 p.c.) component is fuel fabrication.

In the past, the major atomic energy activity in Canada was uranium mining and refining for export in support of military uses. Circumstances have changed so greatly that the Government has announced a policy of no further exports for nuclear weapons but encourages export for peaceful purposes such as nuclear power.

It is also significant that since lower unit power costs result from larger stations, there is a new incentive for large utilities to export power from their systems and to interconnect centres of load by high voltage transmission even over long distances. All users of electricity also benefit from the new trend to lower rates the greater the demand.

The Canadian designs of nuclear power reactor appear capable of adapting to the largest capacities desired and of taking advantage of changes in the market value of natural uranium and of reprocessed fuel to reach even lower power costs as the scale of operations increases.

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