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A vice-president of Atomic Energy of Canada, Dr. A. J. Mooradian, said the commissioning of the reactors at Pickering had established Canada firmly in the world of commercial nuclear power. "It is a clear demonstration that Canada has the capacity to stay at the forefront of a technology and the industrial competence to profit by it."

At the annual conference of the Canadian Nuclear Association in Toronto last summer, Mr. George Gathercole, chairman of Ontario Hydro, said that as far as his utility was concerned, the CANDU system had matured to the point "where we are now fully prepared to depend upon it almost exclusively, if need be, to meet out future energy requirements." He observed that it took 24 years and the construction and acquisition of 39 generating stations for Ontario Hydro's generating capacity to reach the equivalent of just one of the nuclear units that were being installed now at Bruce, where one of the new heavywater production plants is also being build in Ontario.

Economically competitive

A recent AECL publication says Canada has "brought to maturity a nuclear power system that is economically competitive with other power-generating systems, nuclear and conventional, in many parts of the world."

"It is an established fact that the raw uranium requirements and actual fuelling costs of a nuclear power reactor of Canadian design are very much less than those of any other commercial reactor of equivalent capacity. The Canadian reactor thus is easily the best in the world at conserving a prime energy resource, uranium. It is also a reactor whose fuelling costs are least affected by any increase in uranium prices.

"A further feature of the Canadian system is that it lends itself more to domestic manufacture of components and equipment than do most other current systems. For a country aiming at independence in the design and construction of nuclear power stations, the Canadian way is the shortest. It also imposes the least amount of strain on foreign exchange requirements.

"More than anything else what sets the CANDU system apart from its contemporaries is its economical use of neutrons, the fundamental particles that sustain the fission process in a reactor. Neutron economy is achieved through highlydisciplined design, the selective employment in the reactor core of materials of low neutron absorption and the use of heavy water as the moderator.

"The cost of building nuclear power plants now varies little from type to type. The CANDU reactor can be built for the same cost and in the same time schedule as other systems. For operation, however, it must be charged with heavy water and fuel. Alternative systems need only fuel, but fuel enriched in uranium-235. The cost of the enriched fuel charge is less than the combined cost of heavy water and natural



Marshland near the Pickering Generating Station - a haven for wild ducks.

uranium fuel for the CANDU and has led to the contention that CANDU reactors have a higher capital cost than enriched systems. Within a few years after start-up, however, the saving in the cost of fuelling a CANDU more than compensates for any difference in capital cost, and over the lifetime of the station CANDU offers generating costs that are lower than those of other systems."

Nuclear power today occupies a place of increasing importance among the sources on which Canadians rely for supplies of energy.

In Ontario, where most of the present nuclear generating capacity in Canada is concentrated, some 17 per cent of generating capacity is nuclear. This will increase to 28 per cent by 1980, to 59 per cent by 1990 and to 62 per cent by the year 2000. The four units of the Bruce plant are scheduled to come into operation successively between 1975 and 1978, with an ultimate production capacity of 3,000,000 kilowatts. Plans were announced in June to double the capacity of the Pickering plant, Canada's first fully-commercial, utility-owned nuclear plant. The first new unit is scheduled to begin operation in 1980 and the fourth in 1982. A duplicate station is planned at Bruce and another near Bowmanville, Ontario, with the first of its four units to go into service in 1982.

One nuclear power station has been built outside Ontario, a 250,000-kilowatt prototype plant at Gentilly, Quebec, owned by Atomic Energy of Canada and operated by the Hydro-Quebec Power Commission. Gentilly, on the St. Lawrence River about halfway between Montreal and Quebec City, is the world's first nuclear power station to combine natural uranium fuel, heavy water moderator and ordinary water as the coolant. It performed well for 18 months after going on stream in 1971, but was shut down temporarily because of a shortage of heavy water. It is due to resume operation by the end of this year or early in 1974.

Canadian reactors make especially effective use of an important by-product. When fertile U-28 atoms capture neutrons, small