

this province's share of the national total. Canada's largest thermal station is Ontario Hydro's Lakeview generating station at Toronto, which has a capacity of 1,500,000 kw. made up of five 300,000-kw. units, the largest in operation in Canada. This station will be expanded to 2,400,000 kw. by 1968. Four units of 500,000-kw. capacity are planned for the Lambton station near Sarnia, installation of which will be completed in 1971.

Manitoba supplements its predominantly hydro-based power supply with a substantial amount of thermal capacity but current emphasis is on development of water power resources. Saskatchewan, until recently, has relied on thermal capacity to satisfy the needs of the more settled areas and hydro-electric power generated in the province has been used almost exclusively for mining purposes in the northern areas. In the past few years, however, development of storage on the South Saskatchewan River has made hydro-electric power available in the southern part of the province and plans for expanding the province's thermal capacity are limited for the present to a proposed extension to the 132,000-kw. Boundary Dam thermal station. The incidence of vast fuel resources accounts for the emphasis on thermal power generation in Alberta; the province's largest thermal plants are the 405,000-kw. gas turbine and steam station at Edmonton and the 282,000-kw. Wabamun steam station.

More than half of British Columbia's thermal generating capacity is installed in three plants located in the Vancouver area. The capacity of the largest of these plants, the 486,000-kw. Burrard generating station, is expected to be increased to 810,000-kw. by 1968.

Until recently, most of the power requirements of the Northwest Territories were satisfied from thermal sources but the commissioning of the Twin Gorges hydro station on the Taltson River in 1965 altered the balance in favour of hydro. In Yukon Territory, hydro is the larger contributor. Most of the thermal-electric energy in the Territories is generated by small diesel units.

Nuclear Thermal Power.—Commercial electric power generated from the heat of nuclear reaction became a reality in Canada in 1962 when the 20,000-kw. Nuclear Power Demonstration station at Rolphton, Ont., fed power for the first time into a distribution system in Ontario. The NPD station is the forerunner in a series of large nuclear stations that will shoulder more and more of Canada's rapidly growing power loads.

Research into reactor design and the application of nuclear energy in the electric power field are among the more important responsibilities of Atomic Energy of Canada Limited, a Crown company incorporated in 1952 (see also pp. 411-416). AECL has concentrated its efforts on the development of the CANDU reactor, which uses natural uranium as a fuel and heavy water as the moderator. By using heavy water as the moderator, a high energy yield can be obtained from natural uranium and, since natural uranium is a low-cost nuclear fuel, the cost of fuel is a minor component in the cost of producing power. Natural uranium has the added attraction of being available in commercial quantities in Canada.

The Canadian nuclear power reactor also offers the simplest of nuclear fuel cycles. Sufficient energy can be extracted from the fuel so that the economics of the system do not require a value to be placed on the spent fuel. There is, therefore, no need to carry out costly chemical processing of the spent fuel unless the worth of the remaining contained fissile material becomes sufficiently high to make chemical processing an economic proposition. The spent fuel is an ideal package for simple underwater storage and no large volume of highly radioactive liquids from a chemical processing plant has to be handled and contained.

The NPD station has been used extensively to demonstrate the ability of the system to operate at a high capacity factor and to determine the nature and predictability of outages. Fuel changes while the system is in operation have become routine and a considerable amount of research into the sources of heavy water losses has been carried out. As a result of this research, losses have been cut down and the NPD station is demonstrating that a very acceptable heavy water loss rate is attainable.