The water-power resources of Nova Scotia and New Brunswick, although small in comparison with those of other provinces, are a valuable source of energy and make a substantial contribution to the economies of the two provinces. Numerous rivers provide moderate-sized power sites either within economic transmission distance of the principal cities and towns or advantageously situated for use in development of the timber and mineral resources. These provinces have, however, turned to thermal generation, initially coal-fired with a subsequent shift to oil. Plans are now well advanced for development of nuclear generation in New Brunswick and there have been recent indications of a possible return to coal as a fuel source for new installations.

Thermal power generation 13.6.4

The immense water-power resources and the brisk pace of their development have tended to overshadow the considerable contribution being made by thermal energy to Canada's power economy. From a modest 133 MW of generating capacity installed at the end of 1900, Canada's installed hydro capacity rose to 37 090 MW by the end of 1975 and thermal capacity to 21 648 MW (Table 13.10).

The same table shows that thermal generation is predominant in Prince Edward Island and Nova Scotia. By the end of 1971, the Yukon Territory had joined the Northwest Territories, Alberta, Saskatchewan and Ontario in having more than half their total capacity thermal-electric. Thermal generation is expected to become increasingly predominant in Ontario. Although coal is still the most important fossil fuel for thermal plants in Nova Scotia, oil is the preferred choice for new thermal power generation in the other Atlantic provinces.

Over 90% of all thermal power generating equipment in Canada is driven by steam turbines fired by coal, oil, gas or, in the case of nuclear equipment, uranium. The magnitude of loads carried by steam plants combined with the economies of scale has led to the installation of steam units with capacities as high as 540 MW, and units in the 800-MW size range were committed for as early as 1976. Additions of these larger units are only possible where systems are large enough to accommodate them. Additional types of thermal generation are provided by gas turbine and internal combustion equipment; their flexibility makes them particularly suitable for meeting power loads in smaller centres, especially in the more isolated areas. Gas turbines are frequently used for peak loads; their rapid start-up ability and minimal capital cost are manifest advantages.

After World War II, industrial expansion and rapidly growing residential and agricultural development placed extremely heavy demands on power generating facilities, impossible to satisfy by hydro sources alone. An extensive program of thermal plant construction began in the early 1950s; by 1956 thermal capacity represented 15% of the total. Since then, the annual installed capacity has averaged 56% hydro-electric with the remainder in thermal generation. At the end of 1975 thermal capacity accounted for 36.9% of Canada's installed capacity.

Thermal plants accounted for only 25.8% of total generation in 1975 because much of the capacity installed is operated for peak-load duty only, with hydro-electric capacity providing base-load generation. This pattern will change with the introduction of additional nuclear-fuelled thermal generation plants which can operate economically at high capacity for base-load purposes.

Nuclear thermal power. Commercial electric power generated from the heat of nuclear reaction became a reality in Canada in 1962 when the 20-MW Nuclear Power Demonstration (NPD) station at Rolphton, Ont., the forerunner of a series of large nuclear stations, fed power for the first time into a distribution system in Ontario.

Atomic Energy of Canada Limited (AECL), a federal Crown company incorporated in 1952, has concentrated on development of the CANDU power reactor using heavy water (deuterium oxide) as a moderator for slowing or "moderating" the neutrons released by nuclear fission. The high neutron