

Distribution of installed hydroelectric generating capacity given in Table 13.13 shows that substantial amounts of water power have been developed in all provinces and territories except Prince Edward Island. As natural-resource development proceeds, the fortunate incidence of water power near mineral, forest and other resources becomes increasingly apparent. The vast hydro potential of northern rivers may well prove to be a prime factor in the eventual realization of the natural wealth of the Canadian North.

Water-power resources of Nova Scotia and New Brunswick, although small, make a substantial contribution to the economies of the two provinces. Numerous rivers provide moderate-size power sites near principal cities and towns. Others are adjacent to timber and mineral resources. These provinces have, however, turned to thermal generation, initially coal-fired, with a subsequent shift to oil. Construction of a nuclear power plant in New Brunswick is under way and coal may again become a fuel source for new installations.

13.9.4 Thermal power generation

The contribution being made by thermal energy (including nuclear power) to Canada's power economy rose to 29 171 MW by the end of 1977 and 31 647 MW by the end of 1978. Thermal generation is predominant in Prince Edward Island and Nova Scotia and is expected to become increasingly important in Alberta, Saskatchewan and Nova Scotia through greater use of coal, and in Ontario and New Brunswick through greater use of nuclear generation and coal.

Over 90% of all thermal power generating equipment in Canada is driven by steam turbines fired by coal, oil, gas or uranium. Generation provided by gas turbine and internal combustion equipment has flexibility particularly suitable for meeting power loads in smaller and especially isolated areas. Gas turbines are frequently used for peak loads because of rapid start-up capability and low capital cost. (Table 13.13)

Although conventional thermal plants accounted for almost 36% of installed capacity in 1977 and 1978, they accounted for approximately 22% of total generation (Table 13.15), as much of the capacity is operated for peak-load duty while hydroelectric capacity provided base-load generation. This pattern will change as additional nuclear-fuelled plants (which can operate economically at high capacity for base-load purposes), are introduced.

13.9.5 Nuclear thermal power

Commercial electric power generation from a nuclear reactor began in 1962 when the 20-MW nuclear power demonstration station at Rolphton, Ont., fed power for the first time into a distribution system in Ontario.

Atomic Energy of Canada Limited (AECL) has concentrated on development of the CANDU power reactor using heavy water (deuterium oxide) as a moderator for slowing the neutrons released by nuclear fission. Using this with neutron-transparent core materials (zirconium alloys) means Canada's abundant resources of natural uranium may be used as fuel. The CANDU system is sufficiently flexible that enriched uranium, plutonium recovered from spent fuel, or thorium may be incorporated into its fuel system.

Production of heavy water is a key element of the Canadian nuclear power program. The first 726 tonnes-a-year production plant at Ontario Hydro's Bruce nuclear power development on Lake Huron went into operation in 1973 and is producing at over 80% of its design capacity. A production plant of the same potential capacity at the Bruce site has been commissioned and another of one-half this capacity is scheduled for completion in 1981. In Nova Scotia, the Port Hawkesbury and Glace Bay heavy water production plants were in full operation during the year. Ownership of the plants was transferred to AECL in 1975 and 1978 respectively.

At Douglas Point, on the shore of Lake Huron, the country's first full-scale nuclear power station went into operation in 1966. The station, built with the co-operation of Ontario Hydro, houses a 220-MW CANDU reactor. Experience gained in the design and operation of the Rolphton and Douglas Point reactors has led to development of larger units. The four-unit 2 160 MW Pickering nuclear station near Toronto operated during 1978 at a capacity factor of 87.8%. In addition, the last of four units at the 3 164 MW