

Electrical energy consumption in 1977 totalled 299 TWh (an increase of 5.4% over 1976), distributed across the country in the ratio of approximately 33% in each of Quebec and Ontario, 13% in British Columbia, about 6% in Alberta, between 2% to 4% in each of Manitoba, Newfoundland, New Brunswick, Nova Scotia and Saskatchewan, with Prince Edward Island, Yukon and Northwest Territories accounting for the remainder. Growth rates in electricity production varied considerably across the country, from a high of 23.4% in New Brunswick (due to addition of the third unit at Coleson Cove) to a low of 10.6% in Manitoba. On a nationwide basis, total residential consumption grew 3.1%, commercial 0.6% and industrial 11.0%.

The 1977 rate of consumption increase was below the long run average and below that of 1976, reflecting the high correlation between electricity consumption and economic activity. Real gross national product increased by 2.6% in 1977 compared to 4.9% in 1976. Electricity consumption increased by 5.5% in 1978 to 316 TWh. This was up slightly from the increase recorded in 1977, but considerably below the 1960-78 growth rate of 6.5% a year. The annual growth has been 4.7% since 1973 when the sharp increase in the world price of oil resulted in a marked change in energy demand.

The decrease since 1960 in the industrial sector portion reflects the declining prominence of electricity-intensive industries such as aluminum smelting and pulp and paper; the more rapidly rising demand in the commercial and residential sectors reflects, in part, the recent rise in electric space heating and cooling and the increasing degree of urbanization in Canada.

Net export of electrical energy in 1977 was 17 TWh or 5.4% of net generation, up 85% over 1976. This large increase was mainly due to weather conditions, low water availability in the hydro system of the US Pacific northwest and unusually cold weather early in the year, followed by extremely hot weather in July in the New England area. Net exports again increased by about 13% during 1978 over 1977, to a net total of 20 TWh, resulting from exports of 22 TWh and imports of 2 TWh. This represents 6.6% of net Canadian electricity generation, with Quebec, Ontario and Manitoba mainly responsible for the increase.

### **Generating capacity**

13.9.2

Power generating capability measures available generating resources of all hydro and thermal facilities at the time of the one-hour firm peak load for each reporting company and is less than the installed capacity of such generating facilities.

### **Hydroelectric power generation**

13.9.3

Hydroelectric generation forms a significant though decreasing part in Canada's electrical development. By the end of 1978, the hydro portion of the country's total generating capacity had fallen from over 90% about 20 years earlier to 69.7%.

Many of Canada's extensive water resources would seem to be potential sources of hydroelectric power, but not all are economically viable. Only a fraction can be developed competitively. A detailed analysis must be made of such factors as cost, geography, geology and ecology. Until such a study is completed, estimates of Canada's undeveloped hydro-power resources (estimated to exceed 60 000 MW), may be misleading.

The maximum economic installation at a power site can be determined only by careful consideration of all conditions and circumstances. It is normal practice to install units with a combined capacity in excess of the available continuous power at the flow available 50% of the time, and frequently in excess of the power available at the arithmetical mean flow. Excess capacity may be installed for use at peak-load periods, to take advantage of periods of high flow, or to facilitate plant or system maintenance. In some instances, storage dams have been built after initial development to smooth out fluctuations in river flows. In others, deficiencies during low flow have been offset by auxiliary power supplied from thermal plants or by interconnection with other plants operating under different load conditions or located on rivers with different flow characteristics. The extent to which installed capacity exceeds available continuous power depends on factors that govern the system or plant operation, and this varies widely from one area to another.