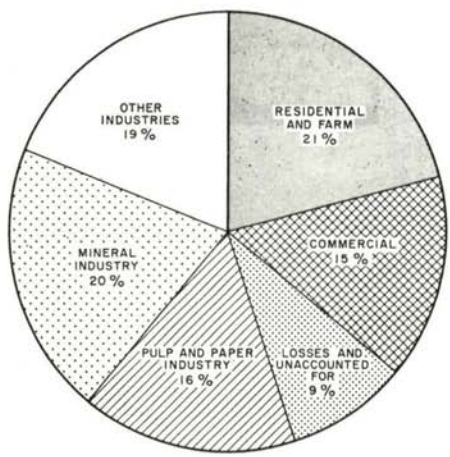
loads which may occur several times each day. By combining the advantages of both hydro and thermal stations in integrated supply systems, power producers are now achieving much greater flexibility of operation.

Another trend in development designed to meet the problem of varying daily loads is the use of pumped storage. An example is the Sir Adam Beck hydro development at Niagara Falls where water taken from the Niagara River above the Falls is carried by tunnel and power canal to penstocks which supply the main generating station on the bank of the Niagara River some distance below the Falls. In off-peak hours, power from the main station is used to pump water from the power canal into a reservoir maintained at a higher level; during peak-load hours, the pumps, which are dual-purpose units, operate as generators and are driven by water released from the reservoir. The pumping-generating units at this development make available an extra 176,700 kw. of generating capacity. A pumping-generating station using the same general principle is under construction on the Brazeau River in Alberta as part of the 338,440-kw. Big Bend hydro development.

Perhaps the most promising application of the pumping-generating principle is its use in conjunction with nuclear power stations. Nuclear units, in common with the larger conventional thermal units, can be used most efficiently under conditions of continuous operation. Off-peak nuclear power can be used to operate pump-turbine units and the hydro-electric power derived from operating the units as generators is available for use during periods of peak demand.

Subsection 2.—Utilization of Power

In 1966, Canada's generating facilities produced a total of 157,682,973,000 kilowatt-hours of electric energy, after allowing for the energy used in the power stations themselves. Of this total, 130,063,836,000 kwh. was produced in hydro-electric stations and 27,619,137,000 kwh. in thermal stations. Energy exported to the United States exceeded by 1,252,471,000 kwh. the energy imported from the United States during the year, bringing to 156,430,502,000 kwh. the total energy made available. The diagram illustrates how this energy was used.



Industry uses approximately 55 p.c. of the total electric energy made available in Canada; residential and farm use accounts for 21 p.c. and commercial use 15 p.c. The remaining 9 p.c. is listed under "losses and unaccounted for". Because many power producers do not distinguish in their records between residential and farm customers, the amount of energy used is shown as a combined total. Energy used for street lighting represents less than 1 p.c. of the total energy made available and is included in the "commercial" category.

About 20 p.c. of the total energy made available in Canada is used in the mineral industry, including smelting and refining, 16 p.c. by the pulp and paper industry and 19 p.c. by other industries. Of the latter, the chemical industry and the primary iron and steel industry together consume almost one half. Approximately 75 p.c. of the energy consumed by the mineral industry is used in the smelting and refining of metals.

The incidence of large water power resources in those regions in which the more important mineral deposits have been found has greatly facilitated mining development. Recent examples are the nickel mining and refining complex at Thompson, Man., which