

federally-supported energy R&D, to be implemented in co-operation with provincial governments and industry, under the leadership of a new permanent interdepartmental panel on energy R&D.

This panel, supported by the energy research and development office, established new priorities for R&D and obtained increases in funding of \$10 million each in both 1976-77 and 1977-78, raising the total for energy R&D in 1977-78 to \$138 million. The latest increase for 1977-78 was apportioned as follows: renewable energy \$4.4 million, energy conservation \$3.7 million, fossil fuels \$1.5 million, and transportation and transmission \$0.4 million. Additional energy R&D funding was anticipated for environmental studies, biomass energy, health and safety programs for energy industries, tidal energy, fossil fuels resource assessment and socio-economic energy research.

A breakdown of total expenditures on energy research and development reflects supplementary funding of \$15.0 million, announced in 1978, bringing total annual federal expenditure to \$144.5 million for 1978-79 (Table 13.2).

### 13.1.3 Renewable energy sources

Government activity in renewable energy resources increased significantly in 1977. Federal spending rose from \$4.4 million in 1976-77 to \$7.4 million in 1977-78. Of the \$13.5 million allotted for 1978-79, half was earmarked for solar energy research and development. Within the federal energy, mines and resources department a renewable energy resources branch was formed to develop government policies and programs in this area.

Research studies on the potential of solar and biomass energy, as well as investigations into the labour, economic, and industrial impact of these new technologies, are being carried out. A number of technical and general publications are available and a national advisory committee on conservation and renewable energy has been set up to provide direct public advice on these matters and related policy issues.

The National Research Council of Canada (NRC) directs research and development activities in renewable energy, and its new solar energy research group emphasized development of solar heating systems for multiple-unit residential quarters in 1977. Other NRC activities include testing the performance of solar collectors, and data monitoring and collection.

**Prospects for solar energy.** About 32% of the total energy demand in Canada is for low-grade heat below 100°C. In principle, almost a third of total demand could be met from heat generated by solar energy, but in practice many obstacles to the widespread use of solar space heating still exist, not the least of which is high initial cost. Other difficulties include the lack of sturdy and long-lasting commercially available solar panels adapted to the Canadian climate and the non-existence of any significant solar manufacturing industry in Canada; the absence of adequate consumer protection standards or legal guarantees to the right to sunlight; and unfavourable municipal and property tax structures. In the light of these institutional rather than purely technical difficulties, it is estimated that solar space and domestic water heating will contribute only between 5% and 7% of the total energy budget by the year 2000. At the end of 1977, there were between 100 and 150 solar heated houses in Canada in various stages of completion.

**Biomass energy.** Another form of renewable energy appears to hold greater promise in the short term than solar heating — energy from biomass. In particular, wastes and residues from forest industries, if put to effective use, could make the entire industry energy self-sufficient. The key technological step is the wood gasifier, to convert wood particles to a gas that burns with a higher flame temperature than wood itself. Other uses of biomass energy forms include manufacture of methanol from wood products and efficient use of municipal and agricultural wastes.

**Wind energy.** An NRC-designed vertical-axis windmill in the Magdalen Islands was successfully commissioned in 1977. Built by Dominion Aluminium Fabricating Co. and operated by Hydro-Québec, it has a peak operating capacity of 230 kilowatts (kW), and