

\$19.3 million in 1979-80. Of the \$19.3 million allotted in renewable energy in 1979-80, over half was earmarked for solar energy. Estimated expenditures for R&D in renewable energy for 1980-81 was \$20.7 million.

In 1978 a \$380-million renewable energy and energy conservation program was announced to encourage and demonstrate the use of renewable energy and conservation technology. The program includes assistance to solar equipment manufacturers by providing contracts to help Canadian companies develop and produce solar equipment; purchase by the federal government of solar equipment for its own buildings during the next five years to a total value of \$125 million; an awards program to encourage energy-efficient building designs; grants to industry to encourage the use of wood waste as a source of energy in the forest industries; funds for research on managing forests and developing techniques for converting wood to energy, with a total of \$35 million to be provided over five years; guaranteed loans on projects that generate electricity from wood or municipal waste; and joint federal-provincial agreements to demonstrate the use of renewable energy and energy-saving technologies.

Research studies on the potential of solar and biomass energy, and the economic impact of these new technologies, are being carried out by EMR. Technical and general publications are available and a national advisory committee on conservation and renewable energy was set up to provide independent advice to the minister.

The National Research Council of Canada (NRC) directs research and development in renewable energy. It emphasized development of solar heating systems for the production of service hot water for film processing, laundries and other industrial use in 1978. Activities included 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 and in principle could be met from heat generated by solar energy, but in practice many obstacles exist, not the least being high initial cost. Other difficulties include the lack of long-lasting commercially available solar panels adapted to the Canadian climate and of significant solar manufacturing industry in Canada; the absence of adequate consumer protection standards or legal guarantees to the access to sunlight; and unfavourable municipal and property tax structures. Because of these institutional rather than purely technical difficulties, it is estimated that solar heating will contribute only 1% or 2% of the total energy budget by the year 2000.

Biomass energy. Another form of renewable energy that appears to hold greater promise in the short term is energy from biomass. Wastes and residues from the forest industry could make that entire industry energy self-sufficient. A 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 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 commissioned in 1977. It has a peak output of 230 kW, and is intended to supplement the local electrical grid, now powered entirely by diesel generators. Experiments continued in 1979. Use of wind to generate electricity appears to be competitive with conventional energy sources in areas such as the Atlantic provinces, the coastal regions of Hudson Bay and southern Alberta where winds are sufficiently strong and constant to make windmill operation economically feasible or where electricity is being generated by expensive diesel fuel.

Other renewable energy technologies. Other methods include harnessing tidal power in the Bay of Fundy. Producing electricity from this source seems nearly cost-competitive with other methods. At the end of 1979 work was proceeding on a federally sponsored geothermal program on the University of Regina campus, as the first phase of a demonstration program to use subterranean hot water for space heating. Drilling of a 2 214 metre test well took place between December 1978 and February 1979. Drilling and geophysical surveys at Meager Creek, BC are being carried out by EMR and BC Hydro on the feasibility of geothermal power — tapping subterranean steam pockets to generate electricity.