

harness and control the power of nuclear fusion, the process that enables the stars, including our sun, to produce light and heat.”⁽³³⁾ “Measured by weight of fuel, the fusion process would produce about one million times the energy of fossil fuels.”⁽³⁴⁾ Nuclear fusion offers the possibility of a virtually unlimited energy source, based on a fuel available everywhere [${}^2_1\text{H}$ (deuterium) + ${}^3_1\text{H}$ (tritium) \rightarrow ${}^4_2\text{He}$ (helium) + ${}_0^1\text{n}$ (neutron) + energy]. It also represents some important advantages, including a number of benefits for the environment:

- It is one of the very few energy sources with the potential to handle [virtually all of] the energy requirements of humankind in its long-term occupation of the planet.
- Proper design of fusion reactors should reduce the generation of radioactive by-products to levels far below those of fission reactors. The fusion by-products would also have shorter half-lives than fission by-products.
- Fusion activation products are nonvolatile, whereas a substantial fraction of fission activation products are volatile. Controlling radioactivity in the event of an accident should therefore be easier in a fusion reactor.
- The fusion reaction does not generate chemical combustion products and in that sense represents a benign energy technology.
- Materials used and by-products generated in a commercial fusion reactor would not lend themselves to the production of nuclear weapons.
- The development of fusion power systems, by virtue of their complexity and highly demanding engineering design, will promote technological advances with applications in other industrial sectors.⁽³⁵⁾

The commercial exploitation of fusion energy may indeed have attractive potential, but the fact remains that immense technical and economic problems will have to be resolved before it becomes a feasible alternative.

Hydrogen and nuclear fusion are only two of the options to which Canada will have to devote a great deal more attention over the coming years. Accordingly, in a perspective of environmental protection and reduction of the health risks inherent in energy production, and recognizing the existence of an Interdepartmental Committee on Energy and Environment, the Committee recommends that:

Recommendation 1

The federal government should step up its efforts to determine the extent to which the various renewable energy vectors or sources can meet Canadians' demand for energy. In addition, the Departments of the Environment and of Energy, Mines and Resources should establish the best possible terms on which:

- (a) energy can be economized and energy consumption reduced;**
- (b) the use of energy resources can be optimized, given the available resources and their impact on health and the environment; and**
- (c) wastes resulting from energy-production techniques can be properly managed.**

⁽³³⁾ National Research Council of Canada, Energy Division, *Alternative Energy Technology in Canada*, Ottawa, September 1986, p. 121.

⁽³⁴⁾ *Ibid.*

⁽³⁵⁾ House of Commons, Special Committee on Alternative Energy and Oil Substitution (1981), p. 166.