

## SUMMARY OF FINDINGS

At 1.58% of GDP in 1997, Canada's R&D effort, as a percentage of GDP, was the second smallest among G-7 countries (only Italy's R&D effort was smaller). Canada's national (i.e., combined public and private sector) R&D effort was approximately \$10.7 billion in 1998, 40% higher in real terms than a decade earlier.<sup>i</sup>

Recent growth in the overall performance of R&D in Canada has been driven by major increases in private sector expenditures over the past two decades. Private sector funding has more than doubled since 1985 to its current level of approximately \$5.2 billion. Over the same period, foreign support for R&D performed in Canada has risen rapidly; foreign support has more than tripled to about \$1.4 billion since 1985. The growth in foreign support for R&D in Canada has been driven in large part by increasing flows of funding from the United States and Europe for research in the biotechnology, manufacturing, and information technology areas. Although the federal government was the largest sponsor of R&D until the mid-1980s, industry investment now outpaces government funding by a large and growing annual share.

While overall federal funding for R&D fell by 6% between 1995 and 1999, to a level of approximately \$2.3 billion, several major socioeconomic objectives have received increasing federal R&D funding over the past few years. Federal support for industrial technology development, for example, has grown by 40% to \$406 million; space research grew by 18% to \$281 million, while the public health research budget grew by 5% to \$290 million.<sup>ii</sup>

Support for Canada's federally sponsored Program of Energy Research and Development (PERD), covering all areas of energy R&D with the exception of nuclear fission, has declined by 75% since 1984. Research funded by Atomic Energy of Canada Limited, a government-owned corporation that performs the majority of Canada's fission R&D, has remained essentially flat, falling by 3% in real terms since 1989 to its current level of \$111 million. Even though federal energy R&D funding fell by 18% between 1995 and 1999 alone, in fiscal 1999, energy R&D still accounted for about 7% of the total federal R&D budget—slightly more than defense R&D, as Figure 1 (page 4) shows. Non-PERD federal energy R&D (consisting mainly of nuclear fission R&D) has declined from \$171 million to \$120 million between 1994 and 1999—a 30% reduction.<sup>iii</sup>

In the aggregate, private sector energy R&D investments in Canada have remained essentially flat in real terms since the early 1980s. However, there have been significant changes to the composition of the private R&D portfolio over the past two decades. For example, as in other OECD countries, low world petroleum prices have resulted in substantial cuts in the intensity of Canadian oil and gas exploration research. Private sector investments in fossil fuel R&D declined 60% from \$267 million to \$107 million between 1983 and 1995. On the other hand, there have been steady increases (approximately 2% annually) in electric utilities' R&D spending and modest increases (5%) in private energy efficiency R&D investments over the 1983-1995 period. Canada's private sector has also positioned itself as a world leader in the research,

development, and commercialization of fuel cell technologies for both mobile and stationary applications.

Two issues have dominated Canada's energy policy agenda in recent years. First, the government is continuing its efforts to liberalize and deregulate the energy industries, after decades of heavy regulation and government controls. Canada's oil and gas industries have now been largely restructured and the regulatory regimes governing these industries have been liberalized. Restructuring of the electric utility industry, however, is proceeding at a considerably slower pace. Responsibility for electricity regulation is to a great extent in the hands of the provincial governments, and, consequently, deregulation of the industry is occurring in an uneven and piecemeal fashion. Some provinces, such as British Columbia and Alberta, are acting more quickly than others, driven in some part by the growing export opportunities that electricity deregulation offers. Canada provides a growing share of electricity to the eastern United States.

Second, global climate change, given its far-reaching implications for energy and the environment, has earned a prominent position on the Canadian energy policy agenda. Canada has ratified the 1992 Framework Convention on Climate Change and signed the 1997 Kyoto Protocol, committing to a 6% reduction of greenhouse gas emissions from 1990 levels by 2008-2012. Despite these international climate change commitments, Canada's greenhouse gas emissions in 2000 will probably exceed those of 1990 by more than 13%.<sup>iv</sup>

The Canadian government's actions to address climate change to date consist primarily of voluntary programs to encourage industry and consumers to work with the government to achieve its greenhouse gas abatement goals. Several tax incentives and funding initiatives are included in Canada's National Action Program on Climate Change, the government's strategic plan for achieving its emissions reduction goals. Among the provisions of the program are investments of some \$55 million annually in climate change technology development, energy efficiency programs, and climate science. In its 1998 budget, the Canadian government announced that \$40 million annually over the next three years would be used to spur early action on climate change.<sup>7</sup>

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<sup>i</sup> Statistics Canada, *Science Statistics*, Vol. 22, No. 5 (October 1998), p.3.

<sup>ii</sup> Statistics Canada, *Federal Scientific Activities 1998-99*, p. 107.

<sup>iii</sup> Statistics Canada, *Federal Scientific Activities 1998-99*, p. 107.

<sup>iv</sup> Natural Resources Canada, "The State of Energy Efficiency in Canada, 1997," p. 4.