

The Politics of CANDU Exports. *By Duane Bratt*. Toronto: University of Toronto Press, 2006. xv + 319 pp. Index, notes, figures, maps, tables. Cloth, \$60.00. ISBN: 0-802-09091-5.

Reviewed by Barry E. C. Boothman

Canadian big business historically has been a tripartite phenomenon. Foreign direct investment was encouraged as a means of accelerating economic growth and eventually accounted for half of all manufacturing activities in Canada. Large corporations controlled by domestic interests tended to arise in sectors not dominated by foreign firms. The third component, public capitalism, took the form of government-controlled corporations engaged in business practices. The scale of public enterprise significantly exceeded the patterns that prevailed in the United States but was lower than those in the United Kingdom or Europe. Some of the Canadian firms supplied goods or services not readily available from alternate sources; others competed directly against domestic or foreign firms. The evolution of those firms has attracted modest attention from Canadian historians, and the literature includes studies of successful contributions to economic and social development, along with accounts of wasteful sinkholes. Public enterprise during the second half of the twentieth-century sometimes was employed as a tool of industrial policy, which could enhance regional employment or the construction of technologically sophisticated industries.

The Canadian government actively supported research on nuclear energy following the Second World War, an investment that subsequently expanded into extensive support for commercial applications. The subject has attracted considerable scholarly interest. There are histories of the leading enterprises and numerous articles or book chapters about the implications of the federal government initiatives. This monograph by Duane Bratt focuses upon the export of CANDU reactors, the power-generation system developed by Atomic Energy of Canada. Bratt claims to provide the most comprehensive account, mapping every sale from 1956 to the present, along with changes in international policies dealing with nuclear nonproliferation. The study draws

upon a broad range of primary and secondary sources. The approach is objective, but the author is concerned with the public-policy aspects and interest-group lobbying dynamics associated with nuclear-reactor exports.

The monograph is divided into three major sections. The background of the Canadian nuclear program is reviewed, highlighting the emergence of government intervention in uranium production and nuclear research. There is a sustained discussion of the economic and political rationales advanced for CANDU exports by the Canadian government. Bratt then examines the constraints upon exports, with an emphasis on security rationales. He reviews the concerns about nonproliferation of nuclear technology and explains the schizophrenic dimensions of Canadian government policy as public officials demanded tighter nonproliferation agreements while concurrently pushing for export sales of reactors. The second section outlines the early efforts to sell reactors abroad, with an emphasis upon sales to India, Pakistan, and Romania. Bratt highlights how economic and political concerns for sales clearly outweighed concerns about nonproliferation. This perspective altered slowly after India, in 1974, conducted its first nuclear explosion based upon plutonium diverted from a Canadian research reactor supplied to the country. The author reviews the tortured routes of the negotiations with prospective purchasers as Canadian officials attempted both to conclude sales agreements and to control use of the technology. He indicates how foreign governments sometimes gained concessions by threatening to buy from other suppliers. The third section of the monograph explores the decline in reactor exports (as the logic of government policy was questioned by various interests) and a later resurgence as sales were made to China and other markets. The final chapter appraises the likely future for continued CANDU exports.

Bratt's analysis is strongest when dealing with the logic and inconsistencies of Canadian government actions. The book provides a succinct review of the evolution of Canadian policies about the proliferation of nuclear technology. An emphasis is given to the efforts geared to strengthening controls, often after events proved the need for them. Many Canadians believed that Canada bore the ultimate responsibility for the spread of nuclear weapons capability to India and Pakistan. Bratt explores the government's reappraisal of the violation of bilateral agreements with India and Pakistan and the

breakdown of further nuclear cooperation. His analysis brings out how Canadian officials continued to push questionable sales with Argentina and Romania despite these misadventures and growing concern over proliferation. He effectively highlights how Canadian officials attempted to reconcile their schizophrenic attitudes in subsequent sales to South Korea and China.

Although the public-policy aspects of nuclear-reactor exports receive reasonable attention, individuals concerned with understanding the global industry will find this book disappointing. The evolution of competitive driving forces, alternate technologies, and shifts in patterns of demand and supply receive minimal appraisal, to the point that the limited coverage undermines the line of argument. CANDU exports never amounted to more than a minor share of worldwide sales, in part because the CANDU reactor was perfected after the technological standard was established around light-water systems. In addition, the system was designed to fit the large-scale supply needs of Ontario Hydro and was not easily adapted for small markets. Domestic CANDU reactors encountered a number of major problems and shut-downs, were widely viewed as inefficient, and could not be easily adjusted to meet the needs of smaller utilities. The Canadian government's eagerness to sell reactors abroad and provide financing support for purchasers was partially linked to a failure to accept CANDU's competitive status, not just the desire to prove that the investments in the nuclear-development program were worthwhile. Bratt legitimately notes that every CANDU export sale has been subsidized, and many have been linked to allegations of bribery or payments to foreign officials.

The analysis insufficiently covers Atomic Energy of Canada Limited, the government-owned corporation charged with the initial development of CANDU reactors and later with their production and sales. Bratt occasionally reflects upon the views of AECL's executives but does not adequately explore how the activities of the corporation influenced developments. AECL expanded dramatically from a small research facility to a major producer between 1956 and 1982, but the capabilities of senior executives and the organizational structure did not keep up with the competitive strategy. These deficiencies contributed to the controversies over reactor sales to Argentina and Romania in the 1970s. A parliamentary investigation damaged the corporation's reputation, and across the following decade funding to the enterprise was slashed. The monograph does

not review how AECL's executives repositioned the company and attempted to rebuild its reputation, even though these initiatives were important for subsequent efforts to sell reactors abroad. There is a brief review in the final chapter of export earnings from CANDU and uranium sales, but the author is compelled to concede that it is unlikely there will be any inroads into major markets and that AECL has lost a variety of prospective sales opportunities. Arguments about the perceived benefits of the nuclear program thus are being scrutinized more skeptically. Pronuclear interest groups still have significant influence but have shifted their lobbying strategy to promote nuclear exports as a form of "green" energy supply, a perspective that has yet to garner widespread support.

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