United States-Canada Energy Interdependencies

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Abstract The energy industries of the United States and Canada are highly interdependent in a number of ways. The nature and extent of these interdependencies are described by sector in this paper. These energy interdependencies have developed because of economic forces and policy decisions. For many years, both the United States and Canada imposed extensive regulations on their industry industries. As these regulations were gradually removed, market forces brought about significant integration of the two countries’ energy industries. In recent years, institutional developments have fostered an even higher level of interdependencies. The United States-Canada free trade agreement, and its successor North American free trade agreement, reduced trade barriers in energy products and provided policy stability conducive to cross-border energy investments. The North American Energy Working Group of NAFTA and the Security and Prosperity Partnership have provided for enhanced cooperation between Canada and the United States on energy matters.

INTRODUCTION
The United States and Canadian economies are highly interdependent. Canada is the largest trading partner of the United States, accounting for more than 15% of its total exports and imports in 2007. About 80% of Canadian exports are sold to the United States, and production of goods and services for export to the United States accounted for 26.9% of Canadian Gross Domestic Product in 2005.

Energy products form a very important component of United States-Canadian trade. This interdependence was dramatically illustrated by the electricity blackout of August 2003 that affected fifty million people in Ontario and the northeastern United States. The interdependence, however, runs much deeper than the interlinking of electricity grids. Canada is the largest external supplier of both crude oil and natural gas to the United States market. Between 1990 and 2005, the share of energy products in Canadian exports to the United States more than doubled from 11.2% to 28.8% (Sundell and Shane, 2006).

Canada is well endowed with energy resources, and in 2005 was the world’s fifth-largest producer of such products. This has helped satisfy the USA’s increasing dependence on foreign energy supplies. During the past twenty-five years, Canadian production of energy products increased twice as rapidly as its consumption, and almost all of its exports were bound for the United States. Energy products account for 5.7% of Gross Domestic Product in Canada, compared to only 2.9% in the United States. Comparing provincial and state energy production, Alberta ranks behind Texas and California, while Ontario and Quebec together produce about three-fourths as much as Alberta. Of Canada’s total energy exports to the United States, 69% originate in Alberta, with no other province accounting for as much as 10%. Energy production nevertheless
remains quite important for other provinces. It accounts for 20.6% of Gross Domestic Product in Newfoundland and Labrador and 11.0% in Saskatchewan, as compared to 17.7% in Alberta (Smith and Vachon, 2006).

Historically, the integration of the energy industries of the United States and Canada has been hindered by political sensitivities and sovereignty issues. During the 1960s, when Canada was seeking new markets for its energy products, the United States imposed import restraints. During the energy crisis of the 1970s, when the United States was seeking more imports of energy products, the Canadian government imposed export restraints (Bradley and Watkins, 2003).

During the 1970s, Canada formed Petro-Canada as a state-owned energy company that was given special exploration rights and subsidized by the government. Export taxes during this period kept the Canadian oil price below the world market price. In 1980, the Trudeau administration instituted a National Energy Policy that restricted foreign investment in energy companies and pressured foreign firms to divest their holdings in such companies. Price controls were placed on oil and natural gas, and exploration subsidies given to companies based upon their degree of Canadian ownership. The goal was to attain Canadian energy independence (Hufbauer and Schott, 2005).

Alberta objected to elements of the National Energy Policy and successfully challenged the export tax on petroleum before the Canadian Supreme Court, which ruled the tax unconstitutional. After the Progressive Conservative Party came to power in the 1984 election, previous policies were reversed and a movement toward deregulation and privatization began, a trend that has continued to this day. Price controls and export restrictions on energy products were soon removed, and Petro-Canada was gradually privatized (Hufbauer and Schott, 2005). Energy markets in the United States had also been subject to much regulation until controls were removed in the 1970s and 1980s. After deregulation, economic forces began to integrate the energy sectors of the United States and Canada, as will be described below.

The Petroleum Sector
Canada’s petroleum production has historically taken place on the Western Canada Sedimentary Basin that underlies most of Alberta and parts of Saskatchewan, Manitoba, British Columbia, and the Northwest Territories. Substantial petroleum production has also taken place in fields off the coasts of Newfoundland and Nova Scotia. While production from conventional sources in Canada has been declining steadily for the past several years, production from the oil sands deposits of northern Alberta has increased and now exceeds that from conventional sources.

If the petroleum in oil sands is included, Canada’s proven reserves of petroleum are second only to Saudi Arabia in size. More than 95% of Canadian proven reserves are the heavy oil found in the oil sands. Extraction of petroleum from oil sands is considerably more costly than production from conventional oil sources. However, with current technology these resources can be economically exploited at prices of around $50/barrel, well within the range of recent and projected petroleum prices, and technological improvements could reduce the price at which extraction of petroleum from oil sands is economically feasible. Current production from oil sands of about 1.2 million barrels/day accounts for a little over one-third of Canada’s petroleum production (Dukert, 2006), with oil sands production projected to reach 3.5 million barrels/day by 2025 (NAEWG, 2006).
Figure 1

Canadian Oil Pipelines and Refining Capacity

As Figure 1 illustrates, an extensive network of oil pipelines connects Canadian production facilities with the American market. More than 99% of Canada’s petroleum exports go to the United States, and Canada is the country’s largest single supplier. Besides its exports of crude oil, Canada also sends more than one-half million barrels/day of petroleum products to the United States. These exports are mainly sent to the Midwestern states, although significant amounts also go to the Rocky Mountain and East Coast states (NAEWG, 2006).

The Natural Gas Sector

Canada is one of the world’s largest producers and exporters of natural gas. In 2005, 85% of American natural gas imports came from Canada, satisfying about 15% of total demand. Most of this gas is produced in the Western Canada Sedimentary Basin, with 80% coming from Alberta, although new discoveries in British Columbia are shifting production westward. A considerable amount of production also takes place in the Scotian Basin off the Nova Scotia Coast, and reserves have been discovered offshore from Newfoundland, making production there a distinct possibility. While offshore production is currently not permitted off the Pacific Coast, the government of British Columbia hopes to lift the moratorium on production there soon (NAEWG, 2006).

Large natural gas fields also exist in the Mackenzie Delta of the Northwest Territories. A consortium of oil and gas companies is proposing to build a pipeline across the Northwest Territories into northern Alberta to connect with existing pipeline networks for distribution of the gas throughout North America (The Mackenzie Project, 2008). The goal is to have this $7 billion, 1,220-kilometer pipeline in operation by 2010. A 3,400-mile pipeline running from Alaska’s North Slope to the United States.
States has been proposed, and loan guarantees for its construction have been approved by the U.S. Congress. However, legal issues are delaying construction and operation of the Canadian portion of the pipeline, and it will almost certainly not enter into service before 2012, if then.

Instead of focusing on production of conventional natural gas in the future, Canada will likely focus on coal bed methane along with offshore production on both the East and West Coasts (NAEWG, 2006).

**Figure 2**

**Main Canadian Natural Gas Pipelines**

![Map of Canadian Natural Gas Pipelines](image)

Source: NAEWG, *North America--The Energy Picture II*

As Figure 2 illustrates, Canadian and American natural gas pipelines are highly interconnected. A major pipeline running from British Columbia through Idaho and Oregon connects with the American distribution network in California. Another pipeline running through Manitoba to Ontario services Minnesota, Michigan, and Wisconsin. A pipeline running into Montana from Alberta connects with an American pipeline to Illinois. On the East Coast, pipelines distribute natural gas from Canada to New York State and from Quebec to the New England states (NAEWG, 2006).
Figure 3
North American Flow of Natural Gas Imports and Exports, 2003
(Billion Cubic Feet)

Given that most proven natural gas reserves are located outside North America, the U.S. Department of Energy estimates that American imports of natural gas from Canada will be surpassed by imports of liquefied natural gas (LNG), from suppliers such as Russia and the Central Asian republics, by 2015.2 As of March 2006, there were five LNG terminals in North America, all in the United States. Seventeen proposed terminals had been approved by government regulators, two of them in Canada, twelve in the United States (predominately along the Gulf Coast) and three in Mexico (two of which are in Baja California with the intention of supplying the United States market) (NGI, 2007).

The Electrical Power Sector
Integration of the United States and Canadian electricity grids increases system efficiency in both countries. Because electricity is difficult to store and electrical systems must maintain a certain balance for efficiency of operation, each country’s electrical power system can compensate for shortfalls in the other during times of peak-load demand. For example, California needs extra electricity in the summer months and can purchase it from British Columbia. The pattern is reversed in winter, with British Columbia purchasing electricity from California. A similar compensating trade pattern prevails between Quebec and New York (Bradley and Watkins, 2003). In addition, during periods when Canada’s
hydroelectric production has been limited by drought conditions, it has been able to purchase electricity from the United States. The United States receives about 1% of its electricity from Canada, and these exports amount to about 7% of Canada’s total electricity production. These net export and import figures do not give a clear picture of the degree of integration, however. As can be seen from Figure 4, extensive two-way trade in electricity occurs, with Canada being a net importer of electricity from the United States in the West and a net exporter to the United States in the East.

**Figure 4**

**Major International Interconnections (kV) and Electricity Trade (GWh) 2004**

Source: NAEWG, *North America--The Energy Picture II*

An unusually large share (59%) of Canada’s electrical power is hydroelectric. An additional 27% comes from conventional thermal, 12% from nuclear, and 2% from renewable energy sources (such as wind). As in the United States, most of the conventional thermal generation of electricity is from coal. Coal is a highly polluting source, however. Because of the pollution limits agreed to by Canada in the Kyoto Protocol, a concerted effort is being made to shift to cleaner energy sources such as natural gas. Canada has tremendous hydroelectric potential because of its many rivers. At today’s prices, much of the potential for hydroelectric power generation is not economically feasible (NAEWG, 2006). However, as Canada moves toward taxation of carbon emissions, this will raise the cost of conventional power generation,
and the option to move to hydroelectric power generation will be a great advantage for Canada.

**Policies that Foster Energy Industry Integration**

The interdependencies between the United States and Canadian energy industries have developed because of economic forces and policy decisions. Integration was certainly fostered by the domestic deregulation of the American and Canadian energy industries. The United States-Canada free trade agreement, and its successor NAFTA, have also had some effect upon the integration of the energy industries. These agreements removed both tariff and nontariff barriers to trade in energy products. Canada pledged that, if in the future it restricted energy production for conservation purposes, the United States would continue to receive its proportional share of output. In return, the United States pledged that Canada would be exempt from any possible future import restrictions that it imposed on energy products. The increased certainty and policy stability resulting from these agreements stimulated cross-border investments in energy industries.

In both the United States and Canada, the formulation and implementation of energy policy is complicated by the federal systems of the two countries. In the United States, individual states regulate energy producing industries in a number of ways. In Canada, the provinces own and control subsoil resources and have most of the regulatory authority over energy industries. In addition, energy policy is a politically sensitive domain in each country, but particularly so in Canada.

While the private sector has engaged in a significant level of coordination on energy matters for some time between Canada and the United States, within the past few years intergovernmental cooperation has greatly increased. For example in 2001, a North American Energy Working Group (NAEWG) was formed within the context of NAFTA. This working group published two overviews of the North American energy situation using harmonized energy terms, units of measurement, and common statistical methods, presenting a picture of North American energy markets that was previously unavailable.

Several crises have occurred since the NAEWG was formed, and world energy markets have been tumultuous, but cooperation on energy matters in North America has remained strong. The NAEWG has since its formation been subsumed into the North American Security and Prosperity Partnership (SPP), a broader trilateral initiative that was established in 2005. Under the terms of the SPP, the heads of state of the three North American countries meet at least once a year to discuss matters of common interest, and energy has consistently been high on the agenda. Energy Ministers of the three countries also meet regularly to discuss ways of enhancing cooperation. In July 2007, they agreed to exchange scientific and technical personnel to conduct joint energy-related studies and projects (USDOE, 2008).

The ownership systems of energy resources will continue to differ among the countries of North America, and the energy sector is much too sensitive politically for regulatory harmonization between the two countries. However, through the NAEWG and the SPP, cooperation on energy matters has been institutionalized to a higher level than ever before. Energy consumers in both countries, who have benefited in a number of ways from the interdependencies of the United States and Canadian industries, should benefit even further in the future because of this enhanced cooperation.
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2 Between 2000 and 2005, natural gas production declined in the United States. While production held steady in Canada, consumption there increased so that on balance less was available for export (Dukert, 2006).

**Bibliography**


