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I N D U S T R Y P R O F I L E

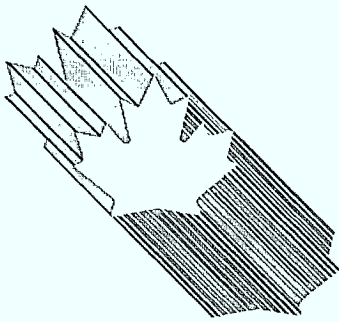


Industry, Science and
Technology Canada

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Power Generation Equipment

Canada



I N D U S T R Y

P R O F I L E

POWER GENERATION EQUIPMENT

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FOREWORD

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In a rapidly changing global trade environment, the international competitiveness of Canadian industry is the key to survival and growth. This Industry Profile is one of a series of papers which assess, in a summary form, the current competitiveness of Canada's industrial sectors, taking into account technological and other key factors, and changes anticipated under the Canada-U.S. Free Trade Agreement. Industry participants were consulted in the preparation of the papers.

The series is being published as steps are being taken to create the new Department of Industry, Science and Technology from the consolidation of the Department of Regional Industrial Expansion and the Ministry of State for Science and Technology. It is my intention that the series will be updated on a regular basis and continue to be a product of the new department. I sincerely hope that these profiles will be informative to those interested in Canadian industrial development and serve as a basis for discussion of industrial trends, prospects and strategic directions.

Minister

1. Structure and Performance

Structure

The power generation equipment industry is made up of firms which manufacture turbines and large diesel engines, boilers, pressure vessels and heat exchangers. These products are largely custom engineered, and are used in the generation of electric power by the public utilities; in the generation of electric and other power in resource processing plants; and in other industrial and marine applications not necessarily associated with the generation of electric power. The industry comprises roughly 200 companies, mainly located in Ontario and Quebec, and employs about 9500 persons.

Total shipments for 1986 were \$1049 million. There are large swings in annual shipments because products consist largely of custom-designed equipment. As a result, the lead time between orders and shipments is long, and new orders are relatively infrequent and of high value.

The industry is divided into two sub-sectors, each of which manufactures a broad product range.

The larger of the two is the power boiler, pressure vessel and heat exchanger sub-sector. It consists of some 185 firms with an estimated 8000 employees, and manufactures mostly large, high-value, custom-engineered goods. The sub-sector is dominated by large, mainly U.S.-owned multinationals which were established in Canada to take advantage of high import tariffs. The major markets of this sub-sector are the public utilities and manufacturing and processing industries. It has a broad range of industrial linkages and draws on a wide variety of suppliers, such as basic steel, refractories, tubing, forgings, fans, pumps, compressors, valves, instrumentation, sophisticated controls, plus engineering services.

The second sub-sector, which manufactures engines and turbines, consists of 13 companies with an estimated 1500 employees. The domestic market is dominated by the requirements of the public utilities for large steam and hydraulic turbines, while the multinational oil, chemical and resource-based industries are the largest buyers of the smaller steam, gas and hydraulic turbines. The engine manufacturing capability in Canada is mainly in diesels for railway locomotives while the general industrial engines market is supplied by imports. The sub-sector's linkages are very broad. It buys basic steel castings, forgings, gears, electric motors, pumps, valves and environmental controls.

Performance

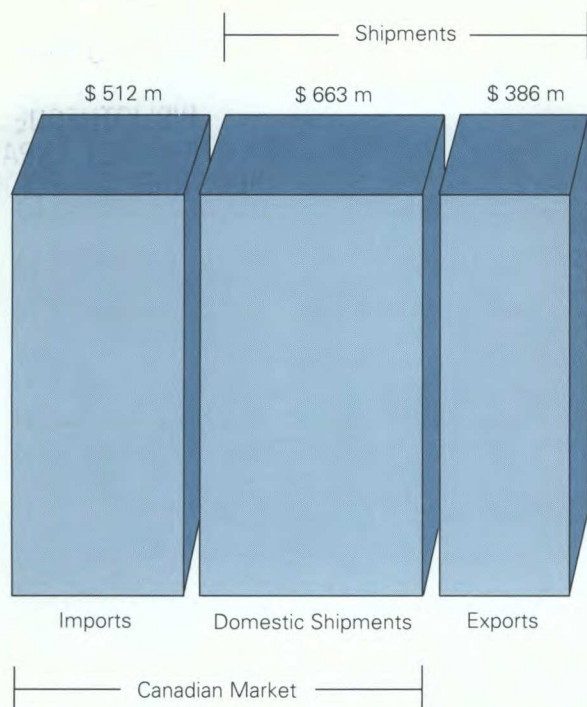
In most industrialized countries, domestic markets are closed to import competition by national procurement policies or the use of other non-tariff barriers (NTBs). The industry in these countries has, therefore, been able to develop from a captive market base, with the accompanying advantage of some stability in volume and price for a significant percentage of its business. Canada and the United States, on the other hand, have remained open markets. As a result, the Canadian industry has lost a significant amount of business to offshore manufacturers.

Canada



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*Imports, Exports and Domestic Shipments
1986*

The public utilities are the major purchasers of both hydraulic and steam turbines in Canada and, until the early 1960s, they bought the majority of their requirements domestically. Ontario and Quebec continue to purchase from Canadian suppliers. However, during the past two decades, the other provinces, with few exceptions, have bought the bulk of their requirements from abroad. Since January 1, 1964, these provinces have purchased 44 of 52 utility-sized steam turbine generator sets offshore. This change in sourcing occurred during a time of decreasing Canadian tariffs, and commitments by some industrialized countries to increase employment in this labour-intensive, high-technology industry, and to develop self-sufficiency in energy.

For the past several years, there has been a worldwide overcapacity in the power generation equipment industry, which is estimated to be working at approximately one-third capacity. For example, in the boiler industry there were contract awards for 20 138 MW of utility fossil-fuel boilers in 1986 outside of the Soviet bloc, all supplied from a total capacity estimated to be in excess of 70 000 MW. Consequently, the international trading environment is characterized by aggressive competition. Major competition in export markets is coming from those countries with protected domestic markets (i.e., Japan, western Europe and the Soviet Union). Other countries, such as Brazil, India and the Republic of Korea, which have negotiated technology transfer agreements with industrialized country producers, are beginning to provide additional competition.

Despite international competition, Canadian companies have had notable success selling their gas and hydraulic turbines and power boilers in developing country markets such as the People's Republic of China, India and Indonesia. Most international competitors have the technical ability to produce high-quality products at competitive costs. Therefore, attractive and flexible financing packages offered by governments are often the deciding factor in awarding contracts.

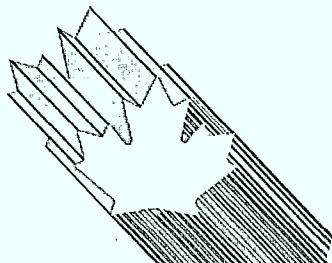
Canadian shipments of power generation equipment in 1986 totalled roughly \$1 billion, which represented eight percent of total machinery industry shipments. The industry had a strong export orientation and sales abroad of \$386 million represented 37 percent of its total shipments. Imports worth \$512 million captured 44 percent of the domestic market.

The performance of the industry as a whole showed a 3.5 percent decrease in the average annual rate of production between 1981 and 1986, as compared to an overall average annual increase of two percent for the machinery industry. The industry's performance for the 1981-86 period follows a U-shaped pattern with a peak in shipments in 1981-82 followed by a decline in 1983-84 caused mainly by the general economic downturn. Increased shipments in 1986 are attributable mainly to strong export sales.

Shipments of power boilers, pressure vessels and heat exchangers totalled \$654 million in 1986. Since 1981, shipments have declined at an average annual rate of 3.9 percent. Exports of \$82 million in 1986 were 13 percent of total shipments, while imports of \$92 million represented 14 percent of the \$665 million domestic market.

Despite the fact that the Canadian market is open to imports, domestic manufacturers have obtained most of the power boiler orders because of their top-notch technical ability and excellent after-sales service. Some of the larger Canadian boiler manufacturers, which are not constrained by their parent companies in exporting, have had considerable success selling to other countries. While the major export market is the United States, Canadian firms have also been successful in eastern Europe, South America and Asia.

Shipments of engines and turbines in 1986 were \$395 million. The sub-sector suffered a 1.4 percent average annual decline in production during the 1981-86 period. Exports of \$304 million were 77 percent of total shipments in 1986, and imports of \$420 million represented 82 percent of the \$510 million domestic market.



Exports have averaged 60 percent of shipments between 1981 and 1986. Most of these sales have been for small and medium-sized steam and gas turbines, with a few for large hydraulic turbines. However, there was a 75 percent average import penetration during the same period, primarily due to purchases by provincial power utilities of large steam, gas and hydraulic turbines. This import competition comes from major manufacturers in Japan, Italy, the United Kingdom, Switzerland, France, the Federal Republic of Germany and the Soviet Union, all of which have two of the important key elements for success: unrestricted freedom to export and total protection in their domestic market.

2. Strengths and Weaknesses

Structural Factors

The key elements essential to a strong, internationally competitive industry are state-of-the-art technology, economies of scale, market mandates, a continuous involvement in research and development (R&D) activities, a secure domestic market base and the availability of competitive export financing.

In general, the power generation equipment industry is strong in the technology and product servicing demanded by its sophisticated clientele. Its manufacturing efficiency in custom-engineered products offsets its relatively high labour and material costs. However, in product areas requiring economies of scale to achieve competitive manufacturing costs, the industry does not have the benefit of sufficiently large markets to be internationally competitive.

Many of the larger firms are owned by foreign multinationals, which can be either a strength or a weakness, depending on the particular circumstances of the firm.

In some cases, Canadian subsidiaries have been refused access to certain export markets because of corporate policy. This situation is particularly true for the U.S. market, which is often reserved for U.S. parent companies. Foreign ownership can also result in a transfer of production out of Canada, which may be in the best interests of the corporation, but is detrimental to the Canadian industry.

On the other hand, foreign ownership has been a strength for many subsidiary companies, particularly those which have obtained world product mandates. In these circumstances, foreign parents have often provided valuable international marketing assistance to the Canadian subsidiary, in some cases placing subcontract orders with their Canadian facilities. In addition to supplying financial assistance from time to time, foreign parents often provide subsidiaries with access to their technology and research and development facilities. The availability of foreign technology, however, has frequently resulted in a low level of R&D activity in Canada.

A major difficulty for the Canadian industry is the lack of a secure domestic market base. The predisposition of some provincial public utilities to purchase turbines offshore has denied Canadian firms a secure domestic market on which to build an internationally competitive industry.

In export marketing, the industry benefits from a full range of standard and concessional financing and risk insurance from the Export Development Corporation (EDC). The availability of this financing encourages not only individual exporters but also national and international consortia when pursuing large projects.

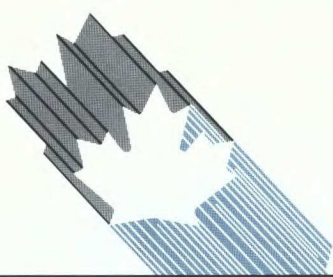
Trade-related factors

The industry is dominated by large, mainly U.S.-owned multinationals which were established in Canada many years ago to circumvent high import tariffs and take advantage of Commonwealth preferential duties. Generally, the Canadian tariff is now in the order of nine percent, and duty remission may be granted where the goods are not available from Canadian manufacturers. Furthermore, special end-use tariffs (often zero percent), such as those covering fertilizer plants, mining and enhanced oil-recovery equipment, have reduced the protection for Canadian equipment manufacturers. In addition, countries such as India, Brazil and the Republic of Korea, which have obtained licences to produce some of these products, can be expected to provide additional competition in the Canadian market. As a consequence, the Canadian industry has a large portion of its market open to strong import competition.

Canadian tariff rates are compared to those of major trading partners in the table below:

TARIFFS (PERCENT)

Product	Canada	United States	Japan	E.C.
Turbines	15	7.5	4.2-7.2	5-6
Engines	9.2	0-5	4.8-4.9	3.2-5.8
Boilers	12.5	6.5	4.2-5.7	5.5
Heat exchangers	9.2-10.2	6.5	5.7-7.2	5.5
Pressure vessels	9.2-10.2	2.6	5.7-7.2	3.8-4.9
Machinery (general)	9.2	0-5	4.2-7.2	3.2-5.8



Various U.S. state and federal "Buy America" procurement preferences act as non-tariff barriers (NTBs) on imports of Canadian goods. In most other industrialized markets, including the European Community and Japan, domestic markets are closed to import competition by national procurement policies or the use of other trade barriers. For example, several countries use the ability to meet national manufacturing, testing and safety standards in their bidder selection process to ensure that only domestic suppliers can qualify. These factors, combined with long-term close ties between local manufacturers and end-users, deny potential foreign suppliers an opportunity to bid. Major purchasers of power generation equipment are not covered by the General Agreement on Tariffs and Trade (GATT) procurement code.

Most Canadian provinces have varying degrees of preference for local manufacture depending on the level of local capability. For example, Ontario Hydro and Hydro-Québec use provincially restricted tenders when purchasing steam and hydraulic turbines, and other provinces encourage the manufacturing of less sophisticated equipment within the province as much as possible.

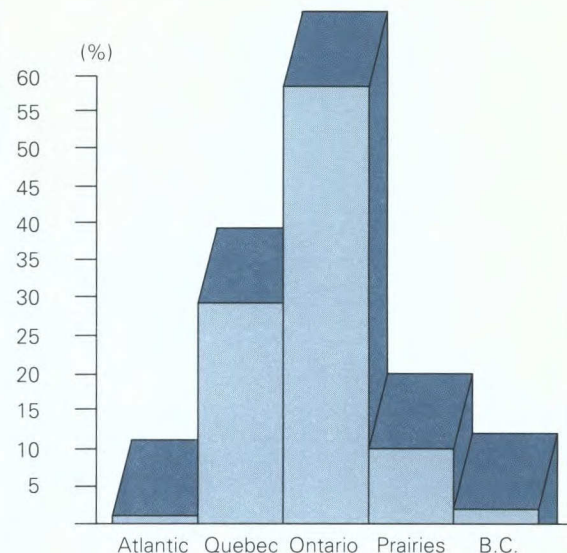
Dumping and foreign concessional financing can have a major effect on the domestic market. This is often difficult to prove and the time, cost and effort involved in pursuing such actions discourage many domestic firms from proceeding. In recent years, a number of foreign hydraulic turbine sales in Canada have meant a loss of both orders and jobs for Canadian companies.

Under the Canada-U.S. Free Trade Agreement (FTA), tariffs on goods covered by this industry will be phased out over a five-year period.

Technological Factors

The product technology of the Canadian industry is at least equal to that of its major international competitors. Indeed, in some product areas, such as hydraulic turbines, Canadian manufacturers have developed leading-edge technology.

This is not an industry of new product breakthroughs, but rather one of slow evolution which demands a continuity of effort. Many of the foreign subsidiaries manufacturing in Canada import their technology, while the remainder of the industry is responsible for its own R&D. However, under the domestic market conditions noted above, it is difficult for Canadian companies to finance the modern manufacturing facilities, ongoing R&D and engineering and marketing activities necessary to maintain their technical competence and manufacturing competitiveness.



Employment by Region 1986

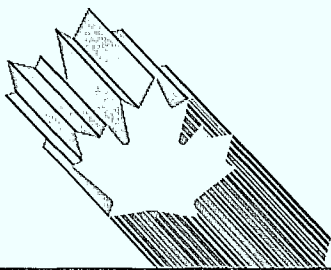
(Total 9500)

With respect to advanced design and machining technology, some Canadian manufacturers have already undertaken modernization programs through the installation of computer-numerically controlled (CNC) machine tools and the use of computer-aided-design (CAD) equipment. Although some Canadian plant facilities and procedures are on an equal footing with their major competitors, some are not. Additional productivity benefits are still obtainable through further automation.

Other Factors

The exchange rate of the Canadian dollar in recent years, particularly with respect to its U.S. counterpart, has benefited the competitiveness of this industry. If its value were to increase substantially, Canada's competitive position in both the export and domestic markets could be seriously impaired.

Procurement policies of provincial utilities have an important influence on the industry. Ontario and Quebec utilities have purchase preferences for local suppliers. Other provinces frequently require local content purchases which lead to fragmentation of the industry, inefficient use of existing facilities and higher costs to the consumer. Thus, local sourcing has a detrimental effect on plant manufacturing overheads, productivity and overall competitiveness in the international marketplace.



3. Evolving Environment

The developing countries are likely to provide substantial markets for new power generation equipment in the near future. The forecast demand for this equipment in Canada is minimal and, except for hydro developments in Quebec and co-generation power plants in Ontario, is likely to take place in provinces where the Canadian industry has not been able to maintain a significant share of the domestic market. The aggressive international competition of recent years is expected to continue.

The elimination of tariffs under the FTA will affect some product areas more than others. Major capital-goods items, such as turbines and power boilers, are likely to be unaffected by the FTA because of existing product mandates or the requirement for site field erection. However, standard products, such as heat exchangers, pressure vessels and packaged boilers, may be affected adversely. These less-sophisticated products rely on economies of scale to be cost competitive. It is anticipated that there will be rationalization of production between American and Canadian plants with some Canadian locations obtaining North American manufacturing mandates. The smaller Canadian-owned firms will require significant investment to remain competitive.

4. Competitiveness Assessment

The Canadian range of manufacturing capability is fairly complete. Canada's particular strengths are in large hydraulic turbines, gas and steam turbines and a wide range of steam-generation equipment, including power and industrial boilers and boiler room equipment. Many Canadian firms in these product areas are internationally competitive and are expected to continue to be so.

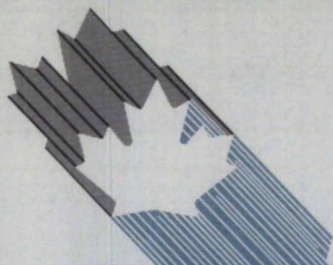
However, this industry is critically dependent on domestic procurement practices, government financing of exports and favourable foreign exchange rates. Even though Canadian firms are competitive, industry representatives have stated that tariff structures allowing duty-free importation of products when used in specific industries (e.g., agriculture, mining, oil and gas), dumping, and concessional financing by foreign governments offshore make it difficult for Canadian manufacturers to compete on major domestic projects. If these conditions continue, it is expected that further attrition of Canadian manufacturers will take place.

Overall, it is anticipated that the removal of Canadian and American tariffs will not have a significant effect in this industry. However, in the area of standard products, such as heat exchangers, pressure vessels and packaged boilers, the advent of the FTA is likely to result in the loss of some business.

For further information concerning the subject matter contained in this profile, contact:

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PRINCIPAL STATISTICS

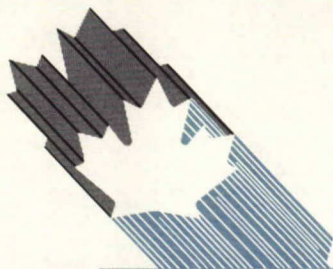
SIC(s) COVERED*: 3011, 3021, 3194, 3199

	1973	1981	1982	1983	1984	1985	1986
Establishments	N/A	N/A	N/A	N/A	N/A	N/A	200
Employment	N/A	N/A	N/A	N/A	N/A	N/A	9 500
Shipments (\$ millions)	318	1 188	1 117	942	845	959 ^e	1 049 ^e

TRADE STATISTICS

	1973	1981	1982	1983	1984	1985	1986
Exports (\$ millions)	56	272	284	270	275	263	386
Domestic shipments (\$ millions)	262	916	832	673	570	697	663
Imports (\$ millions)	148	564	473	526	429	502	512
Canadian market (\$ millions)	410	1 480	1 305	1 198	999	1 199	1 175
Exports as % of shipments	18	23	26	29	33	27	37
Imports as % of domestic market	36	38	36	44	43	42	44
Source of imports (% of total value)				U.S.	E.C.	Asia	Others
			1982	69	20	6	5
			1983	72	16	8	4
			1984	72	20	5	3
			1985	68	16	11	5
			1986	63	23	6	8
Destination of exports (% of total value)				U.S.	E.C.	Asia	Others
			1982	36	1	32	31
			1983	34	4	37	25
			1984	50	7	18	24
			1985	52	3	21	24
			1986	42	5	11	43**

(continued)

**REGIONAL DISTRIBUTION — Information based on 1986 data**

	Atlantic	Quebec	Ontario	Prairies	B.C.
Establishments — % of total	4	23	53	12	8
Employment — % of total	1	29	58	10	2

MAJOR FIRMS

Name	Ownership	Location of Major Plants
Babcock & Wilcox Canada	American	Cambridge, Ontario
Combustion Engineering Canada Inc.	American	Sherbrooke, Quebec Cornwall, Ontario Calgary, Alberta
Foster Wheeler Limited	American	St. Catharines, Ontario
MIL Vickers Inc.	Canadian	Montréal, Quebec
Canadian Erectors Ltd. (TIW Div.)	Canadian	Toronto, Ontario Calgary, Alberta
Koch Engineering Company Ltd.	American	Toronto, Ontario
General Electric Canada Co. Ltd. (DEW)	American	Lachine, Quebec
Westinghouse Canada Inc.	American	Hamilton, Ontario Renfrew, Ontario
Dominion Bridge Sulzer Inc.	Canadian/Swiss	Montréal, Quebec

* SICs on 1980 basis.

** Includes \$90 million in exports to Romania.

e ISTC estimate

N/A Not available

Note: Statistics Canada data have been used in preparing this profile.

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