SECTOR COMPETITIVENESS FRAMEWORKS

RAIL AND GUIDED URBAN TRANSIT EQUIPMENT

PART 1 – OVERVIEW AND PROSPECTS

Industry Sector / *Secteur de l'industrie*
Transportation Industries / *Industries des transports*

Canada

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RAIL AND GUIDED URBAN TRANSIT EQUIPMENT

PART 1 – OVERVIEW AND PROSPECTS

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This *Overview and Prospects* is the first of two companion documents on Rail and Guided Urban Transit Equipment in the **Sector Competitiveness Frameworks** series, which is being produced by Industry Canada in partnership with Canada's key stakeholders in the industry. *Part 2 — Framework for Action* will be prepared in coming months, based on consultations with major industry stakeholders, following study and review of the *Overview and Prospects*.

The **Sector Competitiveness Frameworks** series will focus on the opportunities, both domestic and international, as well as on the challenges facing each sector. The objective is to seek ways in which government and private industry together can strengthen Canada's competitiveness and, in doing so, generate jobs and growth.

In all, some 29 industrial sectors will be analyzed. *Part 1 — Overview and Prospects* will be available for distribution in printed as well as electronic forms during coming months for the following industries:

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Cat. No. C21-22/7-1-1996E
ISBN 0-662-24746-9

Aussi disponible en français sous le titre : Le matériel de transport ferroviaire et de transport urbain guidé : Partie 1— Vue d'ensemble et perspectives.

FOREWORD

The new Canadian marketplace is expanding from national to global horizons and its economic base is shifting increasingly from resources to knowledge. These trends are causing Canadian industries to readjust their business approaches, and government must respond with new tools to help them adapt and innovate. Industry Canada is moving forward with strategic information products and services in support of this industry reorientation. The goal is to aid the private sector in what it is best qualified to do — create jobs and growth.

Sector Competitiveness Frameworks are a series of studies published by Industry Canada to provide more focussed, timely and relevant expertise about businesses and industries. They identify sectors or subsectors having potential for increased exports and other opportunities leading to jobs and growth. In 1996–97, they will cover 29 of Canada's key manufacturing and service sectors.

While they deal with "nuts and bolts" issues affecting individual sectors, the Sector Competitiveness Frameworks also provide comprehensive analyses of policy issues cutting across all sectors. These issues include investment and financing, trade and export strategies, technological innovation and adaptation, human resources, the environment and sustainable development. A thorough understanding of how to capitalize on these issues is essential for a dynamic, job-creating economy.

Both government and the private sector must develop and perfect the ability to address competitive challenges and respond to opportunities. The Sector Competitiveness Frameworks illustrate how government and industry can commit to mutually beneficial goals and actions.

The Sector Competitiveness Frameworks are being published sequentially in two parts. An initial *Overview and Prospects* document profiles each sector in turn, examining trends and prospects. The follow-up *Framework for Action* draws upon consultations and input arising from industry–government collaboration, and identifies immediate to medium-term steps that both can take to improve sectoral competitiveness.

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1 HIGHLIGHTS

The Canadian rail and guided urban transit (GUT) manufacturing industry is a globally competitive, assembly-based sector with a strong reputation for quality, reliability and service. With strong growth of both export and domestic sales since the 1970s, the industry plays a vital role in national wealth creation by contributing to innovation, rationalization, design and development of both public and private transportation components and systems.

The GUT sector has built a solid product design and development base through rationalization, foreign affiliation and effective export market penetration. It has also proven its ability to supply and manage large projects and maintain price competitiveness. Because of government restraint and lack of in-house expertise, transit authorities are increasingly asking GUT suppliers to submit complete build, own (and in some cases operate) and transfer proposals, known as BOT or BOOT. Broadly based consortia are required both to undertake these projects and to put together the required financing, usually with private sector equity participation. Canadian companies such as Bombardier and SNC Lavalin Inc. are experienced in forming such consortia.

As a result of industry specialization and non-tariff barriers such as the U.S. "Buy America" and other requirements, major systems and components such as engines and control equipment are usually imported from U.S. suppliers.

The Canadian rail and GUT industry in 1994 employed about 10 000 people (0.5 percent of overall manufacturing employment) and generated $2.2 billion worth of shipments, or about 0.5 percent of overall manufacturing shipments.

Trade

Led by sales of passenger rail cars from Bombardier, locomotives from Diesel Division of General Motors (DDGM) and freight cars from National Steel Car Ltd., the value of exports has grown dramatically from less than $200 million in 1985 to $1.3 billion by 1995. In addition, rail parts exports were at an all-time record level in 1994, having increased by more than 36 percent over the previous year's level. Over 70 percent of shipments currently is exported, most of which (92 percent) is destined for the U.S.

Despite a small domestic market, the Canadian industry has been successful in establishing a competitive international position. Over the past 15 years, market share for every sector has improved. This includes Canadian freight car manufacturers, who recently regained market share. In 1995, they sold about

1000 freight cars in the domestic market and exported about 3000 cars to the United States. Canadian firms have about a 20-percent share of the total North American rail equipment market. In the urban transit sector, market share is even higher, currently ranging around 35 percent.

In early 1996, Bombardier was announced as a member of two separate high-speed rail (HSR) consortia: the first for the Florida Overland Express, and the second for the U.S. Amtrak northeast corridor project.

Technology

Many Canadian companies have succeeded in acquiring and developing innovative products and technologies through joint ventures, licensing, acquisitions and in-house research and development (R&D). Bombardier invests about 3 percent of its revenues in transport R&D, and has received a number of public and private sector contracts to develop new vehicle prototypes. For example, Bombardier's English Channel shuttle cars include onboard computerized monitoring and control networks, and a range of innovative lightweight, durable materials used in the aerospace industry. Furthermore, Bombardier's Transportation Systems Division designs, integrates and delivers total transportation packages through a turnkey or project management approach.

In locomotive manufacturing, DDGM's major R&D is performed in the U.S. Along with its partner Siemens, DDGM was first in North America with a commercially successful AC traction freight locomotive, a new generation of high-power locomotive.

Some of the most promising developments relate to intermodal transportation. Innotermodal Inc. has developed unique technology that allows truck trailers, with slight modifications, to be operated on train tracks. This system is currently being tested between Drummondville, Quebec, and Mississauga, Ontario, by Ecorail, a subsidiary of Canadian National (CN), in partnership with truck carriers. Canadian Pacific Railway (CP) and a U.S. rail company, CSX Intermodal, are also collaborating in the testing of a new intermodal system, which consists of a 400-metre train with special locomotives at each end. This train splits in the middle and lowers a ramp that is used to drive trailers onto the train's flatcars.

Rapid technological advances are increasing the efficiency of rail transportation as evidenced by the new emphasis on Intelligent Transportation Systems (ITS). ITS is the application of computer technologies, communications and electronics

to improve safety, efficiency and productivity of surface transportation systems, as well as to reduce environmental impacts. ITS is an emerging sector whose opportunities for Canadian companies seem promising.

Major U.S., European and Japanese firms appear to be committing more resources to product development than their Canadian counterparts. Their large size and significant market access give them a greater base over which to amortize large R&D expenditures. Canadian producers are disadvantaged by the fact that the Canadian market is too small to support high R&D expenditures. In addition, most major competitors are supported by favourable domestic procurement policies and R&D assistance.

Investment

In recent years, a large portion of capital investment by Canadian companies, especially Bombardier, has been made in the United States and Mexico as well as in European and Asian countries, in come cases to circumvent non-tariff and other barriers while at the same time establishing a presence in key markets. New investment in Canada has generally been focussed on upgrading existing plants and equipment.

1.1 Major Trends

One of the most important factors influencing the industry's future is the access to markets large enough to allow for economies of scale in both production and development activities. Because Canada's market, even in the absence of interprovincial barriers, is generally too small to meet these requirements, the industry must rely on export sales to achieve the required critical mass. In order to successfully export, Canadian companies must continue to develop and maintain a combination of system design capabilities, technological expertise, competitive prices and the financial strength to bid and participate in large projects.

Non-tariff barriers, especially government procurement policies, are a significant impediment to Canadian exports to developed countries. European and Japanese markets have historically been particularly difficult to penetrate. The U.S. domestic procurement policy remains an irritating barrier to trade with Canada. The effects are particularly adverse for small and medium-sized components-producing firms. Despite these barriers, Canadian firms have done relatively well in world trade. However, this performance could undoubtedly be improved if fewer barriers existed.

Sustainable Development

Pursuant to the 1990 U.S. *Clean Air Act* and in cooperation with locomotive builders and the American Association of Railways (AAR), the U.S. Environmental Protection Agency (EPA) is developing new emission standards for locomotives and other off-road mobile emission sources. Expected to be in place by the year 2000, the new standards are meant to achieve maximum reduction of diesel locomotive emissions through new technology, with due consideration to associated costs, noise, energy and safety factors. In the U.S., both railroads and major diesel locomotive manufacturers now are working on technologies to meet these standards.

Canadian railway companies doing business in the U.S., such as CN and CP, will be required to comply with EPA environmental standards as they apply to U.S. railroads. Since CN and CP have much older fleets than U.S. companies, replacement and rebuilding costs to meet the new standards will be very high. For Canadian suppliers, the new standards create opportunities to take part in developing new environmental technologies and equipment. Furthermore, the environmentally friendly nature of rail transit relative to passenger cars and trucking will help sustain demand for this type of transportation.

1.2 The Bottom Line

The Canadian rail and guided urban transit manufacturing industry is a vital part of the overall transportation equipment manufacturing sector. It is dominated by six principal firms who have in recent years adjusted their corporate strategies and business operations in response to changing economic conditions and emerging trends. It is a 150-year-old industry, which has adapted over time and has a bright future.

To secure its future, this sector must keep pace with rapid technological change by maintaining its leading edge in key product lines. It must continuously improve productivity and international competitiveness through sizable investment in R&D, human resources and market development.

Canadian rail and urban transit companies have rationalized plants as part of the North American market. The critical challenge for small and medium-sized parts-producing firms will be to establish an innovative culture receptive to new technology and differentiated products, international competitiveness and strong marketing.

Tariff elimination has led even minor tax differences to influence competitiveness. Harmonized capital cost allowance would ensure a level playing field for builders and lessors.

With a global market dominated by large diversified multi-national enterprises, international competition will remain intense. Despite past structural problems, the Canadian rail industry has a solid track record and good prospects for the future. Because of its demonstrated flexibility in both technical and commercial linkages, the Canadian industry appears well positioned to maintain and increase its share in a growing transportation equipment market.

2 KEY POINTS ABOUT THIS INDUSTRY

The rail and guided urban transit sector supplies rolling stock and fixed equipment to the freight rail as well as to the urban and intercity passenger rail markets. The industry includes builders of locomotives, freight cars, intercity passenger rail cars, urban rail systems such as subways and streetcars, rail and track equipment, and a variety of systems and components. Canadian data for the sector are collected according to Statistics Canada's Standard Industrial Classification (SIC) code 3261, which includes firms making railroad rolling stock, but does not include parts makers who supply other sectors such as the truck and bus industries and other electronic or equipment categories. Including all of these firms, the rail and guided urban transit industry comprises more than 200 firms in addition to the 21 establishments reported under SIC 3261 in 1994.

2.1 Global Context

Rail transport markets vary widely from country to country, with substantial impact on the respective national rail equipment manufacturing industries.

The global market craves NA new technology . . .

In Europe, a permanent drop in ore transport, heavy industry migration to coastlines and unwieldy rail company administration (unlike flexible road transport) have reduced rail freight traffic. In the United States and in the

member countries of the Commonwealth of Independent States (CIS, formerly part of the Soviet Union), vast distances favour air travel and inhibit passenger rail traffic; however, freight traffic remains strong. In China and India, both air and rail traffic are growing and both countries are big rail equipment consumers. While they produce most of the stock they need, these countries also require new technology; China in particular has bought significant numbers of North American locomotives.

but each country tends to build for itself

Since the rail rolling stock industry is totally dependent on railway network installations, manufacturers can develop new equipment only in close collaboration with their clients. This, combined with a thorough knowledge of individual network technical features, gives national manufacturers a considerable edge over foreign competition.

Guided Urban Transit Sector

There are more than 50 major competitors in the international guided urban transit (GUT) equipment market, including large, diversified multinational enterprises such as Kawasaki and Hitachi of Japan, Siemens, MAN and AEG Westinghouse of Germany, the Franco-British group GEC Alsthom, Ansaldo of Italy, Asea Brown Boveri of Sweden, Switzerland and Germany, and Hyundai of the Republic of Korea.

International sales of mass transport equipment can involve contracts worth hundreds of millions of dollars. Because of government restraint and lack of in-country expertise, transit authorities are increasingly asking GUT suppliers to submit complete build, own (and in some cases operate) and transfer proposals, known as BOT or BOOT. Suppliers are expected to recover their investment within an ownership and transfer period of about 30 years, either through operating profits and/or government guarantees.

BOOT capability is key to winning foreign contracts

Broadly based consortia are required to both undertake these projects and put together the required financing, usually involving private sector equity participation. Integrated proposals often require a range of expertise and technologies, which may be developed jointly to share research and development (R&D) costs. Canadian companies such as Bombardier Inc. and SNC Lavalin International Inc. are experienced in forming such consortia, which will also undertake non-BOT international bids of sufficient size and complexity.

"Municipalities are asking manufacturers to design and supply [transit systems] in turnkey fashion."
— Kenneth Kidd, *Report on Business*

Despite the high risk, the very large sales volume of GUT systems often attracts intense international rivalry. Future expansion potential and long-term growth further intensify competition.

Despite risks, global competition is intense

Bombardier is successful internationally

Canadian urban transit equipment is highly regarded for quality and price and has been selling well to customers in the U.S. and around the world. Throughout the 1980s, Bombardier (which entered the GUT market in 1976) built significant U.S. market share, largely by focussing on the replacement vehicle market. It now operates on a global basis, with subsidiaries in major markets. Bombardier's success is particularly notable given Canada's small domestic market and the company's reliance on export sales to reach a sustainable, competitive size. It has achieved success despite strong U.S. non-tariff barriers and significant foreign competition.

Locomotives and Freight Cars Sector

Canada sells competitive, high-quality locomotives

Major international locomotive builders include General Motors (GM) of Canada and the United States, General Electric (GE) of the United States, GEC Alsthom of France and the United Kingdom, Hitachi of Japan, Brush Electric of the United Kingdom, Krupp of Germany, and Asea Brown Boveri of Sweden, Switzerland and Germany. Europe has 13 locomotive builders, compared with two in North America and three in Japan.

Most locomotives are manufactured to comply with the standards of either the American Association of Railways (AAR) or the Union of International Railways (UIC). More stringent North American standards and advanced technology in GE and GM locomotives make foreign penetration of the North American market difficult, but make these units an attractive alternative for emerging markets.

Over 70 percent of Canadian production is exported. Exports in rail and GUT equipment in 1995 were valued at $1.3 billion. Canada's largest international market is the United States (92 percent of value of exports).

Canada exports over 70% of production, valued at $1.3B, 92% of this to U.S.

2.2 North American Context

The U.S. market is being fuelled both by urban transit infrastructure renewal in major cities, and by locomotive and freight car demand resulting from continued strong U.S. economic performance. Primary customers for Canadian rail and GUT equipment include major urban transit operators, Amtrak Rail and major U.S. railroads. Highly regarded for quality and price, Canadian equipment is generally competitive in the U.S. market. Competition to supply GUT systems to the U.S. market emanates mainly from European and Japanese companies.

U.S. demand fuelled by urban transit renewal and strong economy

Overall, GM locomotives account for about 70 percent of total North American stock. As with locomotives, the Canadian freight car industry is becoming increasingly integrated into the North American market. Canada supplies about 10 percent of the North American freight car market, estimated at 50 000 cars per year. The North American market for urban transit vehicles has remained stable over the past five years, averaging about 550 vehicles per year.

While further market growth is expected, both slower U.S. market growth and changes in relative cost of production point to slower growth than in recent years.

Non-tariff, "Buy America" policies impede sales to U.S.

For Canadian manufacturers of transportation equipment, the United States remains the most important market. Although bilateral tariffs have been removed for the most part, non-tariff barriers involving government procurement remain as unfinished business from the Canada–U.S. Free Trade Agreement (FTA). In particular, full access to the U.S. market continues to be limited by legislative or administrative exceptions (such as the "Buy America" conditions attached to federal funding of state and local transit procurement), as well as procurement restrictions imposed by sub-national governments themselves.

The "Buy America" provisions of the U.S. *Intermodal Surface Transportation Efficiency Act* require transit authorities who receive U.S. federal government funding to ensure that final assembly of rolling stock is performed in the U.S. and to achieve a 60 percent U.S. content level. Other products must be completely manufactured in the United States. Waivers, though possible, are exceptional.

The statutory authority for Amtrak, the national passenger rail corporation, also contains "Buy America" requirements.

2.3 Canadian Industry Snapshot

The rail equipment industry pre-dates Confederation

Canadian rail equipment manufacturing began well in advance of Confederation and the completion of the national railways. In 1859, the Pointe-Saint-Charles Shop (in continuous operation since 1853) of the then Grand Trunk Railway built and designed Canada's largest locomotive of the time.

Canada has built locomotives to suit our needs

Early in the 20th century, Montreal Locomotive Works (MLW) and Canadian Locomotive Company in Kingston designed and built steam locomotives for domestic use and eventual export.

After the Second World War, Canadian railways began to adopt diesel power. MLW began manufacturing diesel-electric locomotives in Montreal, and General Motors opened its Diesel Division in London. In 1966, Canadian National introduced the Turbotrain built by MLW, which still holds the Canadian rail speed record of 210 kilometres per hour. MLW also designed and built, in cooperation with Dofasco and Alcan, a new LRC (light, rapid, comfortable) train for VIA Rail.

Toronto and Montreal subways fostered Canadian firms' entry to urban transit

Streetcar and interurban car production, often under licence from American companies, began between the two World Wars. The Toronto subway system (1954) and the Montreal Metro (1966) gave Canadian companies a unique opportunity to enter the urban transit field. The first Canadian subway cars

were designed and manufactured by MLW and delivered to the Toronto Transit Commission (TTC) in 1962. Bombardier got its first order for Montreal Metro rubber-tired cars in 1974. In the 1970s and 1980s, regional commuter rail service upgrading created demand for commuter cars. In 1986, Vancouver introduced its first rail transit service, the Skytrain, designed and built in Canada by Transportation Systems Division, a subsidiary of Bombardier acquired in 1992.

As a direct result of progressive development in manufacturing sophisticated rail systems, Canada has become a major player in the international rail and urban transit market.

1994 shipments were valued at $2.2 billion; 30% for the domestic market

In 1994, the Canadian rail and GUT industry generated $2.2 billion worth of shipments, which amounted to about 0.3 percent of gross domestic product (GDP), about 0.5 percent of overall manufacturing employment and about 0.5 percent of overall shipments. Shipments in 1994 increased by 66.1 percent over the previous year's level. With a healthy trade surplus (see section 3.2 Trade) Canadian rail equipment has become a major foreign exchange earner among Canada's overall manufactured exports. About 30 percent of production is destined for the domestic market.

The industry in 1994 employed about 10 000 workers, which amounts to about 0.5 percent of total Canadian manufacturing employment. Another 3000 jobs depend indirectly on the rail manufacturing industry. Labour costs appear to be about one fifth of total shipment value, down noticeably from the level during the 1980s. Labour compensation rates are close to the manufacturing average, but are about 10 percent below the average for all manufacturers of transportation equipment.

Canadian firms buy 50% of cost of shipments purchased

Traditionally a major user of refined steel and design engineering, the rail and GUT sector uses increasing amounts of advanced materials and electronics, while BOOT-type projects require major consulting engineering services. Half the cost of shipments is purchased from supplying industries.

Five sectors . . .

The key sectors in Canada are the following:

- *guided urban transit cars:* motorized and non-motorized subway cars and streetcars
- diesel-electric *locomotives*
- passenger and freight *rail cars*
- vehicle *components and subsystems*; signalling and guidance equipment; and rail and track equipment
- *rebuilding* — overhaul of locomotives and rail cars.

Annex A describes each of these in detail.

are led by six major firms . . .

The sector is dominated by six principal firms and about 250 major component and track material suppliers. The six are:

- Bombardier, which builds guided urban transit vehicles and passenger rail cars at La Pocatière, Quebec, and at Kingston and Thunder Bay, Ontario
- Diesel Division of General Motors (DDGM), which assembles locomotives in its London, Ontario, plant
- National Steel Car Ltd., which manufactures freight cars in its Hamilton, Ontario, plant
- Procor Ltd., which manufactures and leases specialty tank cars, built in its Oakville, Ontario, plant
- Trenton Works, which builds freight cars (grain hopper and tank) in its Trenton, Nova Scotia, plant
- AMF Technotransport, which rebuilds locomotives and rail cars in its Montreal, Quebec, plant.

two of them Canadian owned

Of the major firms, two are Canadian owned: Bombardier and National Steel Car.

Bombardier and DDGM made about 70% of 1994 shipments

The Canadian industry is dominated by Bombardier and DDGM, which together accounted for about 70 percent of 1994 industry shipments.

High-value components are imported

The 250 component companies range from large, diversified multinational enterprises, such as Alcatel and General Electric, which supply major sub-systems, to small firms producing specialty products such as communication

equipment and training simulators. These companies supply almost all Canadian vehicle demand. However, components such as motors, computer equipment, etc. are generally imported from other countries.

Production centres are Ontario and Quebec

As shown in the list of major producers above, Canadian rail and GUT production is centred in Ontario and Quebec. Between rolling stock and component suppliers, the regional breakdown is estimated at about 50 percent in Ontario, 40 percent in Quebec, 5 percent in the Atlantic provinces and 5 percent in the western provinces.

Two major industry associations serve manufacturers in the sector. The Canadian Association of Railway Suppliers (CARS) groups the freight equipment manufacturers. The Canadian Urban Transit Association (CUTA) represents urban transit interests through its Transit Suppliers Business Council.

Between 1983 and 1993, the industry spent $552 million in plants and equipment in Canada, an annual average expenditure of $55.2 million.

"... prospects remain fairly good as long as the knowledge base continues to rise..." — Nuala Beck, *Excelerate: Growing in the New Economy*, 1995

Canadian plants are generally devoted to vehicle assembly. Many Canadian companies have acquired and developed innovative products and technologies through a variety of means.

Public Policy Issues

With the implementation of the FTA in 1989, most tariffs on urban transit and rail equipment were quickly eliminated. The exception is freight cars, where formerly high tariffs of 17 percent are continuing to be phased out and will be down to zero by 1998. The complete elimination of duties is expected to be positive for Canadian companies as there is good growth potential in the U.S. market.

The market is affected by rail company restructuring

The Canadian locomotive market is greatly affected by what happens with its major purchasers, CN and CP. The rationalization that occurred in the U.S. is only now beginning in Canada. The *Staggers Rail Act of 1980* in the U.S. created the framework for massive rail industry restructuring through mergers, abandonment of unprofitable lines, and sharing of lines and infrastructure to return the industry to profitability (see Annex B for more information on U.S. deregulation activity).

Amendments to legislation will aid restructuring

Although many changes to rail provisions were made in the *National Transportation Act, 1987* (NTA), under which Canadian railways operated until recently, there remained a need for further legislative amendments to, among other things, underpin restructuring in Canada similar to that in the U.S. Consultations in the fall of 1994 gave rise to proposed NTA amendments to permit easier market exit and allow short line railways to take over abandoned CN and CP lines in a more timely and efficient manner. As a result, the *Canadian Transportation Act* came into force in July 1996.

Eastern line rationalization speeds up

Canadian railways will restructure at a faster pace under the new legislation through branch line abandonment or sale to short line operators. Mainly because of major operating losses ($2 billion on eastern operations between 1988 and 1993), the railways abandoned 1260 kilometres of Canadian track, of which more than 80 percent were in the lower-density eastern network. Both companies agree on the need for system-wide cooperation, not on eastern operations only.

CN privatization, combined with the discontinuation of government subsidies announced in the February 1995 federal government Budget, put CN on an equal footing with CP. Now privatized, CN will no longer be able to sustain such losses, opening the door for more line rationalization.

CN has identified a further 6400 kilometres of low-density track for rationalization by 1999, mainly on its eastern lines. While the eventual shape of a rationalized eastern network is not yet clear, both have competitive strengths in the region and are expected to retain key lines and traffic sources. For both CN and CP Rail, the eastern region holds the key to intermodal traffic growth, which has been increasing almost 10 percent annually for the past five years.

CN and CP investing heavily in intermodal

Intermodal transportation is profitable, and both CN and CP are investing heavily in intermodal infrastructure and equipment. In April 1995, CN opened its newly constructed St. Clair River tunnel, linking Sarnia, Ontario, with Port Huron, Michigan. The 27.5-foot (8.4 metre) diameter tunnel, large enough to

"Intermodal travel means passengers are better served..."
— VIA Rail, *Annual Report, 1995*

carry maximum-height, double-stack, container trains, is the most direct route between Europe and the American Midwest, and reduces transit time between Halifax and Chicago by up to 24 hours. CP Rail has also opened its newly enlarged Windsor–Detroit tunnel under the Detroit River, providing more direct access to the U.S. Midwest and Southwest.

Rail car leasing requires harmonization of capital cost allowance

Differences in government taxation of industry equipment in Canada and the U.S. are impeding the competitiveness of Canadian car builders and leasing companies. Based on current rates, when an asset is 100 percent depreciated in the U.S., the equivalent asset in Canada is only about 55 percent depreciated. This difference means lower after-tax equipment costs for U.S. lessors, who can then make their rates more attractive to Canadian shippers and railways.

About 70 percent of all specialty freight cars now are owned by leasing companies. As leasing economics continue to improve, leasing is becoming popular for all rail car types, allowing railways and shippers to focus attention on core business and away from elements such as equipment maintenance and overhaul, capital investment and supporting infrastructure.

U.S. federal tax law permits rapid depreciation for rail cars: over five years for freight cars and 10 years for tank cars. By contrast, Canadian tax law allows capital cost allowance (CCA) to be claimed over a period closer to the unit's estimated life span.

For operating leases, the U.S. lessor is often also the equipment manufacturer, putting Canadian freight car builders at a disadvantage. Canadian leasing companies and CARS, the suppliers' association, make the case to the Minister of Finance that U.S. depreciation rates confer a significant cost advantage to the detriment of Canadian equipment manufacturers and leasing companies.

New U.S. EPA emission standards to come into force by 2000

The U.S. *Clean Air Act* of 1990 directed the U.S. Environmental Protection Agency (EPA) to develop new emission standards for locomotives and other off-road mobile sources of air emission. These are expected to come into effect by the year 2000. Canadian companies operating in or marketing to the U.S. will have to comply.

2.4 Performance and Competitiveness

Overall, the rail and GUT sector is profitable.

Exports have grown from $200M to $1.3B in past 10 years

Exports have grown dramatically in recent years, from less than $200 million in 1985 to $1.3 billion in 1994. Major contributors to this growth were:

- steadily increasing exports by Bombardier
- locomotive exports by DDGM, particularly since the 1988 worldwide consolidation at its London plant
- exports by National Steel Car, which has recently been highly successful in penetrating the U.S. market.

"Our share was won in an increasingly competitive market..."
— Bombardier Inc., *Annual Report, 1995*

In 1994, rail parts exports were at an all-time record level of $555 million, compared with $352 million in 1993. About 60 percent of shipments are currently exported, 85 percent of which are destined for the U.S. market.

Canada imports engines and control equipment

The Canadian vehicle market is dominated by production from Canadian manufacturers. *Imports* of major systems and components such as engines and control equipment are imported principally from U.S. suppliers. To meet increasing assembly output by both Bombardier and DDGM, imports of components also have increased and currently account for about 40 percent of domestic demand.

Imports of railway parts rose sharply in 1994 to $554.7 million, an increase of 57.3 percent over the 1993 level of $352.4 million. Vehicle imports, mainly intermodal equipment, rose by 231.7 percent over the same period from $53.3 to $176.8 million.

Canada has 20% share of NA market; 35% share of GUT

Canada's global market share improves

Over the past 15 years, market share for every sector in the industry has improved. Despite a small domestic market, the Canadian industry has been successful in establishing a competitive international position. For example, Canadian freight car manufacturers regained market share in 1995, when they sold about 1000 freight cars in the domestic market and exported about 3000 cars to the United States. Canadian firms have about a 20-percent share of the total North American rail equipment market. In the urban transit sector, the market share is even higher, currently ranging around 35 percent.

In 1994, Canada recorded a peak trade surplus in rail equipment of $665 million. Since 1989, Canada has enjoyed a significant trade surplus in this sector, cumulatively amounting to $2.5 billion over the six-year period from 1989 to 1994. Accordingly, rail equipment exports are an important foreign exchange earner for Canada.

Sector trade balance continues positive since 1989

Overall transportation industry data show that Canadian firms have about a 20-percent labour cost advantage, primarily due to recent exchange rate declines and lower public health care costs, which are significant issues for U.S. corporations.

Low exchange rates give Canada a 20% labour cost advantage in a labour-intensive industry

The majority of Canada's value-added in this sector is in vehicle assembly, which tends to be labour intensive. Just as the "Big Three" auto makers have invested heavily in Canadian assembly facilities, labour costs were key in GM's decision to consolidate locomotive assembly in London, Ontario. Labour and overhead constitute 30 percent of locomotive production costs.

3 CHANGING CONDITIONS AND INDUSTRY RESPONSE

The industry responds rapidly to change

The Canadian rail and GUT sector is generally well positioned to respond to rapid globalization, and in particular to freer trade within North America. Current strengths developed as older firms adjusted quickly to changing conditions while newer firms patterned their growth according to emerging market conditions. Continual global market change requires ongoing adjustment.

3.1 Investment and Financing

Bombardier invests outside Canada to capture new markets

In recent years, new investment in Canada has generally been focussed on upgrading existing plants and equipment, rather than on purchasing new. Bombardier has made major investments in the United States and in European and Asian countries, in some cases to circumvent non-tariff and other barriers, while at the same time establishing a presence in key markets.

"... much of the big ticket growth in public transit will be in Asia."
— Kenneth Kidd,
Report on Business

Major new financing will also be required to meet new environmental standards in the U.S. market, both for Canadian railways operating in this market and for equipment exporters.

Government financing and export insurance play a large role in the international rail and GUT markets. Most industrialized countries provide concessional financing to their respective industries in order to help cover risk exposure and to win export contracts that create jobs and expand production in their countries. Export financing institutions include the United States' Eximbank, France's Coface, the United Kingdom's Export Credits Guarantee Department (ECGD) and Canada's Export Development Corporation (EDC).

Export financing remains critical to major GUT projects

Export financing is especially important for large turnkey projects, where Canadian consortia often lack the financial depth of their international competitors. European and Japanese consortia are usually very large and can more easily obtain required financing and performance bonding. Because of the high risks involved, Canadian financial institutions have been reluctant to participate in these projects.

The EDC has played a significant role in export financing for Canadian companies, but the levels of assistance in many cases are still lower than those provided to international competitors. Financing amounts and terms are an important factor in sales to developing countries.

The availability of financing from the EDC and from the Canadian International Development Agency (CIDA) to developing countries in the early 1980s made Canada the leading exporter of locomotives in the world.

However, in recent years, CIDA's priorities have changed, and the availability of soft financing to developing nations has been reduced. The Canadian Commercial Corporation (CCC) has also assisted in Canadian exports by facilitating foreign contracting and bonding requirements.

International consortia are now a viable method of financing

More recently, Canadian companies such as Bombardier and SNC Lavalin have been able to arrange financing through international consortia formed to bid on large urban transit projects.

3.2 Trade

Export sales are critical to maintaining this sector in Canada

Access to markets large enough to allow economies of scale in both production and development is key to the industry's future. Since the Canadian market is too small for these purposes, the industry must achieve critical mass through export sales. To export successfully, Canadian firms must continue to develop and maintain a combination of system design capability, technological expertise, competitive prices, reliable and high-quality products, project management competence, and the financial strength to bid and participate in large-scale projects.

Non-tariff barriers, especially government procurement policies, significantly impede Canadian exports to developed countries. European and Japanese markets are particularly difficult to penetrate.

"Buy America" policy displacing activity from Canada to U.S. . . .

The main non-tariff barriers in the U.S. market are the "Buy America" provisions of the U.S. *Intermodal Surface Transportation Efficiency Act* and similar state and local content or assembly requirements. Transit authorities receiving U.S. federal government funding must ensure that 60 percent of rolling stock content value is sourced in the U.S., as well as final assembly. All non-rolling stock equipment must be entirely sourced in the United States. Waivers, though possible, are exceptional. Domestic procurement is also legislated for Amtrak, the U.S. national passenger rail corporation.

and the domestic market is also threatened

In response, some Canadian firms ship semi-finished product from Canada to final assembly facilities in the U.S. To some extent, the new U.S. plants mean overcapacity, disrupted manufacturing sequences and added costs, as well as investment shifted out of Canada. Examples are Bombardier's Barre, Vermont, final assembly facility and its new 100 000-square-foot (9300 square metre) plant in Plattsburgh, New York, built to finish rail and subway cars for New York City. DDGM is also constructing a final assembly plant in Schenectady, New York.

Component suppliers are hit hardest . . .

The 60-percent U.S. content requirement is hardest on Canadian component suppliers, mostly small and medium-sized firms, as it discourages investment in Canadian R&D and plants, and diverts parts production to the U.S. In turn, some Canadian parts suppliers have set up U.S. plants or transferred production to American affiliates or parents. Foreign investors also prefer to locate in the U.S. to ensure access to the entire North American market.

Canadian firms favour reciprocal treatment — like the Auto Pact

The absence of a "Buy Canadian" policy and the tariff elimination under the FTA means that U.S. manufacturers have much freer access to Canadian markets. Several U.S. firms have started to move aggressively into the Canadian market, for instance, to supply steel wheels for rail cars.

Parts purchases under $100 000 are now exempt from "Buy America"

Major Canadian firms with final assembly plants in the U.S. and new sourcing patterns are no longer seeking elimination of American procurement policies. They would prefer reciprocal national treatment, similar to the 1965 Canada–U.S. Automotive Products Agreement (Auto Pact) and the defence industry's production sharing agreements. The Canadian industry through the CUTA's Transit Suppliers Business Council has sought to move its counterpart, the American Public Transit Association, in this direction.

Canadian firms excel at acquiring and adapting technologies

Recent changes in "Buy America" requirements have exempted purchases under US$100 000, primarily to reduce the level of aggravation for transit authorities and the U.S. Federal Transit Administration, which had to deal with numerous waiver requests for small purchases.

Despite the non-tariff barriers described above, Canadian firms have done relatively well in the circumstances. This performance could undoubtedly be improved if fewer barriers existed.

3.3 Technological Change

Bombardier invests 3% in R&D . . .

To remain competitive with advancing transport technologies, Canadian firms must stay abreast of fast-breaking innovations. Many Canadian companies have a good record in acquiring and developing innovative products and technologies, through means such as joint ventures, licensing, acquisitions and in-house R&D.

built cars for Chunnel . . .

New York Transit . . .

Amtrak . . .

In the *GUT sector*, Canadian firms are technically competitive and, in some respects, world leaders. Bombardier invests about 3 percent of its revenues in transport R&D, and has received a number of public and private sector contracts to develop new vehicle prototypes.

Bombardier's cars for the Chunnel shuttle, which links England and France beneath the English Channel, include onboard computerized monitoring and control networks, and a range of innovative lightweight, durable materials used in the aerospace industry.

Other Bombardier transit innovations include reduced-weight bodies for a train prototype being tested by the New York Transit Authority, and the first North American-produced bogie that can run effectively at 240 kilometres per hour for Amtrak's northeastern high-speed rail corridor.

ART (Advanced Rapid Transit) trains

Bombardier's Transportation Systems Division designs, integrates and delivers a total transportation package through a turnkey or project management approach. The Transportation Systems Division has set up Advanced Rapid Transit (ART), a fully automated and driverless transit train, in three major North American cities. ART delivers lower operating and maintenance costs and the best on-time performance in the industry.

DDGM's London plant was first with AC locomotive

In *locomotive* manufacturing, DDGM's major R&D is performed in the U.S. Along with its partner Siemens, DDGM was first in North America with a commercially successful AC traction freight locomotive, a new generation of high-power locomotive. Three 4400-horsepower AC locomotives are capable of the work of five 3000-horsepower DC units.

Components firms have proprietary technology

A number of dynamic *components* firms have proprietary technology, such as advanced train controls, communications systems and vehicle monitoring systems.

Innotermodal Inc. puts truck trailers on rails

Innotermodal Inc. has developed a unique technology that allows truck trailers, with slight modifications, to be operated on train tracks for inter-modal transportation. The system requires no special infrastructure and minimal equipment. The system is designed for short to medium distance hauls of 1500 kilometres or less, and is being tested between Drummondville, Quebec, and Mississauga, Ontario, by a CN subsidiary, Ecorail, in partnership with truck carriers.

CP's "Iron highway" receives truck trailers

CP Rail and a U.S. rail company, CSX Intermodal, are also developing a new intermodal system, the Iron Highway, which consists of a 400-metre train with special locomotives at each end. It targets short hauls in the range of 500 to 1100 kilometres. The train splits in the middle and lowers a ramp used to drive trailers onto the train's flatcars. CP will be testing two Iron Highway trains between Toronto and Montreal, while CSX Intermodal will test two trains on its Chicago–Detroit line. Electro-pneumatic braking for freight trains is an important new safety development.

HSR (high-speed rail) promises the way of the future

High-speed rail (HSR) refers to passenger rail transport travelling at speeds over 153 kilometres per hour. As speed rises, the technology becomes more complex, and tracks need to be on a dedicated, grade-separated roadbed. Maintenance demands become more exacting and construction costs increase significantly.

Bombardier does HSR in U.S.

Since the 1980s, VIA Rail, Bombardier and governments have been studying HSR. A 1995 joint federal–provincial study reported that an HSR system on the Quebec–Windsor corridor would cost about $18.3 billion for the 300-kilometre-per-hour technology, and $16.4 billion for the 200-kilometre-per-hour system. Current fiscal restraint will make HSR difficult in Canada, at least in the medium term. However, opportunities exist for Canadian participation in the numerous U.S. corridors that have been proposed.

In early 1996, Bombardier was announced as a member of two separate HSR consortia: the first for the Florida Overland Express (FOX) (overall project value US$4.8 billion), and the second for the U.S. Amtrak northeast corridor (US$611 million for rolling stock).

Despite these announcements, the timing of future HSR projects remains uncertain, primarily because of government debt loads. Alternative financing, including significant private sector investment, will be required. VIA Rail and Amtrak themselves are facing further subsidy cutbacks and have limited resources to contribute to HSR.

ITS (Intelligent Transportation Systems) will improve safety, efficiency and productivity

Intelligent Transportation Systems (ITS) refers to the application of computer technologies, communications and electronics to improve safety, efficiency and productivity of surface transportation systems as well as to reduce environmental impacts. In time, ITS will transform the entire surface transportation sector, including private motor vehicle, mass transit and railroad systems, emergency vehicles and trucking. Current ITS products include satellite-based vehicle location and communication systems, computerized transit management systems, electronic toll collection systems, and in-vehicle route guidance and advanced freeway management systems.

ITS is an emerging sector whose opportunities for Canadian companies are significant. Some observers estimate that the world market for this emerging sector could reach $1 trillion over the next 25 years.

Foreign competitors lead Canada in product development

Major U.S., European and Japanese firms appear to be committing more resources to product development than their Canadian counterparts. Their large size and significant market access give them a greater base to amortize large R&D expenditures, which allow them to sell more competitively into other markets. Canadian producers are disadvantaged by the fact that the Canadian market is too small to support high R&D investment. In addition, most major competitors are supported by favourable domestic procurement policies and R&D assistance.

3.4 Human Resources

As with Canadian manufacturing overall, skills training to keep pace with technological change is paramount. Upgrading worker skills is key for the GUT sector in achieving greater productivity and competitiveness.

3.5 Sustainable Development

New U.S. EPA standards offer challenge and opportunity

In keeping with the 1990 U.S. *Clean Air Act* and in cooperation with locomotive builders and the AAR, the U.S. EPA is developing new emission standards for locomotives and other off-road mobile emission sources. These are likely to be in place by the year 2000. The new standards are meant to achieve maximum reduction of diesel locomotive emissions through new technology, with due consideration to associated costs, noise, energy and safety factors. In the U.S., both railroads and major diesel locomotive manufacturers now are working on technologies to meet these standards.

"Transit is one of Canada's best solutions for . . . serious environmental and congestion problems. . . ." — Canadian Urban Transit Association, *Modal Shift to Transit*

The new standards are expected to take a two-tiered approach, with the first tier applying to the current locomotive fleet and units built up to 2004. The principal objective of the first tier will be a 50-percent reduction of nitrogen oxide (NO_X) emissions for newly manufactured locomotives. Second-tier regulations will apply to locomotives built after 2004 and will require a 65-percent reduction in NO_X as well as some reduction in particle emissions.

Canadian freight railways in U.S. will have to comply with EPA

Canadian railway companies such as CN and CP that do business in the U.S. will be required to comply with EPA environmental standards as they apply to U.S. railroads. Since CN and CP have much older fleets than U.S. companies, replacement and rebuilding costs to meet the new standards will be very high. For Canadian suppliers, the new standards create opportunities to take part in developing new environmental technologies and equipment.

Southern California applies new standards early . . .

Faced with the worst air quality in the U.S., southern California is applying new emission reduction measures well ahead of the EPA deadline. Since more than just a cleaner diesel may be required, other approaches are being considered including alternate fuels, in particular liquefied natural gas (LNG).

also considering LNG and fuel cell technology

For the longer term, southern California is examining the feasibility of fuel cell technology (FCT) to power electric trains in the Los Angeles basin. FCT could provide near-zero emissions and quieter operations.

4 GROWTH PROSPECTS

4.1 Demand Outlook

Global demand continues strong into next century

Global demand for transit services, and hence equipment, is predicted to increase worldwide during the 1990s and well into the next century. Changing demographics and increased road congestion as well as energy and environmental concerns all provide the impetus for innovative technologies in rail and automated transit systems. Opportunities for the sale of freight rail equipment will continue to grow internationally as railway companies replace older equipment and purchase new equipment for bimodal road and rail system applications.

NA demand remains steady with strong competition from U.S. firms

North American demand during the early 1990s has been influenced by strong economic growth in the U.S. economy (3.1 percent in 1993 and 4.1 percent in 1994). Consequently demand for rail equipment has also been strong. In 1995, U.S. gross national product (GNP) growth slowed to 2 percent, and freight haulage has fallen off accordingly. Demand for passenger rail and urban transit equipment is less affected by GNP growth, and is largely a function of levels of public funding and subsidies provided by various levels of government.

GUT demand very strong in Europe, Asia, former USSR

Canadian rail and GUT suppliers face intense competition from U.S. suppliers in the U.S. market. The pressure, of course, is more intense during times of economic slowdown, particularly when substantial overcapacity exists. Current favourable exchange rates for the Canadian dollar vis-à-vis U.S. currency make Canadian suppliers very competitive in the U.S. market. Accordingly, U.S. demand outlook for Canadian suppliers looks positive, though it may remain quite flat in the medium term.

Guided Urban Transit Sector

The outlook for Canada's GUT sector appears positive for the next decade in North America as well as in Asia, eastern Europe and the former Soviet Union.

Urban transit renewal in U.S. could exceed $20B

Spurred by environmental and traffic volume concerns, urban transit renewal in the U.S. will present particularly strong opportunities for Canadian suppliers: market potential between 1995 and 2005 could exceed US$20 billion, with annual demand projected to increase to 650 vehicles. Canadian suppliers are well positioned to supply integrated urban transit systems, as well as intercity passenger rail vehicles to meet expanding urban transit needs around the world.

NICs offer market for GUT

Demand for GUT systems is rapidly increasing in fast-growing newly industrialized countries (NICs). Recent examples include systems in Ankara, Turkey, and Kuala Lumpur, Malaysia, in which both Bombardier and SNC Lavalin are involved. SNC Lavalin has also recently signed a US$500-million contract to build, own and operate a mass transit system in Karachi, Pakistan.

These trends indicate substantial business opportunities for Canadian companies in the next decade and beyond.

Locomotives and Freight Cars Sector

Domestic locomotive demand strong as CN and CP replace aging fleets

In view of the need to replace aging equipment, domestic demand for rail equipment is expected to be strong in the short term. CN is planning to invest about $455 million in 1996 (up from $370 million in 1995) in three areas: $270 million for intermodal infrastructure such as terminal construction and improvements; $110 million for new equipment, particularly new locomotives to replace its aging fleet; and $75 million for train service and information systems upgrading. Over the next 10 years, CN plans to acquire 543 new locomotives; $500 million will be spent between 1995 and 1999 for new units from DDGM in London, Ontario.

In 1995, CP Rail spent a record $650 million on capital expenditures including $200 million on AC locomotives built by GE in the U.S. In 1996, CP plans to continue investing in new locomotives and intermodal equipment as well as infrastructure.

Overall, the outlook for Canadian built locomotives remains positive over the medium term. DDGM is a strong and healthy competitor and its London, Ontario, plant is well equipped to produce the increasingly complex locomotives being developed. The market is currently expanding, with predictions of steady deliveries over the next five years.

U.S. railroads are modernizing their fleets

Analysts expect a North American demand of 600 and 700 units per year for the next five years. Following significant downsizing and restructuring in the U.S., railroads are now modernizing their fleets and embracing newer technologies such as higher-horsepower locomotives and intermodal equipment.

Developing countries like Canada's robust, low-maintenance locomotives

Start-up and revitalization of railway networks in developing countries offers potential growth. These countries appreciate the robustness and lower maintenance requirements of North American locomotives, as well as Canada's competitive prices. While European locomotives function well at home, they often encounter problems under more severe operating conditions and without adequate maintenance support.

Demand for locomotives also remains firm as new technologies and more powerful locomotives increase productivity and reduce operating costs. Recent traction efficiency developments and changes in railway operations suggest that locomotives with a capacity of 6000 horsepower or more will be preferred in the near future. Manufacturers have announced plans for engines with a capacity of 5000–6000 horsepower, with trains already being designed to handle the increased horsepower.

With increasing U.S. passenger traffic, many cities are looking for a cheaper, environmentally sound alternative to repairing old expressways and building new ones. Los Angeles is increasing passenger rail service using locomotives modelled on Ontario's GO transit system.

While the current slowdown of the U.S. economy could reduce U.S. freight car deliveries by as much as 20 percent in 1996, Canadian exports are expected to remain at their current level because of Canada's relative cost advantage.

Components Sector

Parts demand steady but limited by "Buy America"

The slowdown of the U.S. economy is expected to diminish component demand. Despite this, Canadian parts exports to the U.S. are expected to remain strong, even if somewhat reduced, because of favourable exchange rates. On the negative side, "Buy America" and similar requirements continue to limit the volume of components sourced in Canada.

The strongest demand driver is higher assembly outputs by Bombardier, DDGM and the rail car producers. Prospects are also strong for new guidance and control equipment for emerging Intelligent Transportation Systems.

4.2 Challenges

Structural challenges include:

Structural challenges include:

- a small domestic market and a characteristically "lumpy" market
- lack of Canadian capability to produce engines and other propulsion equipment and electronics
- weaknesses in export financing, which is key to bidding competitively on turnkey projects and large export orders
- disparities between Canadian capital cost allowance and the U.S. depreciation regime.

lumpy demand . . .

low R&D in high-value parts . . .

limited financing . . .

Competitive challenges include:

Concern has been expressed in the past by U.S. rail equipment competitors regarding previous government assistance to the Canadian rail car industry. Particularly in view of surging Canadian production, a concern remains that U.S. producers may seek countervail action by Washington.

U.S. protectionism . . .

The "Buy America" provisions noted above have led to job and production transfer south of the border. In response, the CUTA's Transit Suppliers Business Council is seeking relief from "Buy America" and similar restrictions on Canadian access to the U.S. market. If a negotiated settlement is not reached, job and production transfer can be expected to increase as market opportunities expand. As well, Canadian suppliers could be prevented from taking full advantage of a projected US$20 billion HSR market. HSR projects in the U.S. will involve considerable public funding and are therefore limited by domestic procurement preferences.

technological outflanking . . .

Because Canada's major competitors in the U.S., Europe and Japan, with the help of their governments, appear to be committing more resources to product development, Canadian firms in the industry may be becoming outflanked technologically.

The landmark U.S. *Intermodal Surface Transportation Efficiency Act* of 1991 set aside US$660 million specifically to nurture advanced transportation technologies through dozens of demonstration projects across the country. The U.S. President's 1993 Report to Congress, "Technology for America's Economic Growth," gives highest priority to technology that will put America ahead.

foreign government subsidies and financing . . .

Foreign government export financing for competitors is an issue in competitive bidding facing Canadian consortia attempting to win contracts for turnkey projects.

EPA standards by 2000

The new EPA environmental standards beginning in the year 2000 will have to be met by Canadian railways that wish to continue operating in the United States. Given the older age of the Canadian locomotives and ongoing financial difficulties facing the Canadian companies, complying with the new U.S. standards will impose a substantial burden on them. At the same time, however, Canadian suppliers of railway equipment will see improved opportunities as a result.

4.3 Strengths and Opportunities

Strengths include:

good access to U.S. market...

excellent assembly technologies...

growing BOOT and turnkey experience

Generally, Canadian rail equipment strengths include:

- well-established market access to the U.S., despite non-tariff barriers
- state-of-the-art assembled product technologies in key exportable areas
- a solid and growing reputation in international turnkey projects.

Future opportunities in the guided urban transit sector are growing rapidly. In the next five to 10 years, US$40 billion in business potential is projected for North America alone.

Opportunities include:

GUT growth...

ITS development...

ITS is an emerging sector where opportunity exists for Canadian companies. Observers estimate that the world market for ITS could reach US$1 trillion over the next 25 years.

new environmental technologies...

The new U.S. EPA environmental standards present significant opportunities for developing and producing new environmental technologies and equipment.

new turnkey and BOOT proposal calls

Bombardier and SNC Lavalin have broken the ground for establishing the kind of joint venture that will allow Canadian industry to penetrate large, otherwise inaccessible, foreign markets.

4.4 The Bottom Line

Success depends on:

product diversification . . .

accessing new markets . . .

keeping pace with technology . . .

resolving "Buy America" and capital cost allowance issues

To secure its future, this sector must keep pace with rapid technological change by maintaining its leading edge in key product lines. It must continuously improve productivity and international competitiveness through sizable investment in R&D, human resources and market development. The following structural challenges must be addressed jointly by industry and government.

The U.S. domestic procurement policies remain an irritating barrier between the two countries. The effects are particularly adverse for small and medium-sized parts-producing firms, whose critical challenge will be to establish an innovative culture receptive to new technology and differentiated products, international competitiveness and strong marketing.

Tariff elimination has led even minor tax differences to influence competitiveness. Harmonized capital cost allowance would ensure a level playing field in the rail car leasing field and for the builders who supply the cars. Export financing is a third major issue to be examined.

With a global market dominated by large, diversified, multinational enterprises, international competition will remain intense. Because of its demonstrated flexibility in both technical and commercial linkages, the Canadian industry appears well positioned to maintain and increase its share in a growing overall transportation equipment market.

This Sector Competitiveness Frameworks document on *Rail and Guided Urban Transit Equipment: Part 1 — Overview and Prospects* has been prepared as a basis for further discussion of issues and resolutions with key stakeholders. The outcome of the discussions will be published in *Part 2 — Framework for Action.*

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Annex A
MORE ON KEY SECTORS

Guided Urban Transit Manufacturing

The term guided urban transit (GUT) is used to describe urban passenger transportation systems that operate on special guideways, usually steel rails. Infrastructure for these systems typically accounts for about half of the total cost and includes guideways, transit stations, power substations, shops and yards. Turnkey systems are often managed by consulting engineering firms such as SNC Lavalin, with construction firms building the infrastructure. The rolling stock and control equipment portions can also involve consortia comprising Canadian and foreign firms.

The GUT segment is one of the few secondary manufacturing areas dominated by Canadian-owned companies, in this case Bombardier Inc. With the acquisition of the Transportation Systems Division in 1992, Bombardier became the sole Canadian manufacturer of GUT systems and a major international competitor. Bombardier, which employs about 3000 people in its three Canadian plants, supplies virtually all of the domestic market and over one third of the American market.

Part of Bombardier's strategy has been to develop, acquire and adapt technologies to suit market needs. For example, Bombardier's licensing of French technology for the Montreal Metro and Japanese designs for the New York City subway was critical to the early success and subsequent growth of the company. Similarly, the acquisition of rail equipment manufacturers in Europe and North America has given Bombardier a complete transit equipment line and better access to these markets. Bombardier's purchase of Transportation Systems Division added to its expertise in project management, engineering and construction, thus enabling it to pursue turnkey projects more aggressively. Finally, the company's licensing of TGV technology and alliance with GEC Alsthom has allowed it to gain a competitive position in the North American high-speed rail market, thereby underpinning its GUT leadership position.

Bombardier is one of the few manufacturers worldwide offering a complete range of mass transit and commuter rail cars, such as rubber-tired and steel-wheeled subway cars, light rail vehicles, self-propelled gallery commuter cars, commuter train coaches, bi-level transcontinental train coaches, and monorail and high-speed rail vehicles.

Locomotive Manufacturing

Only two major locomotive manufacturers operate in North America now: the Diesel Division of General Motors (DDGM), which consolidated its world locomotive production in London, Ontario, in 1988; and General Electric located in Erie, Pennsylvania. GE also used to manufacture locomotives in Canada, but closed its Montreal plant in 1993 because of decreased demand and tariff elimination under the FTA.

DDGM currently produces about 400 locomotives per year, most of which are exported to the United States. Canadian content varies between 35 percent and 65 percent, depending on customer specifications and "Buy America" applicability. DDGM employs about 3500 people, of whom about 2500 assemble locomotives and the remainder build military vehicles.

Although demand is highly cyclical and production may vary significantly depending on the timing of large orders, GM and GE currently have about equal shares of North American production. For many years, GM was the dominant locomotive builder, but GE Capital's aggressive financing has recently increased GE's market share. Overall, however, GM locomotives account for about 70 percent of total North American stock, an important factor in aftermarket sales.

The parts and service aftermarket has been estimated to be worth about one fifteenth of the initial value of the locomotive in each year of operation. This market is mainly composed of consumables such as filters and wear parts mostly associated with the drivetrain: diesel engine, traction motors, alternators and generators.

Freight Car Manufacturing

Freight cars, with the exception of pressurized tank cars, are generally a low-value, price-sensitive commodity-grade item with an average price of about US$60 000, compared with locomotives costing up to US$2 million each.

The Canadian freight car sector consists of three main manufacturers: National Steel Car Ltd., Procor Ltd. and Trenton Works Inc. The largest of these firms is National, which produced about 4000 cars in 1995, representing about $280 million in shipments. The company, which has 1500 employees working in its plant in Hamilton, Ontario, produces all types of freight cars except specialized tank cars, and has excellent engineering capabilities. Two years ago, a group of private investors purchased National from Dofasco, which had owned the company since 1910. Procor, located in Oakville, Ontario, specializes in the manufacturing and leasing of specialty tank cars for its own fleet and that of its U.S. parent, Union Tank Car. As a leasing company, Procor has about 55 percent of Canada's freight car leasing market.

Trenton Works of Sydney, Nova Scotia, was recently acquired by Greenbriar, a U.S. leasing company. Last year, the firm produced some 700 cars for a shipment value of about $45 million. In the past, the firm was a full-line builder, including tank cars. However, under the new owner, more specialization is being introduced. Because of the threat of countervail action based on previous government assistance, Trenton has been inhibited from selling in the United States.

From time to time, AMF Technotransport, primarily a rebuilding shop in Montreal, also produces freight cars. AMF is currently in the process of being sold to GEC Alsthom.

Components and Equipment Suppliers

The Canadian urban transit and rail equipment manufacturing sector includes more than 200 vehicle component and equipment suppliers. These range from large, diversified multinationals, such as Alcatel and General Electric, which supply propulsion and other major subsystems, to small firms producing a wide product range for several sectors. Among these:

- 15 *vehicle systems and component suppliers* manufacture complete subsystems such as electric motors, wheelsets, brake systems and components, coil springs, gears, batteries, interior components, air compressors, power cables, door operating systems and HVAC (heat, ventilation, air conditioning) components

- five manufacture *power supply and distribution equipment* such as system controls, high voltage breakers, third-rail components, sub-station equipment and utility transformers
- eight provide *signalling equipment*, such as wayside interfaces, central control components, switch machines, hot box detectors and ATCS (advanced train control systems)
- six principal *rail and track equipment* suppliers manufacture rails, welding materials, turnouts, turnout heaters and blowers, track fasteners and insulators.

Many technologically advanced components, such as motors and computer equipment, are either imported from the U.S. or built in Canada using proprietary technology licensed from American companies. The 60-percent U.S. content requirement under Buy America also leads to increased imports of U.S. parts, as these are incorporated into Canadian rail vehicles for re-export to the U.S. This provision reduces opportunities for Canadian suppliers.

Despite intense competition and structural impediments, the Canadian supply industry includes a number of dynamic companies with proprietary technology. Vapor Canada Inc. of Montreal produces complete door systems for subway cars, and electric and pneumatic door operators and controls for passenger rail cars. The SEL Division of Alcatel Canada Inc., in Weston, Ontario, designs, manufactures and installs turnkey signalling systems for streetcars, light rail and subways. Pocatec Ltd. of La Pocatière, Quebec, produces public transit communication systems, digital speed indicators and message display systems.

Rebuilding

Repairing and rebuilding existing locomotives, freight cars and GUT cars is proving to be a cost-effective alternative to buying new stock. If costs can be held to about 50–70 percent of the price of new equipment, then rebuilding represents a very real alternative to the substantial capital outlay required to finance major acquisitions.

Railways have traditionally carried out their own rebuilding, but this situation is changing. Deregulation and the need to downsize and become more efficient are leading railways to focus on their core transportation competencies, with less emphasis on in-house heavy maintenance. One Canadian company successfully specializing in rebuilding is AMF Technotransport of Montreal.

Annex B
DEREGULATION OF RAILWAYS IN THE UNITED STATES

After a long period of decline, demand for rail equipment in North America has rebounded in recent years. U.S. railroads are emerging from a massive restructuring period that followed deregulation of the industry 16 years ago. The U.S. *Staggers Rail Act of 1980* partially deregulated the U.S. rail industry by enabling railways to merge, restructure and abandon unprofitable operations and rail lines. The railroads were also allowed to compete with other modes of transportation, such as long-haul trucking and maritime shipping, which led to the development of increased intermodal transportation. These changes were required in order to revitalize the rail industry and enabled the companies to return to profitability.

Since deregulation, U.S. railroads have invested almost US$160 billion in track and equipment, largely as a result of their increased profitability. The increased efficiencies resulting from the new equipment and better utilization of existing equipment enabled railways to reduce their rates and better compete against other modes of transportation. The industry's restored profitability also reflects efficiencies gained from a series of mergers and other restructuring efforts, increased automation and adoption of state-of-the-art technologies.

Mergers have reduced the number of Class 1 railways in the U.S. from about 30 in 1980 down to six today, and total U.S. locomotive stock decreased from 28 000 to 20 000 units. During the restructuring period, North American demand for new locomotives was low, ranging between 140 and 400 units per year. Since the late 1980s, demand has recovered, ranging between 500 and 800 units per year.

Rail intermodal traffic has increased dramatically since 1980 and now constitutes almost 25 percent of total rail traffic. Intermodalism combines the inherent advantages of rail's lower cost in terms of weight moved over a distance with the flexibility of truck transport. Demand for intermodal equipment has thus risen considerably in response to fast-growing intermodal traffic.