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# INDUSTRY, SCIENCE AND TECHNOLOGY CANADA

REVIEW OF COMPETITIVENESS OF NORTHERN ONTARIO'S TRADITIONAL & SELECTED NON-TRADITIONAL INDUSTRIES

> Report III: Steel

March, 1991



# INDUSTRY, SCIENCE AND TECHNOLOGY CANADA

Review of Competitiveness of Northern Ontario's Traditional & Selected Non-Traditional Industries

Report III: Steel

March, 1991

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II. INDUSTRY PROFILES

# C. STEEL

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# **II. INDUSTRY PROFILES**

# C. STEEL

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#### A. **PROFILE OF STEEL SECTOR**

1. <u>Executive Highlights</u>

- The world consumption of steel has declined in the last decade primarily due to the lower intensity-of-use by the industrialized countries.
- Lower demand coupled with the overcapacity resulting from the high levels of investment in plant and equipment in the late 1970s and early 1980s, led to 60 international steelmakers losing a total of \$22 billion (after tax) during the period 1977-1984.
- As a result, many producers in the U.S. implemented major downsizing and modernization programmes in order to survive in an increasingly competitive world market.
- Up until the late 1970s, Canada was a strong performer in the world steel industry. However, it invested very heavily in plants at the same time that demand began to fall and the Canadian steel industry's capacity utilization declined to an all time low of 55% in 1982.
- In response to these changing market conditions, all three major
   Canadian integrated steel producers, Dofasco, Stelco and Algoma,
   has reduced investment and implemented cost cutting measures.
- By the mid to late 1980s, all three Canadian producers had increased their capacity utilization and had cut back their workforce by nearly 15%.



- However, further declines in demand and increases in competition as well as high interest rates in 1989 and 1990 resulted in the Canadian producers suffering combined losses of over \$1.5 billion in 1990.
- These producers will have to further reduce debt and employment, and increase production efficiency in order to maintain their share of world and domestic markets. Such changes will likely alter significantly the present face of the Canadian steel industry and will have serious implication on the approximately 68,000 workers currently employed by the industry as of 1989.

# 2. <u>Introduction</u>

As part of a larger report examining the competitiveness of Northern Ontario's traditional industries, this sector report examines the primary iron and steel industry and the factors which affect the competitiveness of the industry both on a global, national and provincial basis.

Northern Ontario's steel industry consists almost solely of the operations of Algoma. It is for this reason that this report examines the competitiveness of the steel industry on a broader level.

#### 3. World Steel Industry

(a) Structure

The structure of the steel industry comprises iron foundries, iron and steel mills, steel pipe, tube mills, metal smelting and refining. The majority of major steel producers are integrated steel producers in that their operations include the mining of primary iron ore as well as the smelting and production of steel.

Primary iron ore is the raw material used to make steel and iron products. This includes blast furnace iron, direct reduced iron and in Canada, electric smelted iron. Recycled ferrous scrap is a substitute for primary iron ore and accounts for 50% of iron units to make steel in Canada.



#### (b) Consumption

World steel demand is based on the six end user industries, steel centres, machinery and industrial packaging equipment, motor vehicle and parts, steel fabrication, pipes and tubes, and stamping, pressing and coating.

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Total annual steel consumption of the developed world has declined in the last decade. During the early 1980s recession, steel consumption dropped by 17% and capacity utilization plummeted to 65%-70%. The United States was hit the most dramatically where consumption dropped from a peak of 146 million tonnes in 1978 to 98 million tonnes in 1983 which then led to mass reorganization and rationalization.

Declines in world demand have been due to lower steel intensity-ofuse brought on by the completion of an extended period of physical infrastructure building, rapid growth in services and light manufacturing industries, the substitution of plastics and aluminum and the downsizing of automobiles and the amount of steel used in automobiles.

Other factors which can affect steel demand include economic growth in both the developed and developing countries, the rate of inflation, the interest rates and the availability and pricing of substitution materials.

#### Exhibit 1

#### **Relative Steel Intensity-of-Use**

<u>Country</u>	<u> 1970 - 1973</u>	<u> 1980 - 1983</u>	<u>1990 - 1995</u> (estimate)
	(tonnes of steel co 1975 U.S.	onsumption per a dollars of GNP)	million
U.S.	92.8	56.2	46.5
Canada	88.5	61.1	56.2
Japan	161.5	98.9	78.1
U.K.	116.4	62.4	50.6
West Germany	98.8	59.7	53.4
Brazil	89.5	72.0	65.7
South Korea	115.5	208.2	210.1

Source: Canadian Minerals Yearbook, 1988.

# (c) Production

As a result, the last decade in the world steel industry has been characterized by mass restructuring and rationalization. Major cost reductions and productivity improvements through the streamlining of operations, labour and management have led to substantial improvements in the operating rates of most industrialized countries.

The USSR, Japan and the United States are the largest steel producers in the world and accounted for 45.6% of total world production in 1989.



#### Exhibit 2

#### World Steel Production

Country	<u>1982</u>	<u>1985</u>	<u>1989</u>
	(000's tonnes)		
U.S.S.R.	147.2	154.5	160.7
Japan	99.5	105.3	107.9
United States	67.6	80.1	88.9
People's Republic of China	37.1	46.7	61.3
West Germany	35.9	40.5	41.0
Italy	24.0	23.9	25.1
Brazil	13.0	20.5	25.0
Republic of Korea	11.8	13.5	21.9
France	18.4	18.8	19.3
U.K.	13.7	15.7	18.8
Czechoslovakia	15.0	15.0	15.5
Canada	11.9	14.6	15.8
Poland	14.8	15.8	15.2
Others	<u>134.9</u>	<u>154.2</u>	<u>167.9</u>
Total	<u>644.8</u>	<u>719.1</u>	783.7

Source: International Iron and Steel Institute, various years.

Canada's share of world production has remained stable at around 2% since the early 1980s.

During the 1977-1984 period of low operating rates and depressed world production steel prices, according to a report produced by Paine Webber, 60 international steelmakers lost a total of \$22 billion after tax, equal to a loss of \$11 per tonne of steel shipped during this period. In response to such a dire situation, producers adopted the following strategies to ensure survival: ٠.

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- eliminated high cost and redundant capacity;
- plant modernization;
- forward integration; and
- reduction and restructuring of debt.

This resulted in reductions in man-hours per tonne shipped by all the five largest OECD steel producing countries including Canada, Japan and West Germany.

Newly industrialized countries such as Argentina, Brazil, Mexico and Taiwan have become a real strength in international markets due to their modern steelworks, low labour and material costs and government support all of which has allowed them to be extremely cost competitive.

Cost differences amongst industrialized steel nations have narrowed over the last decade because many producers have implemented similar cost and productivity improvement schemes. However, both Canadian and Japanese producers have lost cost competitive rank to the United States in recent years. This is due to the success that the U.S. had enjoyed since the major shake-out in the U.S. steel industry in the late 1970s and early 1980s. For instance, according to a report by Paine Webber (World Steel Dynamics) it now takes only 5.5 man-hours to produce a ton of steel in the U.S. compared to almost twice that rate a decade ago. Paine Webber also estimates that Canadian productivity is 10% below that of U.S. levels.

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However, employee costs in the U.S. steel industry remains relatively high to those of its international competitors.

(d) Trade

Excess steelmaking capacity in the industrialized world and the development of major new low cost steelworks in the newly industrialized countries led to strong growth in world steel trade and intense competition in world export markets.

This foreign competition has significantly affected U.S. and Canadian steel producers in particular. Steel imports in the U.S. increased from 10% in 1970 to 25% in 1985. In Canada imports increased from 12% to 16% during this period. In addition to loss of market share, this increased competition led to a very aggressive pricing and subsequent profit erosion. Canadian exports to the U.S. have not varied greatly over time, comprising 3% of the total U.S. steel imported.

As a means to protect domestic steel industries during a period of mass restructuring many countries have imposed various forms of import control. The European Economic Community (EEC), Japan and the U.S. all placed restrictions on the level of steel imports allowed while at the same time seeking to find new export avenues for their products.

(e) Technology, Research and Development

Investment in technology contributed to significant gains in productivity in the industry. These technologies included:

• major improvements in coking and blast furnace operations;

• replacement of open hearth steelmaking with basic oxygen steelmaking (produces a heat of steel in less than an hour compared to 8-12 hours for open hearth); and

• increase in continuous casting of molten steel.

#### 4. Canadian Steel Industry

(a) Consumption

Domestic steel demand has been declining in Canada since the early 1970s. Between 1973 and 1986, Canadian domestic steel shipments decreased an average of 45,000 tones per year, while total shipments increased annually by an average of 116,000 tonnes. During the same period, exports increased an average of 161,000 tonnes annually.

Almost all of the primary iron produced in Canada is used in the production of steel, with Canada's three major integrated steel producers, Algoma Steel, Dofasco Inc. and Stelco Inc. being the main domestic consumers of iron ore. Despite declines in domestic

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steel, Canadian consumption of iron ore in 1989 increased 33.5% from the low of 1982.

#### Exhibit 3

	Pig Iron -	Iron and Steel Scrap	
<u>Year</u>	Steel Furnace	Steel Furnaces (000's tonnes)	<u>Total</u>
1982	7,926	5,492	13,418
1983	8,544	6,449	14,993
1984	9,573	7,383	16,956
1985	9,792	7,034	16,826
1986	9,400	6,948	16,348
1987	9,737	7,143	16,880
1988	9,827	7,476	17,303
1989	10,128	7,790	17,918

# **Canadian Consumption of Iron**

Source: Statistics Canada, Primary Iron and Steel.

# (b) Production

Three Ontario based companies, Dofasco Inc. Stelco Inc., and Algoma Steel Corp. account for 75% of domestic steel capacity. Although all three companies are fully integrated, each has their own area of specialization. Major steel products of each of these companies includes:

#### • Sheet and Strip

The market for sheet and strip is primarily domestic and dominated by Dofasco and Stelco. Algoma's cost competitiveness is weakened by high transportation costs involved in shipping product to Hamilton.

• Seamless Tubular Products

Algoma is the only Canadian producer of seamless tubular products and import competition is strong. Its main export market is the U.S. and competition within the U.S. market is also very strong. While it has a new tubular mill which it is highly cost and quality competitive, Algoma's success is limited by low current demand.

Plate

There is low domestic demand for plate due to declines in shipbuilding and railway car production Algoma is the leading domestic producer but faces strong competition from Japan and the U.S.

Rails

Competition is very strong in this market with customers demanding higher quality and superior grade rails. Algoma



has been one of the two major producers of rails but is facing increased import and export competition.

Heavy Structurals

The domestic market for wide flange beams has been relatively flat due to the number of major infrastructure and energy projects. Algoma is the only domestic producer of these beams and the outlook for Algoma in this market is not positive.

Canada was a very strong performer in the world steel industry during the 1970s. However, Canadian steel producers invested heavily in the late 1970s at a time when new steel production was decreasing 25%. As a result, capacity utilization dropped from over 90% in 1979 to a low of 55% in 1982. Since then, utilization has recovered to over the 80% level.

Compared to other international competitors, Canadian steel producers have been relatively slow in shutting down capacity. Capacity levels have only dropped 12.5% in 1989 from the high of 1985.

Material costs are a strong deterrent of cost competitiveness in the steel industry. The iron ore mines of the Great Lakes region are relatively high cost producers. Algoma is at a particular

disadvantage due to the higher transportation and inventory costs related to its Wawa mine location.

### Exhibit 4

<u>Year</u>	Total Production	Furnace Capacity (000's tonnes)	% Rated Capacity
1975	11,900	14,100	81.0
1977	13,400	16,400	81.5
1979	15,800	17,300	91.4
1981	14,700	20,400	72.0
1983	12,700	21,800	58.3
1985	14,600	21,900	66.6
1987	14,550	18,600	78.1
1989	15,500	19,000	81.4

# Canadian Crude Steel Production/Capacity of Iron and Steel

Source: Canadian Minerals Yearbook, 1989; Canadian Steel Trade Committee.

High levels of capital expenditure in the early 1980s attributed to the excess of production capacity during a period of low demand. Expenditures dropped off in the mid 1980s and is now on the increase as part of a wave of modernization and technological improvements amongst Ontario producers to remain cost competitive on an international basis. Recent capital expenditures include two ladle metallurgy stations at Algoma, the construction of a new \$450 million integrated cold mill complex in Hamilton by Dofasco Inc. and a \$198 million flat roll processing project by Stelco Inc.

The Canadian steel industry has pared its workforce down 15% to 68,000 workers from 80,000 workers in the last decade. This



compares to a 75% decrease from 650,000 to 161,000 employees in the United States.

#### (c) Major Canadian Steel Producers

#### <u>Dofasco</u>

Dofasco is the largest integrated steel producer in Canada. In 1990, Dofasco recorded a \$679 million loss on sales of \$3.2 billion. This compares to a \$218 million profit on \$3.9 billion sales for the previous year. The loss can be attributed primarily to operating losses of Algoma Steel of which Dofasco purchased a 100% share for \$562 million in 1988. As a result, Dofasco wrote off \$700 million for the Algoma purchase in 1990. The 1990 Dofasco losses was also due in part to a decline in demand for its leading product, flat rolled steel. Both raw steel production and shipment declined 21% and 17% in 1990 from 1989 levels of 7.2 million tonnes and 6.0 million tonnes respectively.

#### <u>Stelco</u>

Stelco is the second largest integrated steel producer in Canada and has also recently incurred huge operating losses caused by huge declines in production levels and a high debt burden. In 1990, Stelco suffered a \$211 million loss on \$2.1 billion sales compared to a \$79 million profit on \$2.8 billion sales in 1989.

In 1990 production and shipment levels dropped 41% and 21% from 4.7 million and 4.3 million tonnes in 1989. Stelco's workforce has

been reduced from 11,000 in 1989 to 6,000 in 1990 (compared to 26,000 a decade ago). A three month strike, decline in production levels and interest charges from nearly a \$1 billion debt load all attributed to the 1990 losses.

#### <u>Algoma</u>

Algoma is the third largest integrated steel producer in Canada and the only steel producer based in Northern Ontario. In fact as the dominant economic force in Sault Ste. Marie employing up to a quarter of the city's labour force (12,400) during its peak period in 1982.

Algoma Steel had an excellent operating and financial performance in the 1970's. With a product mix focused on construction, automotive, transportation and energy sectors of economy, it benefitted from the strong growth in these sectors during this period. It invested heavily in state-of-the-art technology and production capacity in order to meet the growth in these markets.

However, Algoma was hit badly in the 1982 economic recession, with sales declining 40% in one year alone. Despite improved operating sales and cost reduction, by 1986 long term profitability was still a question due to intense foreign competition and a downturn in the North American energy sector.

In 1988, Dofasco purchased a 100% share in Algoma. While it did return to profitability in 1986-1988, Algoma suffered a pretax loss of



\$215 million in 1989 as well as large undisclosed losses in 1990, due to competitive problems with its rails, structural and seamless tubular businesses, a downturn in the major flat rolled steel markets and a 16 week labour strike.

Despite recently selling its coal mines for \$100 million, Algoma is over \$800 million in debt and has been seeking debt restructuring in order to remain a going concern. It recently secured a \$60 million operating budget loan to ensure its continued operation during this restructuring period. A shutdown would mean the direct loss of over 8,000 jobs in the Sault Ste. Marie and Wawa area. The rationalization of Algoma will probably include the mass rationalization of product lines, the closing of related production facilities and the sale of its rail and structural businesses.

#### (d) Trade

The level of Canadian exports and imports have increased between 1982-1989. The increase in imports largely U.S. originated which has led to the U.S. increasing their share of total Canadian steel market. However, at present, Canada's exports to the U.S. are limited due to import quotas and anti-dumping restrictions. Total Canadian shipments to the U.S. decreased from 3.2 million tonnes in 1988 to 2.7 million tonnes in 1990.

#### Exhibit 5

### Canadian Trade Statistics (000 tonnes)

	<b>Exports</b>	<u>Imports</u>
1982	3593	1215
1983	2797	1346
1984	2035	1449
1985	<b>2</b> 191	1843
1986	2108	1693
1987	4105	3061
1988	N/A	N/A
1989	4564	3033

Source: Energy, Mines & Resources Canada; Statistics Canada, Canadian Minerals Year, various years.

#### 5. Competitiveness Steel Industry

There are several key factors which will affect the competitiveness of both the world and Canadian steel industry. These factors include:

# (a) Future Consumption

World steel consumption is expected to grow at an average rate of 1.5%-2% per year from 1990-1995 in the developed world. Growth will be 5%-8% in newly industrialized countries, due to relatively low steel intensities at present and the development of steel-intensive infrastructures.



## (b) Production

#### <u>World</u>

The world market of steel is expected to grow in the early 1990s due to an anticipated improvement in the economy. North American output is expected to grow at a rate of 1% annually with the European steel industry expected to perform slightly better than the North American market. Japanese production is forecast to increase at a rate between 1%-2% as a result of higher domestic demand and potential export sales. Newly industrialized nations are expected to increase at over 2% annually for the next decade.

#### <u>Canada</u>

Canadian production of primary iron is projected to decline slightly during the mid 1990s as steel production is expected to drop back to the 1988 level. In the next five to ten years, primary iron production should increase as Canadian steel production is expected to increase due to greater trade as part of the Canadian/U.S. Free Trade Agreement. It is expected that Canadian steel should displace some of U.S. imports from other countries.

In fact, the integrated Canadian producers should become low cost producers due to the high levels of capital expenditures on plant and equipment over the last five years. Export potential will be good as Canadian producers focus on markets for high value added products. However, some industry analysts believe that there is only room for one integrated steel producer and a collection of regional mini-mills in Canada. This would suggest massive rationalization of the Canadian steel industry, with the closing of many facilities and a large number of layoffs, of a magnitude yet to be experienced within the Canadian steel industry.

#### (c) Technology, Research and Development

Given the level of plant and employee rationalization which has occurred within the industry already, technology will be the key source of further productivity and cost improvement which are necessary to remain competitive within the industry.

Traditionally, Algoma has been a leader in the use of state-of-the-art technology. It has been the world leader in employing continuous casting in its steelmaking operation and casts more than 65% (1986) of its raw steel production, whereas the Canadian average is 36%. Algoma was one of the first producers to use computer related technologies such as computerized process control systems.

However, steel companies worldwide have been investing more into new technologies such that Algoma's technological applications are no longer considered a competitive advantage. Furthermore, Algoma's very heavy debt burden has markedly limited its ability to invest in new technology.



Technology developments will have a significant impact on integrated electric furnace production and ultimately on the scrap market. Specifically, ladle metallurgy technology frees the main furnace for more primary production and produces a better quality product. This allows electric furnace mills to gain a greater share of the steel market which increases the demand and price for scrap. (Scrap is used in electric furnace steel mills.)

Continuous casting of thin slab, which allows easier rolling into sheet metal, is another technology that will be important in improving the integrated producers cost and quality of steel production. It also reduces the quantity of own-generated scrap and increases the demand for purchased scrap.

(d) Macro-Economic Factors

The competitiveness within a sector can also be affected by a number of macroeconomic forces, such as inflation, interest and exchange rates.

Like most other mining sectors, steel production is a capital intensive activity and is characterized by relatively high debt-toequity ratios. Thus, a company's cost structure and ability to compete internationally is dependent in part on its debt structure and domestic interest rates. Since steel prices are based on international and domestic demand, a high domestic inflation rate can affect its cost structure through higher labour costs, plant and equipment. Furthermore, inflation rates can lead to high interest rates (higher interest charges) as the government attempts to dampen spending.

Given the international nature of steel, a country's exchange rate relative to other competing countries' exchange rates can affect competitiveness. Exchange rates are linked, in part, to interest rates. Higher interest rates attract more investors to the country causing the currency to appreciate as currency demand increases. The higher the value of the currency relative to other currencies, the more foreign currency is required to purchase goods from that country. Thus, foreign customers will buy its steel from countries with lower valued currencies.

# 6. <u>Conclusion</u>

Both the world and Canadian steel industry have gone through many changes in the last decade and these changes are expected to continue onwards into the next decade. Despite demand for steel to rise during the next few years, further rationalization within the industry is expected and is necessary. This is particularly true of the major Canadian integrated steel producers who suffered combined losses of \$1.5 billion during 1990. Burdened with huge debt levels and overcapacity, these companies will have to undertake a major rationalization program to ensure long term survival. For Algoma Steel, such mass rationalization will be key to its survival. Algoma has lost many of its competitive advantages that it once



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In addition, labour problems which included a four month lockout/strike in 1990 have limited improvements in labour costs and productivity.

Rationalization of its product lines will also be necessary due to the many underperforming and/or cyclical markets in which Algoma operates.

Lastly, high debt levels will limit Algoma's investments in technology which is essential for all producers in ensuring production and cost competitiveness in the world markets.

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