



Infinite wealth

President's Message

The Aluminum Association of Canada retained the services of the consulting firm E&B DATA to conduct an updated assessment of the aluminum industry's economic contribution to the development of the province of Quebec.

We are now pleased to present you with the results of this study, which provide insight into the impact our sector of activity has on the economy of Quebec and its various regions.

Best regards,

Christian L. Van Houtte
President

E&B (Economic & Business) DATA is an economic research company that develops economic information products with high added value for industrial, institutional and financial decision-makers. E&B DATA is specialized in compiling databases in the industrial and technological development sector, as well as indicators, notably on a regional level. Established in 1998, the company quickly earned a strong reputation among a prestigious clientele as a source of strategic information. In the industrial sector, E&B DATA is currently conducting several research studies on the business location factors and the scouting process, as well as on the mechanisms and conditions needed to create wealth.



Primary Aluminum in Quebec

World-Class Production:
Regional Leverage

June 2006

E&B DATA



World-Class Production: Regional Leverage

Summary

I – A world-class and, until now, competitive industry in Quebec

A quiet strength. The historical growth of Quebec's primary aluminum industry has persisted in spite of a turbulent environment (globalization, exchange rates, fluctuating world prices). This constancy has been supported by a stable and predictable business environment (ex.: energy).

Regular reinvestment. The performance of Quebec's primary aluminum industry, particularly the sustained growth in sales and exports, could not have been maintained without constant and significant reinvestments over a period of more than 20 years, reflecting the industry's coherent vision and continuity in its application. With average investments of some \$700 million each year, the primary aluminum industry is the leader in terms of average reinvestment per plant in Quebec, thereby raising the province's total investment level.

Internationally competitive. The value of its exports (representing billions of dollars) and its share of international trade make primary aluminum one of the only world-class industries in Quebec. In fact, Quebec aluminum is the best performing export product in the province, with its increasing share in a worldwide market which is, itself, expanding. This Quebec asset is also part of an industry in which worldwide growth is expected to continue for at least the next 50 years.

II – Major impacts on Quebec's economy, the aluminum cluster and the regions

Significant and regular injections of funds in Quebec's economy. The primary aluminum industry spends \$2.5 billion in Quebec each year, not including its purchases of electric power and investment spending which, themselves, generate considerable spin-offs.

Leverage. The primary aluminum industry is one of the sectors that have little visibility in Quebec due to their intensive investment in capital rather than manpower. Nevertheless, their impact is substantial. Ten primary aluminum smelters account for 10% to 20% of the performance of Quebec's economic indicators (exports, industrial capital assets, contribution to the manufacturing trade balance).

Multiplying effect. For each dollar of direct value added generated by the primary aluminum industry, two more value-added dollars are generated by suppliers and aluminum manufacturers in Quebec. While just ten smelters are responsible for the value added created by processing primary aluminum, the value added generated elsewhere in the cluster is created by over 1000 companies.

Creating wealth in the regions. The vitality of the resource regions in which the primary aluminum smelters operate is reflected by positive transfer payments to Quebec's public finances (contrary to resource regions that do not have power-consuming industries like primary aluminum smelters). In fact, their presence continues to be the foundation for creating wealth in Quebec's resource regions.



TEN PRIMARY ALUMINUM SMELTERS ACCOUNT FOR 10% TO 20% OF THE PERFORMANCE OF QUEBEC'S ECONOMIC INDICATORS.





A Quiet Strength

Quebec: Home to the largest aluminum producers in the world

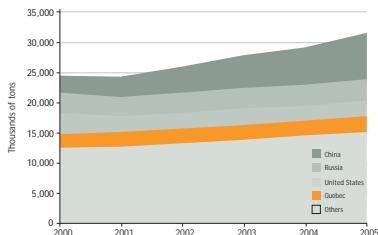
Figure 1: Members of the Aluminum Association of Canada

Alcan	Alcoa	Alouette
A Canadian corporation and the first aluminum company to start up operations in Canada, Alcan has over 65,000 employees in 59 countries, including close to 8000 in Quebec. Alcan operates one aluminum smelter in Kitimat, British Columbia, and six in Quebec: one in Shawinigan, one in Beauharnois and four in Saguenay-Lac-Saint-Jean. The latter form the largest aluminum smelting complex in the world. Alcan's international head office is located in Montreal.	The leading producer of aluminum in the world, Alcoa, has over 129,000 employees in 42 countries, with over 6000 in Canada, including the 3000 employees of its three aluminum smelters and rod plant in Quebec, all located on the banks of the Saint Lawrence River: the Baie-Comeau, Deschambault, and Becancour (A.B.I.) Smelters and the Becancour Rod Plant.	An international consortium of five partners: Alcan (40%), Austria Metall (Austria, 20%), Hydro Aluminium (Norway, 20%), la Société générale de financement du Québec (13.33%), and Marubeni (Japan, 6.67%). Alouette operates a smelter in Sept-Îles, Quebec, with close to 900 employees.

Sources: Alcan, Alcoa, Aluminerie Alouette

Quebec: Fourth largest producer in the world

Figure 2: Largest regions of primary aluminum production, 2000-2005



Sources: Natural Resources Canada and the Aluminum Association of Canada Compilation: E&B DATA



THE LARGEST ALUMINUM PRODUCERS IN THE WORLD ALL HAVE OPERATIONS IN QUEBEC.

Why is this important?

The presence of facilities owned by large international corporations is an important factor in developing an economy, particularly if these facilities are extremely active locally. In fact, their operational standards, international networks, ripple effect and often significant role in exports, to mention just a few, are all positive factors for the local economy. These spin-offs are multiplied when several large corporations from the same industry are present. In addition to emulation between corporations, the critical mass they create justifies sustained investment in education and research infrastructures.

What does this mean for Quebec?

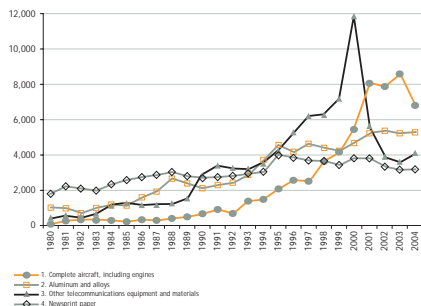
The three largest aluminum producers in the world, Alcan, Alcoa and Hydro Aluminium (through its partnership in Aluminerie Alouette), all have operations in Quebec. These corporations operate ten primary aluminum smelters in Quebec, not to mention their activities upstream (production of alumina), downstream (ten manufacturing plants), related activities (production of electricity and railway and port activities) and head offices.

The primary aluminum production capacity in Quebec was 2.6 million tons in 2005, making it the fourth largest producer in the world. Quebec's position as one of the main producers – even though it has no bauxite, the base ore used – was originally due to the competitive cost of electric power and its proximity to the United States. Today, although Quebec is now farther from growing markets (particularly those in Asia) and in spite of the erosion of the advantage that the cost of electricity used to offer, Quebec's strength resides in the expertise that has been developed in the province in terms of manpower, sub-contractors, equipment manufacturers and research.

One of the most dynamic export sectors in Quebec

A unique case of steady growth among the principal export products

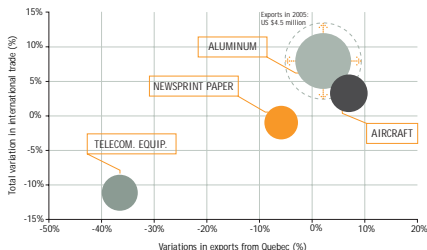
Figure 3: Principal exports from Quebec (\$ millions), 1980-2004



Source: Institut de la statistique du Québec

Aluminum exports from Quebec: An increasing share of a growing international market

Figure 4: Share of international trade assumed by the principal products exported from Quebec



Sources: Strategis, International Trade Center, U.N. and World Trade Organization, 2006

Why is this important?

By analysing export activities, we can identify "basic sectors" that enhance the entire economy by bringing in foreign currency. A national industry's market portion of international trade also indicates its leadership in the world. By analysing long-term trends around the world – rising or declining – we can determine whether the context for a specific national industry is favourable or not.



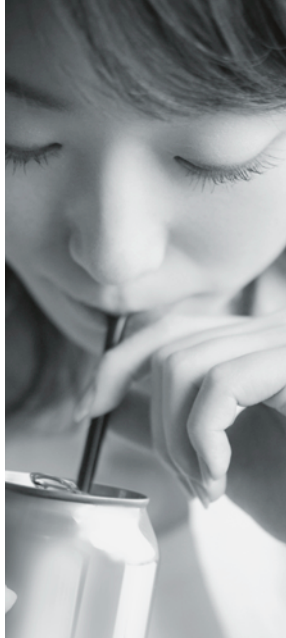
ALUMINUM AND ALUMINUM ALLOYS ACCOUNTED FOR OVER 9% OF THE VALUE OF QUEBEC'S TOTAL EXPORTS IN 2004.

What does this mean for Quebec?

Among the various categories of products exported from Quebec, aluminum ranks second, just behind aircraft. Aluminum and aluminum alloys accounted for over 9% of the value of Quebec's total exports in 2004. The export level of aluminum is naturally influenced by the level of local processing since, in turn, this can generate new exports.

In 2004, Quebec's aluminum exports represented 11% of world trade of this commodity (19% for newsprint paper).

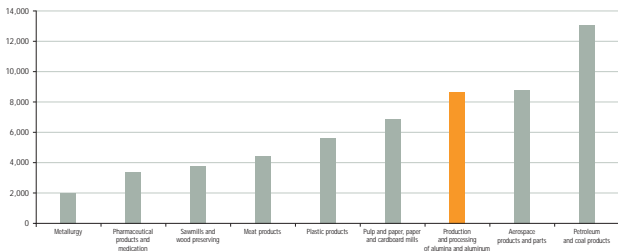
In terms of Quebec's share of international trade, aluminum outclasses the aircraft industry (7%) and telecommunications equipment (2%). This means that Quebec still holds an advantageous strategic position in a sector of the future. A recent analysis made by the McKinsey firm predicts that world production of primary aluminum will double by 2020 and that its growth will continue at a regular pace throughout the world until at least the middle of the 21st century.



Growth in rapid and regular shipments

Quebec's third industrial sector

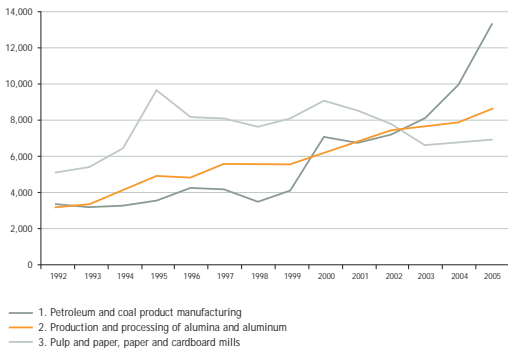
Figure 5: Shipments (\$ millions) for certain manufacturing sectors, 2005



Source: Statistics Canada

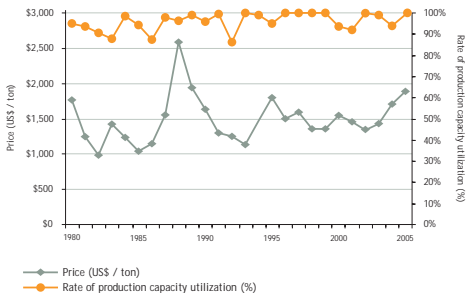
Steady, non-cyclical growth

Figure 6: Quebec industry shipments, 1992-2005



Source: Statistics Canada

Figure 7: International prices and aluminum production capacity utilization in Quebec, 1980-2005



Sources: Platts Metals Week and Natural Resources Canada
Compilation: E&B Data

Why is this important?

Production levels and production capacity utilization are important indicators in judging the vitality of a sector of industrial activity. In fact, these analyses reveal whether or not the production is cyclical, as well as its long-term growth or decline.

What does this mean for Quebec?

Primary aluminum is one of the three leading industrial sectors in Quebec in terms of its production value, practically on par with aircraft production. The recent increase in the price of hydrocarbons has contributed to positioning the petroleum product industry in first place.

It should also be noted that, for the first time, in 2002, the value of aluminum production exceeded the production value of the pulp and paper and cardboard sector.

In spite of extreme fluctuations in the international price of aluminum, production capacity utilization in Canada maintained an average of 96% during the period from 1980-2005.

This means that the aluminum industry has maintained remarkably stable operations.

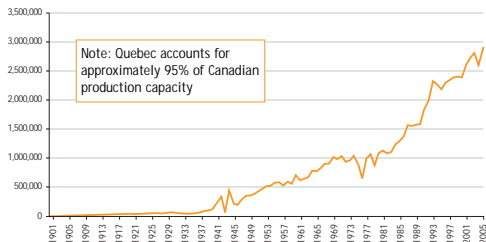
By and large, production in Quebec was not affected by changes in demand and international prices. This stability is partially due to regular plant upgrading projects, which have ensured their competitive edge on the international market.

(1) The production value of aluminum varies according to the market price from year to year. Values presented here, as well as the classifications compared to other sectors, are based on market prices in 2005.

Steady Reinvestment

A sector in expansion for over 100 years

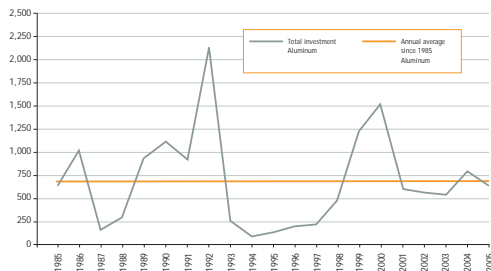
Figure 8: Production of primary aluminum (millions of tons), Canada, 1901-2005



Sources: Natural Resources Canada and the Aluminum Association of Canada
Estimates: E&B DATA

Steady reinvestment for over 20 years

Figure 9: Capital expenditures by the primary aluminum industry, Quebec, 1985-2005



Sources: Alcan, Alcoa and Aluminerie Alouette
Compilation: E&B Data

Why is this important?

Development of production and capitalization of an industry in a region (province or country) reflect the vitality of the industry and its confidence in the current and future business environment.

Capital assets can be analysed using macro-economic data, as well as by reviewing announcements of specific major projects.

What does this mean for Quebec?

The continued growth of aluminum production in Canada and Quebec for over 100 years has been supported by steady reinvestment. A closer analysis of the past 20 years is informative. During this period, the aluminum industry increased its momentum in Quebec with the arrival of a new international investor. This momentum crowned the intensive efforts made by the Government of Quebec to increase the value added on electricity produced in Quebec.

During the period from 1985 to 2005, the primary aluminum industry invested \$14.5 billion in Quebec. During the last decade, two major projects were carried out, with Alcan's project at Alma (\$2.9 billion) completed in 2000, and the expansion of Aluminerie Alouette in Sept-Îles (\$1.45 billion) completed in 2005, in addition to the \$1.5 billion invested in Phase 1 of the project. In short, these indicators demonstrate the strength of the primary aluminum industry's activity in Quebec. In fact, the aluminum industry has the highest average level of investment per plant of all industries in Quebec.



**DURING THE PERIOD FROM 1985 TO 2005,
THE PRIMARY ALUMINUM INDUSTRY INVESTED
\$14.5 BILLION IN QUEBEC.**



Development of
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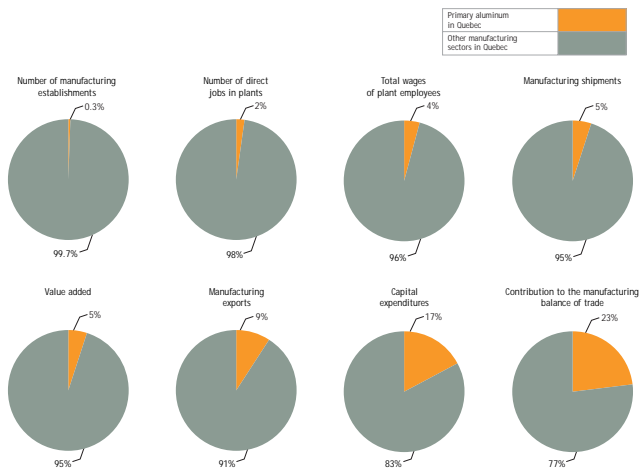
THE ECONOMIC CONTRIBUTION OF THE
ALUMINUM SECTOR, MAYBE LESS OBVIOUS,
BUT NOT LESS REAL.



Leverage

A substantial contribution to the economy

Figure 10: Impact of the 10 aluminum smelters on the manufacturing sector, Quebec



Source: Institut de la statistique du Québec – 2003 (most recent year for comparative data)

Why is this important?

A number of economic indicators are required to identify the importance of a sector of economic activity. Certain sectors have a very visible impact due to the distribution of activities in the territory (ex.: agri-food sector) or a high level of employment (ex.: clothing sector). Others, such as the primary aluminum sector, although no less real, make a less obvious contribution to Quebec's economy.

What does this mean for Quebec?

The primary aluminum industry is one of a number of sectors that are less visible because of their intensive investment in capital rather than manpower.

With 2% of the manufacturing manpower, the ten smelters in Quebec are obviously productive since they generate:

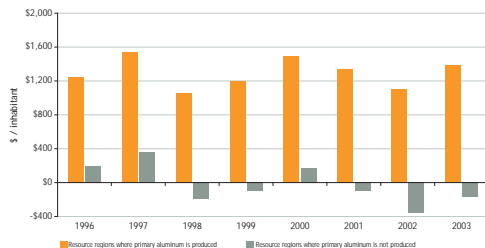
- 5% of the manufacturing sector's shipments and value added (contribution to the GDP);
- 9% of manufacturing exports.

They also contribute more than their share in creating wealth, with 17% of all capital asset expenditures in the manufacturing sector and 23% of the contribution to the manufacturing balance of trade. These indicators for 2003, the most recent year for which comparative data is available, were even higher in 2005 due to the intense activity of this industry in Quebec.

Creating Regional Wealth

In general, the population is more prosperous in resource regions where major industries have set up their operations

Figure 11: Net payment per inhabitant to public authorities for aluminum-producing and non-producing resource regions, Quebec, 1996-2003

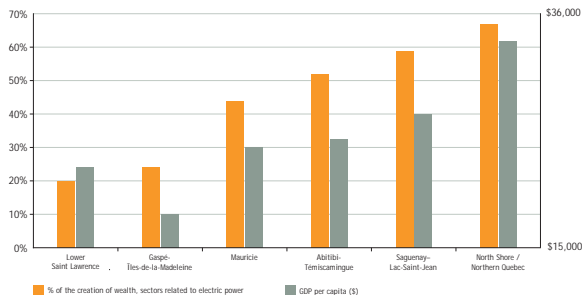


Source: Institut de la statistique du Québec, Direction des statistiques économiques et sociales
Compilation: E&B DATA

⁽¹⁾ Balance of income and other taxes paid by individuals compared to direct transfers made to individuals and families by federal, provincial and municipal authorities

Electricity continues to be a major factor in creating wealth in the regions.

Figure 12: GDP per inhabitant and the relative importance of economic activities related to electric power in certain regions of Quebec



Sources: Institut de la statistique du Québec, E&B DATA

Why is this important?

In examining the structure of regional economies according to their capacity to generate wealth, it is helpful to identify three main sectors:

The wealth creation sector. This sector covers companies that bring cash into the regional economy, for example, through exports or tourism activities, which draw consumers from outside to spend their money locally. This sector includes industries directly related to electricity, as well as other sectors, such as agri-food processing.

The public and para-public administration sector groups authorities from various levels of government, as well as education and health care institutions. The activities in this sector are funded by income and other taxes raised through the economic activities of citizens and companies – and are therefore directly dependent on them.

The private, so-called “induced”, sector. These activities are generated by retail businesses, construction, personal services and other activities induced by wealth-generating activities. Their viability is directly dependent on the purchasing power of the population, companies and local public authorities.

While wealth-creating sectors ensure that new “cash inputs” are made in the regional economy, the induced sectors and public authorities ensure the recirculation of these funds for the benefit of society in general.

What does this mean for Quebec?

The portion of wealth creation attributable to industries related to electricity is as high as 59% and 66% in the Saguenay-Lac-Saint-Jean and North Shore / Northern Quebec regions respectively, the two Quebec regions where aluminum smelters are most active. This results in a higher per capita GDP and, in general, positive transfers to the public authorities.

The contribution of power-consuming industries to regional economies is considerably greater than their portion of employment would lead one to believe. In fact, their presence is the basis for the creation of wealth in Quebec’s resource regions and the alternatives to activities related to electricity continue to be less favourable to regional prosperity.

Major structuring and recurring expenditures in Quebec



Figure 13: Current spending in Quebec, 2005

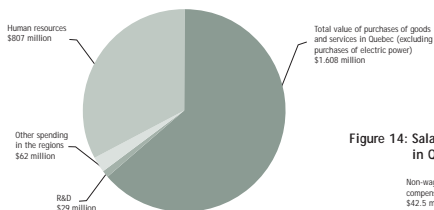
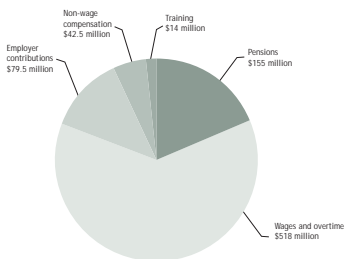


Figure 14: Salaries and other human resource expenditures in Quebec, 2005



Sources for both figures: Alcan, Alcoa, Aluminerie Alouette
Compilation: E&B DATA



THE PRIMARY ALUMINUM INDUSTRY INJECTS \$2.5 BILLION INTO QUEBEC'S ECONOMY EACH YEAR.

Why is this important?

One of the ways to measure economic impacts is to establish the value of spending in a given territory, excluding imports.

This analysis establishes the current expenditures of the primary aluminum industry. To create a more conservative analysis, purchases of electricity are not included.

What does this mean for Quebec?

The primary aluminum industry injects \$2.5 billion into Quebec's economy each year.

64% of this amount is paid to sub-contractors and equipment manufacturers doing business in Quebec.

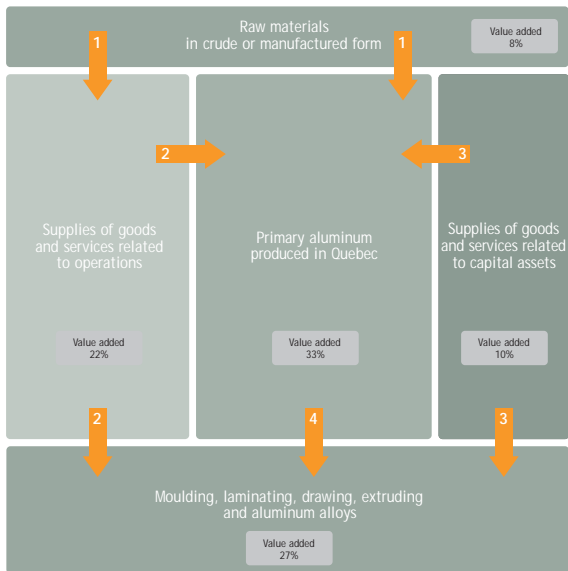
33% consists of human resources expenditures, with wages representing 62% of this amount.

3% is spent elsewhere in the regions and on R&D.

These amounts do not take into account spending engendered by investment or head office activities.

Multiplying Effect

Figure 15: The Quebec aluminum cluster: distribution of value added



Source: E&B DATA, based on data from the Aluminum Association of Canada and the Intersectoral model for Quebec prepared by the Institut de la statistique du Québec.

Note: This value added does not include the effects related to the purchases of electricity or created by workers' spending.



THE QUEBEC ALUMINUM CLUSTER REPRESENTS
AN ANNUAL VALUE ADDED OF ALMOST \$2 BILLION.



Why is this important?

Current industrial analyses focus on industrial clusters rather than sectors, the definition of which is considered to be too restrictive for strategic purposes. Analyses based on clusters take into account activities upstream (raw materials and other supplies) and downstream (second and third manufacturing) from a central industrial activity. They also take activities related to the supply of equipment and services into account. For clusters that are active on the investment level, they also include industrial activities related to engineering and construction. The contribution of the cluster to an economy can be effectively measured by its value added in the form of its contribution to the GDP. After 20 years of effort put in by the Province of Quebec to develop the aluminum sector, it is relevant to take stock of the extent and interrelations of the structure that has been created and the key role played by primary aluminum manufacturing. An analysis of the value added by the various components of the aluminum cluster in Quebec is very revealing in this regard.

What does this mean for Quebec?

For each value-added dollar generated by Quebec smelters, there are two value-added dollars generated by suppliers and aluminum manufacturers in Quebec.⁽¹⁾

As we know, the principal raw material, bauxite, is not found in Quebec; however, other raw materials are (ex.: a portion of the alumina), thereby contributing 8% of the value added in Quebec's aluminum cluster (see arrows 1 in Figure 15).

A major industry of suppliers of goods and services (other than raw materials) has developed, including professional, technical and computer services, waste-management and recycling services and transport services. These suppliers contribute 22% of the sector's value added (see arrow 2).

In addition to these suppliers of goods and services related to operations are the activities of suppliers of goods and services related to capital assets (10% of the total value added). In this area alone, smelters spend an average of \$700 million each year on capital assets, with a structuring effect on consulting engineering companies, as well as suppliers of construction materials and machinery (see arrows 3).

Lastly, the analysis reveals a high level of activity downstream among manufacturers (ex.: extrusion, moulding) confirming the results of recent studies (2) (see arrow 4). Manufacturers therefore contribute 27% of the value added generated by the cluster.

In general, while the value added of primary aluminum processing is created by ten plants, the value added generated elsewhere in the cluster is created by 1000 companies.

(1) This calculation is conservative in that it does not take into account the impacts related to the purchase of electricity, nor does it include all the benefits downstream and effects attributed to worker spending.

(2) Sources: "Filière industrielle de la transformation de l'aluminium au Québec", 2003 – MDEIE - "Structuration d'une banque de données sur l'offre et la demande d'aluminium au Québec", 2003 – Sous-traitance industrielle Québec



FOR EACH VALUE-ADDED DOLLAR GENERATED
BY QUEBEC SMELTERS, THERE ARE TWO VALUE-ADDED
DOLLARS GENERATED BY SUPPLIERS AND ALUMINUM
MANUFACTURERS IN QUEBEC.



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