Aluminum

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World production of primary and recycled aluminum reached a record in 2000 of an estimated 32.5 Mt, up 2.5% from 31.8 Mt in 1999. Of this, 24.4 Mt was primary material, compared to 23.7 Mt in 1999. This amount of primary aluminum production exceeds the amount of total production of all other nonferrous metals combined, although it is less than 5% of global steel production.

Among the International Aluminium Institute (IAI)[1] members, the primary aluminum production rate increased 1.2% during the year to 58 400 t/d in December 2000 from an average of 57 700 t/d in December 1999. The average production rate for all of 2000 was 57 900 t/d, compared with an average rate of 56 600 t/d in 1999, an increase of 2.3%. This average daily production rate has been growing at about 2% per year since 1980, and about 4% per year since 1960 (Figure 3).

Although IAI inventories of unwrought aluminum remained relatively constant at around 1.8 Mt, primary aluminum inventories at the London Metal Exchange (LME) decreased throughout the year. LME primary aluminum inventories started the year at approximately 775 000 t, peaked at 860 000 t in February, and then steadily decreased to 322 000 t at the end of the year. Various authors have suggested that this decrease represents a fundamental long-term change resulting from the electronic trading of metals. The aggregate total of IAI and LME stocks decreased from 4.034 Mt at the end of 1999 to a low of 3.478 Mt in November 2000. Stocks then increased to 3.5 Mt at year-end. (The IAI has an Internet site at http://www.world-aluminium.org.)

[1] The International Primary Aluminium Institute (IPAI) changed its name to the International Aluminium Institute (IAI) in 2000. Note: The IAI reporting system for inventories was revised in 1999.

Aluminum prices were volatile in 2000. After increasing throughout 1999 from a five-year low of US52¢/lb reached in March 1999, prices reached a two-and-one-half-year high in January 2000 of US79¢/lb. Since then, aluminum prices have generally traded in this range, ending 2000 at about US71¢/lb.

Primary aluminum cash settlement prices on the LME started 2000 at US$1615/t (US73¢/lb), increased to the year's high of US$1745/t (US79¢/lb) in January, and then fell to the year's low of just below US$1400/t (US63¢/lb) in April. Prices fluctuated between that price and US$1640/t (US75¢/lb) during the rest of the year to end it at US$1560/t (US68¢/lb). The average price for the year was US$1550/t (US70¢/lb), compared to an average of US$1362/t (US62¢/lb) in 1999 (Figure 10).

The IAI also reported that members' alumina production capacity increased to 51.479 Mt/y in December 2000 from a revised 48.490 Mt/y in December 1999, while alumina production also rose to 48.1 Mt in 2000 from 45.8 Mt in 1999.

The alumina market weakened during the year as expansions and increased utilization of existing and new capacity countered the effect of lost production at Kaiser's Gramercy refinery. *Metal Bulletin* reports that spot prices for metallurgical-grade alumina have declined to US$165-$180/t from over US$400/t in early 2000.

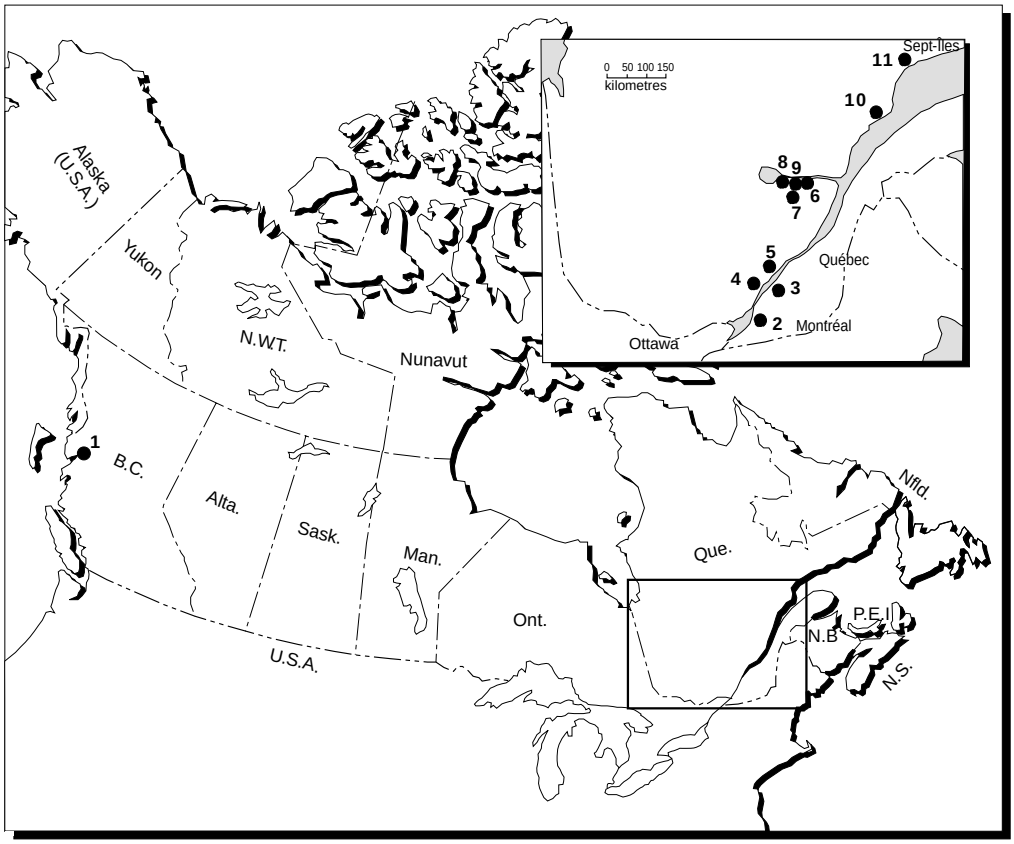
Aluminum, in both its pure and alloyed form, is used to make a wide variety of products for the consumer and capital goods markets. Aluminum's largest market sectors are transportation (29%), packaging (18%), building and construction (19%), electrical

CANADIAN PRIMARY ALUMINUM, 1997-2000

	1997	1998	1999	2000p
	(000 tonnes)			
Production	2 327	2 374	2 390	2 400
Apparent use	628	734	840	798

p Preliminary.

Figure 1
Aluminum Smelters, 2000



SMELTER	COMPANY	CAPACITY (t/y)
1. Kitimat	Alcan	272 000
2. Beauharnois	Alcan	49 000
3. Bécancour	A.B.I.	390 000
4. Shawinigan	Alcan	88 000
5. Lauralco	Alcoa Lauralco	240 000
6. Grande-Baie	Alcan	186 000
7. Laterrière	Alcan	210 000
Alma	Alcan	400 000[a]
8. Isle-Maligne	Alcan	25 000[b]
9. Arvida	Alcan	238 000
10. Baie-Comeau	Canadian Reynolds Metals (Alcoa)	418 000
11. Alouette	Alouette	244 000

[a] Will reach full capacity in mid-2001. [b] The last potline closed permanently in March 2000.

(9%), consumer goods (7%), and machinery and equipment (6%).

The World Bureau of Metal Statistics (WBMS) reported that, in 1999, Asia was the region in the world with the largest aluminum use, accounting for 34% of total world primary aluminum use. North America accounts for 30% and Europe for 30%. (WBMS has an Internet site at http://www.wbms.dircon.co.uk.)

Metals, including aluminum, are recycled and are not consumed during use in consumer and most industrial applications. Discussions on metals taking place in a number of fora indicate that the terms should be changed to more appropriately reflect actual practice. As a result, the words "consume" and "consumed" commonly used in reports on metal use have been replaced where applicable with more appropriate terms (e.g., "apparent consumption" has been changed to "apparent use").

In the same vein, recycled aluminum is often referred to as secondary aluminum. While this latter terminology reflects a use beyond the primary use and production, the term is confusing to many people as aluminum is recycled many times and the product obtained and used in new products meets the specifications of new material for that application rather than the specifications of a second-class or lower-quality product. The use of the word "secondary" has therefore also been replaced by "recycled."

CANADIAN DEVELOPMENTS

The production of primary aluminum decreased by 0.7% to 2.373 Mt in 2000 from 2.390 Mt in 1999. The reduction was due to the closure of Alcan's Isle Maligne smelter in March 2000. Canada ranks fourth after the United States, Russia and China in terms of world production. The value of Canadian production, estimated at $5.5 billion, compared to $4.8 billion in 1999, reflects the increased metal price in 2000. Monthly Canadian production statistics can be obtained on Natural Resources Canada's Internet site at http://www.nrcan.gc.ca/mms/efab/data.

Reported Canadian use of aluminum metal at the first processing stage, including rcycled aluminum, was 999 242 t in 1999, up 12% from a revised figure of 902 514 t in 1998. Part of this increase was due to an increase in the number of companies reporting.[2]

Canada is the second largest aluminum-exporting country in the world after Russia. Canadian exports of primary smelter products in 2000 decreased in quantity to 1.837 Mt but increased in value to $4.529 billion, compared to 1.862 Mt valued at $4.05 billion (revised) in 1999. Of this amount, exports to the United States totaled 1.44 Mt valued at $3.62 billion, compared to 1.51 Mt valued at $3.33 billion (revised) in 1999 (Tables 3a and 3b).

British Columbia's *Power for Jobs Strategy* makes surplus electrical power available to industry, under flexible terms and conditions, to create jobs and investment. One of the industries the province has targeted is aluminum. The province continued discussions with several aluminum producers to undertake planning and feasibility studies that may lead to the development of smelters and value-added facilities in British Columbia. (Additional information is available on the Internet at http://www.gov.bc.ca or http://www.gov.bc.ca/ei.)

Alcan Aluminium Limited continues to maintain its position as a low-cost supplier of bauxite, alumina and aluminum. On August 11, 1999, Alcan, Pechiney Corporation of France and Alusuisse Lonza Group Limited (algroup) of Switzerland proposed a merger. The Alcan-Alusuisse portion of the merger was completed in October 2000; the Alcan-Pechiney portion of the merger was withdrawn due to European Commission concerns. In the resulting merger, Alusuisse was valued at US$5.67 billion. The new Alcan, the largest specialty packaging company in the world, had combined revenues of US$13 billion and 53 000 employees in 37 countries. Shortly after the merger was completed, Alcan Aluminium Limited officially changed its name to Alcan Inc. to reflect its more diversified product mix and global character. (Alcan has an Internet site at http://www.alcan.com.)

Alcan owned 46% of total Canadian primary aluminum smelter capacity, and this portion is set to increase to 54% in 2001 with the completion and ramping up of the Alma smelter. The $2.2 billion Alma smelter started producing metal in October 2000 and is expected to reach its full production capacity of 400 000 t/y in mid-2001. The smelter employs 650 people (including 425 employees who transferred from Isle-Maligne). Alma uses Pechiney AP30 technology and is one of the most efficient facilities in the world. Costs are expected to be in the lowest quartile when compared to other smelters.

In late 2000, Alcan announced that it planned to shut down one of six potlines at the 272 000-t/y Kitimat smelter due to lower water levels in the Nechako Reservoir for the Kemano hydro-electric generating station. In early 2001, however, due to energy conservation measures and other arrangements with BC Hydro, the shut-down was avoided although production was expected to be reduced by approximately 40 000 t over 16 months.

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[2] These numbers may include runaround scrap. Work is under way to obtain clarification.

Alcoa Inc. became the second largest primary aluminum producer in Canada with the completion of its merger with Reynolds Metals Company Limited. After the merger Alcoa owned about 44% of total Canadian primary aluminum smelting capacity. Alcoa owns the 240 000-t/y Lauralco smelter located in Deschambault, Quebec, the 418 000-t/y Baie-Comeau smelter in Baie-Comeau, Quebec, and a 74.95% interest in the 390 000-t/y Aluminerie de Bécancour Inc. (A.B.I.) smelter located in Bécancour, Quebec. Alcoa's other corporate partner in A.B.I. is Pechiney Corporation of France (25.05%).

On a corporate level, Alcoa looked at the possibility of expansions at its existing smelters, including all three of its smelters in Canada. When these smelters were first constructed, planning was done to allow for easy expansion. Also during the year, Alcoa formed a new Northeastern Division based in Montréal to manage the Lauralco, Baie-Comeau and A.B.I. smelters in Canada and its two smelters in Massena, New York. The rationalization and consolidation of services resulted in a reduction of 260 jobs at the Baie Comeau smelter; 85% of these reductions were met through attrition and early retirement.

The 390 000-t/y A.B.I. smelter was the second largest Canadian smelter in 2000. It is owned by Alcoa (74.95%) and Pechiney SA (25.05%). During the year, the company and the Syndicat des Employés de l'Aluminerie de Bécancour (SEAB) signed a four-year labour contract. A.B.I. had previously indicated that it would like to add a fourth potline to increase capacity; however, plans require an additional power supply contract.

Partners in the 244 000-t/y Alouette smelter at Sept-Îles, Quebec, studied a doubling of capacity through a potential $1 billion expansion, which would require a new power contract. The partners include: Aluminium Austria Metall Québec (20%), VAW Aluminium Canada (20%), Corus Aluminium Québec Inc. (20%), Société générale de financement du Québec (20%), Kobe Aluminium Canada Inc. (13.33%), and Marubeni Québec Inc. (6.66%).

In British Columbia, KPI Technology and Development LLC, an independent consulting firm based in Spokane, Washington, worked on a pre-feasibility study for a new 360 000-t/y smelter to be located near Port Alberni, Vancouver Island. B.C. Hydro and the provincial government are currently conducting a power supply study for the 650-MW project. KPI and officials from the town of Port Alberni expected a feasibility study to start in late 2001. (Additional information is available on the Internet at http://www.bchydro.bc.ca/pagp, http://www.alberni-region.com and www.ktdal.com.)

In Quebec, Lavalum, L.P. opened a $20 million aluminum recycling smelter with a capacity of 35 000 t/y. Lavalum, a joint venture of Société nationale des ferrailles inc. (SNF) (60%) and SGF Mineral inc. (a subsidiary of Société Générale de financement du Quebec [40%]), will employ 60 people. (Additional information is available on the Internet at http://www.snf.ca and http://www.sgfqc.com.)

In September, the Canadian Aluminium Industry Technological Roadmap was published by the National Research Council of Canada, Canada Economic Development, Industry Canada and Réseau Trans-Al Inc. with the cooperation of the Aluminium Association of Canada, major industry stakeholders, suppliers and universities. Following a year of consultation and analysis, the Roadmap provides planning information for future industry needs. An electronic copy can be obtained from the Internet site of the Centre québécois de recherche et de développement de l'aluminium (CQRDA) at http://www.cqrda.qc.ca.

Following up on the recommendations contained in the Roadmap, the Government of Canada announced in October a $52 million federal contribution for a new National Research Council of Canada research centre in the Saguenay–Lac-Saint-Jean region. The new centre will be established on the University of Quebec's Chicoutimi campus. The centre will assist industry in developing value-added products to fill gaps in Canadian production capabilities.

The Aluminium Association of Canada is a non-profit organization supported by Canada's aluminum producers: Alcan Inc., Alcoa Inc. and Aluminerie Alouette Inc. The Association serves as a link between the Canadian aluminum industry, aluminum users, the public and governments. The Association's Internet site, located at http://www.aia.aluminium.qc.ca, has information on, and links to, Canada's primary aluminum producers.

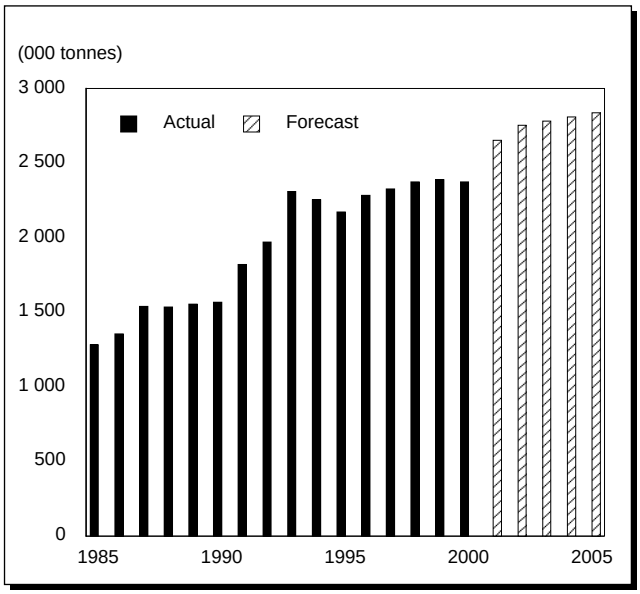
CANADIAN OUTLOOK

Canada is expected to produce about 2.6 Mt of primary aluminum in 2001, up from the 2.4 Mt produced in 2000. The increase will be due to the planned completion of the new Alcan smelter at Alma.

Although Canadian aluminum production capacity increased substantially during the latter half of the 1980s, it remained relatively stable during the 1990s. Canada's production capacity will increase to 2.7 Mt/y in 2001 with the completion of Alcan's Alma smelter. Other smelter expansion projects in Quebec (at Alouette, A.B.I. and Lauralco) are dependent on the negotiation of additional long-term power supply contracts with Hydro-Québec. Decisions and results of work on possible new capacity in British Columbia are still pending.

In 2000, Canada's reported use of aluminum is expected to increase 3% from 1999. Total reported use is estimated at 1.03 Mt of aluminum, which includes 0.74 Mt of primary aluminum. Canada ranks fourth in primary aluminum use after the United States, Russia and China.

Figure 2
Canadian Primary Aluminum Production, 1985-2005



Source: Natural Resources Canada.

WORLD DEVELOPMENTS

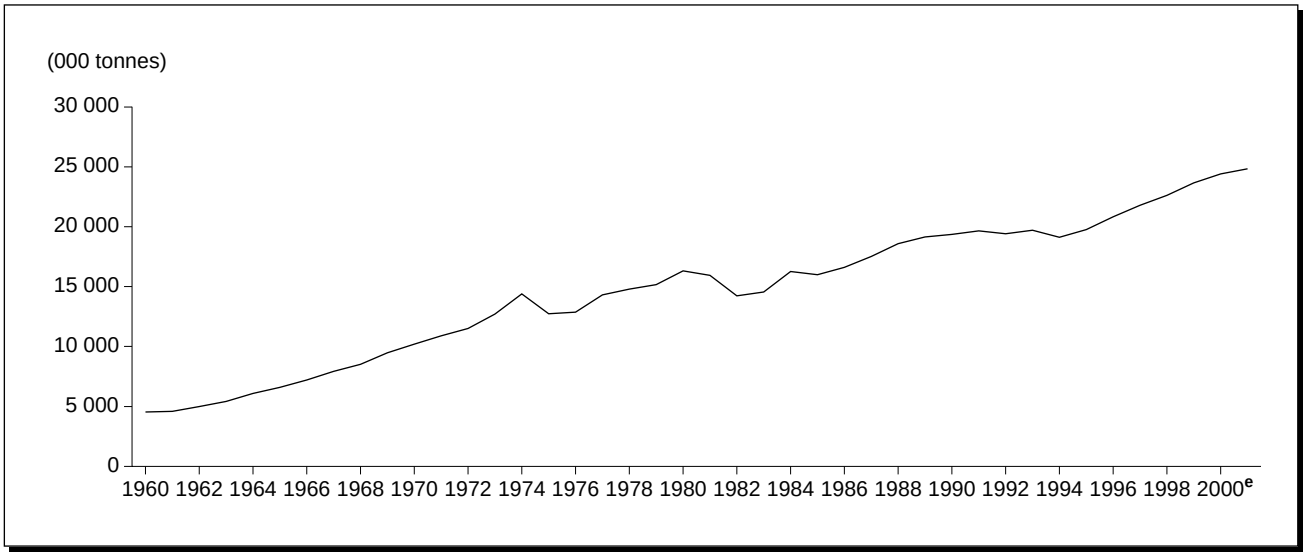
In 2000, producers continued to focus on cost reduction and increased competitiveness through economies of scale through mergers, acquisitions and technological improvements to facilities. Three major mergers and several smaller ones were completed in the ongoing consolidation of aluminum smelting and manufacturing capacity in large global corporations.

Alcoa Inc. and Reynolds Metals Company Limited completed their merger after receiving regulatory approval from regulatory authorities, conditional on sales of assets in a number of locations. Alcoa remains the largest producer of primary aluminum in the world. Alcoa produced 3.5 Mt of primary aluminum and 14 Mt of alumina, representing approximately 17% of IAI reported primary production and 29% of IAI reported alumina production. (Alcoa has an Internet site at http://www.alcoa.com.)

Alcan Aluminium completed its merger with Alusuisse as discussed above. At year-end, Alcan had a smelting capacity of approximately 2.2 Mt/y of primary aluminum and 5.3 Mt/y of alumina refining capacity. This represents approximately 10% of IAI reported primary production and 11% of IAI reported alumina production. (Alcan has an Internet site at http://www.alcan.com.)

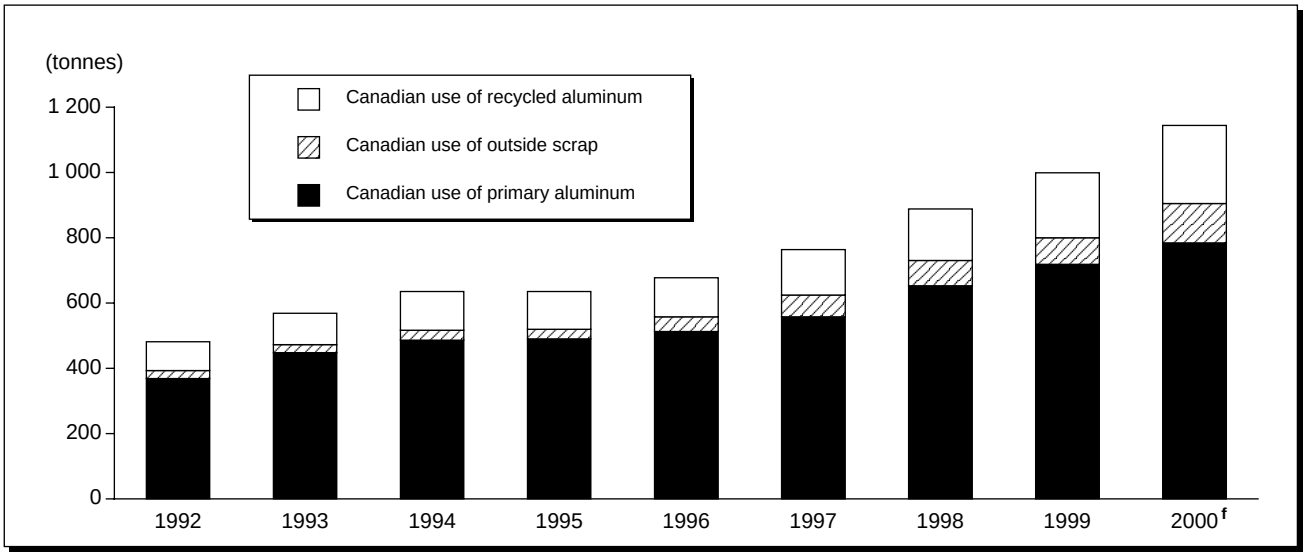
Russky Aluminii, or Russian Aluminium, was formed through an amalgamation of Sibirsky Aluminium's assets with the aluminum interests of Sibneft Oil. At year-end, Russky Aluminii had 2.1 Mt/y of primary

Figure 3
World Total Primary Aluminum Production, 1960-2000



Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics.
e Estimated.

Figure 4
Reported Use of Aluminum in Canada, 1992-2000



Source: Natural Resources Canada.
f Forecast.
Note: The use of aluminum may be overstated; survey forms have been revised for 2001.

aluminum production capacity in the Bratsk, Krasnoyarsk and Sayansk smelters and an interest in the Novokuznetsk smelter, the Achinsk and Mykolayivsky (Ukraine) alumina refineries, and other downstream facilities.

As energy prices soared in the western United States in mid-year, higher costs resulted for smelters without long-term contracts. By year-end, approximately 700 000 t of annual capacity was closed. New Bonneville Power Administration (BPA) contracts will reduce the power available to the smelters and new sources of power will be required if aluminum production in the region is to be maintained at capacity.

The decreased U.S. primary aluminum production was made up by increased production throughout the rest of the world; the IAI indicates a world daily average production in December of 58 400 t, up 700 t/d from the 57 700 t/d rate in December 1999.

Two greenfield primary smelters started producing aluminum in 2000, adding 650 000 t/y of capacity in 2001. In addition to the Alcan Alma smelter discussed above, Billiton Plc.'s US$1.3 billion Mozal smelter in Mozambique cast its first metal. This smelter is expected to reach its full capacity of 250 000 t/y early in 2001.

During 2000, there was an increase in electronic marketing activity as metal producers and users focused on new ways to market products and purchase supplies. For example, General Motors Corporation expects to source a large proportion of purchases online by 2001. Initiatives included:

- Aluminium.Com, a business-to-business electronic commerce company established in 1999, continued its efforts to create a global Internet marketplace;
- Covisint, an Internet procurement company was launched by partners including General Motors, Daimler-Chrysler AG, Ford Motor Company, Renault SA, Nissan Motor Co., Oracle and Commerce One (http://www.covisint.com);
- Quadrem, a mining and metals online procurement marketplace, was formed for the global mining, minerals and metals industries (http://www.quadrem.com and http://www.mmprocurement.com);
- the LME opened LME Select, an electronic trading platform;
- a metals Internet trading exchange for nonferrous metals, EMETRA, started operations in February (http://www.emetra.com); and
- Metals-Russia.com was established for metals, raw materials and equipment related to the Russian metals industry (http://www.metals-russia.com).

United States

The Aluminum Association, Inc. reported that the United States, the world's largest producer of primary and recycled aluminum, produced a total of 3.668 Mt of primary aluminum in 2000, down 2.9% from the 3.778 Mt produced in 1999. The World Bureau of Metal Statistics reports that 3.4 Mt of aluminum were recycled in the United States, representing approximately 42% of recycled aluminum worldwide (8.2 Mt) in 2000.

Increased power costs and decreased availability caused disruptions to the aluminum smelters and their employees in the western United States. Smelter contracts with the BPA, renewed in late 2000, reduced the amount of power available to the smelters. Smelters affected by the power shortages and increased power costs have a combined capacity of about 1.9 Mt/y. In early 2001, approximately 900 000 t of that smelting capacity had been closed with no certainty as to when or if it would re-open. Some producers have started to develop additional power supplies for a longer-term solution, such as Goldendale Aluminum's new 248-MW gas-fired power facility that will come online in mid-2002.

The affected smelters have included: Alcoa's Troutdale, Oregon and Ferndale, Washington smelters; Alcoa's Wenatchee, Washington smelter (in early 2001); Michigan Avenue Partner's (formerly Reynold Metals Co.'s) Longview, Washington smelter (in early 2001); Kaiser Aluminum & Chemical Corporation's smelters in Tacoma and Mead, Washington; Vanalco Inc.'s Vancouver, Washington smelter; and Golden Northwest Aluminum Inc.'s Goldendale smelters in Washington and Dalles, Oregon. Glencore Ltd.'s Columbia Falls, Montana smelter and Ormet Corp.'s Hannibal, Ohio smelter also suffered.

Power costs also affected fabricators. By the end of 2000, energy surcharges were being imposed by firms in an attempt to recover the increased energy costs for transformation. In response to the general situation and to the disruption and uncertainty facing communities and the aluminum industry, the BPA created a study team. At year-end, several economic studies were under way on the viability and role of aluminum smelting in the northwestern United States. (Additional information is available on the Internet at http://www.bpa.gov and http://www.uswa329.org.)

In February, Reynolds Metals Company shareholders approved a merger with Alcoa. In May, regulatory authorities in the United States and the European Union approved the merger with several conditions. The resulting merger, valued at US$5.9 billion, reinforced Alcoa's standing as the largest aluminum company in the world. Alcoa was required to divest Reynolds' interests in three alumina refineries and a partial interest in the Longview, Washington smelter. Pursuant to those conditions, Alcoa:

- agreed to sell the Worsley refinery to Billiton Plc. in August (refer to the section on Australia);
- agreed to sell the former Reynold's Longview, Washington, smelter to Michigan Avenue Partners in December (after regulatory approvals, the sale of the 204 000-t/y smelter was completed in February 2001 [http://www.mccookmetals.com]);
- completed the sale of the 1.6-Mt/y Sherwin alumina refinery located near Corpus Christi, Texas, to BPU Reynolds, Inc., a private investment company, in December (the Reynolds Metals Company plant has been producing 200 000 t/y of chemical alumina and BPU intended to expand that portion of production); and
- held ongoing negotiations at year-end that were expected to be completed in early 2001 to divest Reynolds' interests in an alumina refinery in Stade, Germany.

Alcoa made a number of other changes to its operations, including:

- In January, Alcoa announced the restart of approximately 200 000 t/y of idled capacity. This represented about one half of the remaining idled capacity resulting from closures in the early 1990s when world production capacity and production increased more than use.
- Alcoa acquired Cordant Technologies Inc., a technology-based company serving global aerospace and industrial markets, and Howmet International Inc., the world's largest manufacturer of precision castings. The acquisition was valued at US$3.3 billion.
- In January 2001, Alcoa World Alumina and Chemicals (AWAC), a joint venture of Alcoa and WMC Limited, suspended operations at the St. Croix alumina refinery in the U.S. Virgin Islands. The refinery had a capacity of 600 000 t/y but was producing at a lower rate of 450 000 t/y. The alumina produced at St. Croix was sold to Alcoa's smelters in the United States and, with the cutbacks in the western United States, this alumina was no longer needed. Future production will be evaluated by AWAC in light of supply requirements.
- Early in 2001, Alcoa announced a reduction in alumina production at its Point Comfort, Texas, refinery to 1.6-1.9 Mt/y from its capacity of 2.3 Mt/y and the temporary closure of its aluminum fluoride production plant at Fort Meade, Florida.

Alcan Aluminum Corporation announced in May the restart of 60 000 t/y of idle capacity at Sebree, Kentucky, by the end of October. The capacity was taken off-line during the early 1990s due to oversupply in the aluminum market. Alcan also announced that it would increase billet capacity by 65 000 t/y. When completed in 2002, most of the output of the 185 000-t/y smelter will be used for billets.

Alcan continued to upgrade its U.S. rolling facilities. For example, it will complete an expansion of its Terre Haute, Indiana, light-gauge rolling facility by 22 700 t/y by mid-2001. This facility is among the world's largest and most technologically advanced producers of light-gauge aluminum fin and foil products.

Kaiser faced increased costs for power at its two U.S. smelters. The company's 73 000-t/y Tacoma, Washington, smelter was closed in June, and the last 90 000 t/y still operating at the 200 000-t/y Mead, Washington, smelter was closed at year-end.

Kaiser obtained environmental approvals and started reconstruction of its Gramercy, Louisiana, alumina refinery, which was destroyed in 1999 by an explosion. The US$275 million plant began partial operation in December and construction was scheduled to be completed in mid-2001. The 1.25-Mt/y plant was expected to be in full operation in mid-2001.

Kaiser and the United Steelworkers reached a settlement ending a two-year dispute at five Kaiser U.S. operations. A five-year agreement was signed in September. (Additional information is available on the Internet at http://www.kaiseral.com and http://www.uswa.org.)

In April, Century Aluminum Company purchased an additional 23% of the Mt. Holly smelter in South Carolina from Xstrata AG for US$95 million. Century now owns 49.67% of the 215 000-t/y plant, which is the newest smelter in the United States. Alcoa acquired the remaining portion of the smelter with its acquisition of Alumax Inc. and manages the facility. Century also reached an agreement with National Southwire Aluminum Co. to purchase the 236 000-t/y Hawesville, Kentucky, smelter for US$460 million and to assume US$8 million in industrial revenue bonds. As part of the smelter purchase, the company reached an agreement with United Steelworkers Union Local 9423 on a five-year contract. Completion of the sale was expected in early 2001. Century also owns a 168 000-t/y smelter in Ravenswood, West Virginia and, with three smelters, has become the second largest aluminum producer in the United States. (Century has an Internet site at http://www.centuryaluminum.com.)

In September, due to high power costs, Golden Northwest Aluminum Inc. announced a 40% cutback, of 100 000 t/y, in production at its smelters with an aggregate capacity of 250 000 t/y in Washington and Oregon. Later in the year, the company announced the complete closure of the Dalles smelter in Oregon and a reduction of Goldendale, Washington's production to 25 000 t/y. Norsk Hydro and Golden Northwest had previously stated that they would proceed with a US$55 million smelter upgrade and an expansion program, including an increase in casting capacity at Goldendale; they also extended their tolling agreement to 2012. Goldendale signed an agreement with an independent power producer and the BPA to construct a new 248-MW, gas-fired power facility to provide power to its smelter. This power plant was expected to be completed in mid-2002. (Additional information is available on the Internet at http://www.nwaluminum.com.)

Columbia Falls Aluminum Company operates a 163 000-t/y smelter in Columbia Falls, Montana. Power cost and availability forced the closure of 80 000 t/y of capacity in 2000 and the company announced a complete plant closure in January 2001. The company has agreed to work with the BPA to construct additional electricity generation capacity. (Columbia Falls has an Internet site at http://www.cfaluminum.com.)

In September 2000, Noranda Aluminum Inc. (Norandal) started producing heavy-gauge foil at a new US$238 million, 90 000-t/y mill in Huntingdon, Tennessee. The plant was expected to reach full capacity in early 2001. (Noranda has an Internet site at http://www.noranda.com.)

Hydro Aluminium started production in November 2000 at an aluminum scrap remelt facility in Henderson, Kentucky. The US$33 million plant will produce 90 000 t/y of primary-quality billet. The plant can be easily expanded to 120 000 t/y. (Hydro Aluminum has an Internet site at http://www.hydro.com.)

The Aluminum Association, based in Washington, D.C., represents U.S. and foreign-based primary producers of aluminum, recyclers, and producers of semi-fabricated products. Member companies operate almost 200 plants in 37 states. (The Aluminum Association has an Internet site at http://www.aluminum.org.)

Jamaica

The Kaiser Jamaica Bauxite Company (KJBC) operation, owned by Kaiser Aluminum Corporation and the Jamaican government, reduced its bauxite production in 1999 as a result of the closure of Kaiser's Gramercy U.S. alumina plant in mid-1999. The company increased the production rate of Jamaican bauxite in mid-2000 and expected to reach its full capacity of 2.4 Mt/y in 2001.

Alcan announced in early 2001 that it may sell its bauxite and alumina operations in Jamaica. Alcan Jamaica, owned by Alcan (93%) and Jamaican Bauxite Mining Limited (7%), has two alumina refineries at Kirkvine and Ewarton with a combined capacity of 1.2 Mt/y with captive bauxite mines.

South America

In **Argentina**, ALUAR-Aluminio Argentino SA continued studying a US$2 billion expansion program. Work focused on two possible projects: a new US$1.5 billion, 250 000-t/y smelter in the province of Santa Cruz and a US$400 million expansion of the Puerto Madryn smelter to expand capacity by 140 000 t to 400 000 t/y. Associated rolling facilities, port facilities and electrical infrastructure would be included in this work. Decisions were expected in early 2001 and, if favourable, construction could be completed in 2003.

Alcan conducted studies for an additional US$200 million expansion of the Pindamonhangaba rolling mill in the state of Sao Paulo in southern **Brazil**. Alcan expanded the plant at a cost of US$370 million to 280 000 t/y from 120 000 t/y in 1999 and utilization of that capacity was increasing faster than originally expected. Alcan also planned to increase its recycling centre at the Pindamonhangaba mill to 120 000 t/y from its current 80 000 t/y.

Alcoa Aluminio S.A. manages the Alumar Consortium smelting and refining plants near Sao Luis, Maranhao, in northeastern Brazil. Billiton Plc, one of the Alumar partners, conducted a study for a US$800 million, coal-fired power plant as an alternative power supply. Alcoa Aluminio also operates a 270 000-t/y refinery at Pocos de Caldas and is participating in a consortium building the new Machadinho hydro-electric power plant in southern Brazil. Completion of Machadinho is expected in 2002.

Alumina do Norte do Brasil S.A. (Alunorte) announced an expansion of its 1.5-Mt/y alumina refinery in Barcarena, Pará to 2.3 Mt/y at a cost of US$332 million. Brazil's Development Bank (BNDES) will provide US$230 million in financing. Construction was expected to be completed in 2002 with the facility reaching full capacity in mid-2003.

Companhia Vale Rio do Doce (CVRD) received a US$56 million loan from BNDES for the US$100 million expansion of the Albras aluminum smelter to 405 000 t/y from 350 000 t/y. Work is expected to be completed in mid-2001. CVRD also began studying a further expansion of Albras to 580 000 t/y.

The Mineracao Rio do Norte Board approved an expansion of bauxite production capacity at the Trombetas bauxite mine to support expansions at the Alunorte and Alumar alumina refineries. The expansion will result in a 60% increase in bauxite production to 16.3 Mt/y from the current capacity of 11 Mt/y. Trombetas is expected to reach this mining rate in January 2003.

Cia Brasileira de Aluminio (CBA) planned a US$350 million expansion program of its operations in the state of Sao Paulo. The program will see a capacity expansion of the Sorocoba smelter to 340 000 t/y from 230 000 t/y by 2003, with associated expansions at its alumina plants and bauxite mines. Construction was started on the US$10 million, 80-MW Piraju hydro-electric plant on the Parana-panema River as part of a program to increase the company's power generation capacity.

Noranda continued environmental permitting work for its Alumysa hydro-electric and aluminum smelter project near Puerto Aisen in southern **Chile**. An Environmental Impact Study was expected to be completed and submitted to the government in early 2001. The company is looking for partners for the US$1.6 billion, 440 000-t/y smelter, a 777-MW hydro plant, and a new port near Puerto Aisen. The total project would cost an estimated US$2.6 billion and be operational after 2005.

In March 2000, Pechiney announced an agreement with the **Suriname** government to study a new bauxite mine and alumina plant. The Bakhuis bauxite deposit in western Suriname would feed a potential US$700 million, 1-Mt/y alumina plant. Pechiney (49%) and the Suriname government (51%) would be partners in the project. Construction of the plant would start in 2002 after studies and financing are completed.

The Government of **Venezuela** continued efforts to privatize its aluminum interests. The Corporación Aluminos de Venezuela S.A. holds four companies (CVG Alcasa, CVG Bauxilum, CVG Carbonorca and CVG Venalum) that will be split into separate business units. Debt reduction and discussions with a number of potential industry partners for investment in the industry were followed by the negotiation of a five-year investment and management agreement in December with Pechiney on CVG Bauxilum. In exchange for a guaranteed portion of CVG Bauxilum's alumina production, Pechiney will provide management expertise to increase productivity, update the technology, and improve environmental aspects of the operations. The capacity of the alumina plant will increase in a first phase to 2.15 Mt/y at a cost of US$260 million. In addition, a feasibility study for a second expansion to 3 Mt/y will be carried out. A formal agreement was expected to be signed in early 2001. The government also started discussions with a number of companies to restart two potlines and complete construction of a fifth line at Alcasa. (Additional information is available on the Internet at http://www.aluminio.com.ve.)

Europe

The Federation of Aluminium Consumers in Europe (FACE) continued its efforts to promote the use of aluminum, assess the impact of new technologies, and reduce the costs of primary metal through tariff reductions to stimulate demand. FACE was formed in 1999 and now has 44 members from European aluminum-using companies from 12 member states. As the European Union (EU) uses more than double the amount of primary aluminum it produces, FACE estimates that the EU's 6% duty on unwrought aluminum imports costs European consumers US$475 million per year. In early 2001, FACE renewed efforts to achieve consensus among EU members to reduce the duty imposed on unwrought aluminum rather than through a reduced tariff quota. (FACE has an Internet site at http://www.facealuminium.com.)

In February 2000, Britain formally submitted a request to the European Commission to suspend the 6% duty on unwrought aluminum through an autonomous suspension of duty or a tariff quota on part of these imports. The Commission reviewed the request but consensus was not achieved and the duty remains on imports of unwrought aluminum. The Gulf Arab States also have been lobbying against this duty and hope to include it in a free trade agreement.

Kumera Corporation, a privately held engineering company based in **Finland**, conducted studies for a US$800 million, 230 000-t/y smelter at Pori in western Finland. Additional power supplies would be required – likely a new nuclear plant. (Kumera has an Internet site at http://www.kumera.com.)

Alcoa worked to sell Reynolds' interest in an alumina refinery in Stade, **Germany**. This sale was imposed by the European Commission on the Reynolds merger. Alcoa obtained an extension to the original deadline and expected to divest its interest in early 2001.

Hydro Aluminium a.s. announced that it would expand the capacity of the Sunndal smelter in **Norway** by 168 000 t to 321 000 t/y. The US$600 million project involves construction of a new prebake 234 000-t/y potline and closing an existing 66 000-t/y potroom. Construction was expected to be completed in 2004. After the expansion and environmental upgrades, the Sunndal smelter will be Europe's largest smelter with a capacity of approximately 350 000 t/y of extrusion ingot and primary foundry alloys. The environmental improvements will double aluminum production but reduce the total emissions of greenhouse gases from the existing plant, making the plant one of the most environmentally friendly in the world. Additional expenditures will be required at Norsk Hydro's other smelters in Norway to meet EU directives.

After completing feasibility studies, Elkem a/s announced that it would modernize and expand the Mosjoen smelter in Norway from 200 000 t/y to 280 000 t/y and expand the capacity of the cast house to 330 000 t/y. This US$200 million program was expected to be completed in 2003.

Alcoa conducted engineering studies on updating the San Ciprian alumina refinery in **Spain**. The modernization of the plant was expected to increase its capacity from 1.1 Mt/y to 1.3 Mt/y by early in 2001.

Glencore International AG purchased Kubikenborg Aluminium i Sundsvall AB. Kubikenborg owns a 100 000-t/y smelter in Sundsvall, **Sweden**. Kubikenborg originally purchased the smelter from Graenges AB in 1998.

Early in the year, Alusuisse Lonza Group Limited (algroup) decided to continue and expand the operation of the Steg smelter in **Switzerland** from 35 000 t/y to 43 000 t/y after signing a five-year agreement on power prices. Algroup also decided to expand the capacity of the Soral smelter in Husnes, **Norway**, operated in a joint venture with Norsk Hydro A/S, from 115 000 t/y to 130 000 t/y. Algroup subsequently merged with Alcan.

In May, Alcan announced the immediate restart of 50 000 t/y of capacity at the Lynemouth smelter at Ashington, Northumberland, in the **United Kingdom**. The capacity was taken off-line during the 1990s due to oversupply in the aluminum market. In mid-year, Alcan closed the 11 000-t/y Kinlochleven smelter in Argyll, Scotland, which started production in 1909.

The **Montenegro** government announced that it would privatize its 100 000-t/y smelter and associated casting facilities, rolling mill and manufacturing plants. In June 2000, the European Commission granted tariff quotas for aluminum products imported from this complex in Montenegro as part of its efforts to help Balkan countries. (Additional information is available on the Internet at http://europa.eu.int.)

Iceland

Iceland's Minister for Industry and Commerce, Hydro Aluminium a.s., Haefi hf, Landsvirkjun and Reydarál hf signed an agreement to continue studying the feasibility of a new smelter at Noral in Reydarfjördur. Parties hoped to reach a final decision in early 2002. Construction of the first phase of the smelter could begin in 2003 with start-up in 2006. Construction of the Kárahnukar power project, to provide the required additional power supplies for the smelter, was expected to start in 2002 with completion in 2006. The US$1 billion Reydarál smelter would have an initial production capacity of 240 000 t/y and

would increase to 480 000 t/y when additional power was available. (Additional information is available on the Internet at http://www.lv.is and http://www.hydro.com.)

Early in the year, Alusuisse Lonza Group Limited (now part of Alcan Inc.) decided to expand capacity at its ISAL smelter from 162 000 t/y to 176 000 t/y. (ISAL has a site on the Internet at http://www.isal.is.)

Early in 2000, Nordic Aluminum Corp. (Nordurál), owned by Columbia Ventures Corporation, completed financing in mid-2000 for a 30 000-t/y expansion to bring the smelter's capacity to 90 000 t/y. Construction was expected to be completed in 2001. (Nordurál has a site on the Internet at http://www.nordural.is.) Columbia Ventures also presented a proposal to the Icelandic government for a new smelter in Reydarfjördur in eastern Iceland. However, only one proposal could go ahead in that location and it appears more likely that the previously noted Norsk Hydro-Haefi proposal will proceed.

Romania

The Government of **Romania** continued to plan for the privatization of a number of state-owned companies, including its 54.7% interest in the ALRO Slatina smelter. Slatina has a nameplate capacity of 265 000 t/y but operated at approximately 175 000 t/y in 2000. The company continued to modernize the smelter to increase efficiency and reduce emissions.

Russky Aluminii re-opened the 250 000-t/y Oradea alumina refinery in late 2000 with plans to reach its full operating rate in 2001. It was expected that capacity would be eventually increased.

Russia

The Russian government raised export tariffs on scrap metals, including aluminum, to 50% from the 30% rate applied in early 2000 to reduce exports of scrap. Late in 2000, the Russian Parliament passed a bill suspending nonferrous scrap exports for four years but, at the end of the year, it was unknown when it would become law. The government also continued discussions on changes to export duties and the phase-out of tolling operations[3] that in the past have formed a large portion of Russia's alumina refining and aluminum smelting activity.

Wholesale electricity rates increased during 2000, which increased smelting costs, although this was offset by de-linking electricity prices from the U.S. dollar. Although some plants had difficulty paying for power and supplies, the production of both alumina and aluminum increased during the year. Alumina production is estimated to be 2.9 Mt (up 7%) and aluminum production is estimated to be 3.3 Mt (up 3%). With the expected lower production in the United States in 2001, it is likely that Russia will become the top-ranking producer of primary aluminum in 2001.

Most of the smelters in Russia plan to expand, partly though modernization, which will also reduce emissions. Proposed new smelters, coupled with brownfield expansions, could raise Russian capacity by over 1 Mt/y. The ownership of the smelters in Russia changed as the amalgamation of the former state-run enterprises continued. Two main groups have consolidated many of the aluminum smelters: Russky Aluminii (or Russian Aluminium) and Sual-Trastkonsalt.

At the end of 2000, Russky Aluminii (an amalgamation of Sibirsky Aluminium's assets with the aluminum interests of Sibneft Oil) had 2.1 Mt/y of aluminum production capacity in the Bratsk, Krasnoyarsk and Sayansk smelters. The company also has interests in the Novokuznetsk smelter and in the Achinsk (Russia), Mykolayivsky (Ukraine), Yugoslavian and Romanian alumina refineries, as well as in other downstream facilities.

Russky Aluminii abandoned its participation in a proposed new 260 000-t/y smelter in Irkutsk to increase efficiencies at the Krasnoyarsk and Bratsk smelters. The company planned to spend US$120 million over the next 10 years to reduce emissions and modernize the facilities, including a switch to prebaked anodes at its 835 000-t/y Krasnoyarsk smelter. The company expected production to increase by 50 000 t/y as a result of this work. At the 900 000-t/y Bratsk smelter, which is the largest smelter in the world, facilities will also be automated and converted from Soderberg to prebaked anode technology. The company planned, as an interim step, changes to the composition of anode paste to reduce emissions. It also planned to increase the production of semi-fabricated and fabricated products, and to undertake modernization programs at the Novokuznetsk smelter, at both its alumina plants (Achinsk in Russia and Mykolayivsky in Ukraine), and at its bauxite mines.

In April, Sibirsky Aluminium (now associated with Russky Aluminii) announced a five-year plan to increase the capacity of the Sayansk smelter in Siberia from 400 000 t/y to 650 000 t/y. The company also conducted studies for a new 250 000-t/y smelter at Pervomaisk in Ukraine – one of the conditions for the purchase of the Mykolayivsky alumina refinery. Construction could start in 2002. (Sibirsky has an Internet site at http://www.sibirskyaluminum.com.)

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3 In a tolling agreement, the plant processes material owned by others for a fee. The transition to reduce tolling by the smelters and refineries results in increased capital requirements to finance and carry the inventories, which increases costs. As companies move from tolling operations, management of the smelters has to be increasingly focused on product marketing and obtaining/purchasing supplies.

The Siberian-Urals Aluminium Company-Trastkonsalt group (SUAL) was formed through an amalgamation of SUAL with Trastkonsalt interests. At year-end, SUAL had 0.5 Mt/y of aluminum smelting capacity at the Irkutsk, Bogoslovsk, Uralsk and Kandalsksha smelters, interests in the Uralsk and Bogoslovsk alumina refineries in the Sverdlovsk region, and bauxite mines.

SUAL obtained a US$100 million loan from Sberbank to further develop its bauxite mines, primarily through the construction of a 160-km railway that is expected to take two years to complete. The railway will facilitate the transport of bauxite from a new bauxite mine at Sredne-Timan in the Komi Republic, which is currently accessible via an ice road only. SUAL is expanding its alumina operations to 700 000 t/y by 2002 and expected that its capacity will eventually reach 6.5 Mt/y. The company also studied the construction of a US$600 million-$700 million, 1.5-Mt/y alumina plant in Ukhta, Komi Republic.

Also a part of SUAL, Irkutsk Aluminum Works planned to upgrade its smelter over the next five years and to add a fifth potline once financing is obtained. Its capacity would be raised by 75 000 t/y with this addition.

Early in 2001, SUAL and Pechiney discussed cooperation in upgrading SUAL's operations from bauxite mining, through alumina refining and primary production, to rolling facilities.

The Leningrad Nuclear Power Station has excess power capacity and the regional government explored options with potential investors in new smelters near St Petersburg in the Leningrad region. Volkhov Aluminum discussed with potential partners an increase of its smelting capacity from its current 22 000 t/y. Volkhov wishes to either expand the existing smelter or build a new greenfield 150 000-200 000-t/y smelter in the Leningrad area of northwestern Russia. The cost of the smelter would be approximately US$400 million. Alutec Inc., a U.S.-based management consulting company, also started a prefeasibility study for a 220 000-t/y smelter in the Leningrad region, near Sosnovy Bor. The study was expected to be completed in early 2001. The project would cost approximately US$800 million and take two years to construct once financing and a positive decision are obtained.

The Russian National Aluminium and Magnesium Institute (VAMI) expected to complete a feasibility study in early 2001 for a new aluminum smelter with a capacity of 300 000 t/y in the Irkutsk region. The study was originally started for Russky Aluminii; however, when that company dropped out of the project, a new company, Alucom-Taishet, took over the study. Alucom-Taishet planned to start construction on a small experimental smelter in 2001.

Azerbaijan

The Government of Azerbaijan merged its aluminum assets in the Sumgait Non-Ferrous Metals plant, in a non-operating 25 000-t/y aluminum smelter, in Ganga Alumina, and in another mining company into one single company (Azeralyuminii) in preparation for seeking additional investment and possible privatization. After a tender process, the government appointed Fondel Metals International B.V., a Dutch trading company, to manage the amalgamated company and to start feasibility studies into re-opening the smelter and expanding the alumina refinery to 450 000 t/y. The refinery uses alunite and bauxite as sources for the alumina production.

Slovakia

The Board at Slovakia's Slovalco A.S. aluminum smelter at Ziar-nad-Hronom approved a US$80 million expansion from the current 105 000 t/y to 155 000 t/y. Construction was expected to start in mid-2001 and would take two years to complete. The company also planned to increase capacity for the production of semi-finished products after the smelter was expanded. At year-end, Slovalco was owned by Zavod Slovenskeho Narodneho Povstania O.S. (ZSNP), 75.5%; Norsk Hydro, 14.5%; and the European Bank for Reconstruction and Development (EBRD), 10%. Early in 2001, the government planned to sell part of its interest to EBRD and Norsk Hydro. (Additional information is available on the Internet at http://www.slovalco.sk, http://www.zsnp.sk and http://www.ebrd.com.)

Slovenia

In 2000, Kidricevo Talum d.o.o. planned to spend US$110 million to increase its smelter capacity from 75 000 t/y to 155 000 t/y. The company obtained a loan to fund part of the modernization of its existing facilities and the construction of a new potroom. Work was expected to be completed by 2003.

Ukraine

The Government of Ukraine also took measures to stop illegal sales of aluminum and, in June, banned exports of unprocessed nonferrous scrap. The government also continued with plans to partly privatize its alumina and aluminum interests.

The government held a tender for 68.01% of the state-owned aluminum producer, Zaporizky Aluminiyevy Kombinat (Zaporozhye), which operates a 110 000-t/y smelter in southern Ukraine and a 240 000-t/y alumina refinery. In early 2001, the government announced that it had agreed to sell 68.01% of the company to AvtoVAZ-Invest. AvtoVAZ-Invest will invest US$200 million in upgrading the facilities as Zaporozhye planned to expand production to

200 000 t/y by 2006. Employees own 6.99% of the company and the government planned to keep its remaining 25% interest. Kaiser Aluminum & Chemicals had earlier completed a study on improving the smelter's environmental performance, including a conversion from Soderberg to prebake technology. The cost of the program to raise production capacity to 157 000 t/y was estimated at US$200 million. Earlier, Zaporozhye signed an agreement with Sibirsky to cooperate in production and sales of alumina. (Additional information is available on the Internet at http://packet.zp.ua/online/zalk.)

The Government of Ukraine announced that it would privatize 30% of the Mykolayivsky Hlynozemny's Zavod alumina plant (Nikolaev). Ukrayinsky Aluminium (associated with Sibirsky Aluminium/Russky Aluminii interests) subsequently won the tender and completed the US$100 million purchase. It then purchased additional shares of Nikolaev on the market and an additional 10% auctioned by the government in November. At year-end, the other shareholders were reported as Sibirsky Aluminium (36%), the government (10%) and employees (9%). Ukrayinsky Aluminum started studies for the construction of a new 130 000-t/y aluminum smelter in Ukraine, at an estimated cost of US$190 million, to fulfil its commitments on the Nikolaev purchase. Other commitments included modernization and an increase in refinery capacity to 1.3 Mt/y from 990 000 t/y, the assumption of some of the refinery's debts, and the purchase of bauxite mines in Guinea. Nikolaev produced a record 1.115 Mt of alumina in 2000 and production was to be increased to 1.2 Mt in 2001.

Kazakhstan

The Government of Kazakhstan imposed a 4% export tariff on scrap and recycled aluminum. The minimum tariff is US$25.73/t. The government also expected to privatize its remaining 31.7% ownership in Aluminum of Kazakhstan as part of its privatization program.

Aluminum of Kazakhstan planned to increase the capacity of its Pavlodar alumina refinery to 1.5 Mt/y by 2005. In addition, the company completed a feasibility study for a new US$1.2 billion, 215 000-t/y smelter, also in Pavlodar. The company sought funding for this work from investors and, once obtained, plans to begin the project for which construction was expected to take two to three years. In conjunction with these expansions, the company bought new mining equipment to increase the stripping of overburden and production at its Krasnooktyabrskoye bauxite mine.

Middle East

The rapid pace of upgrading and expansion of the aluminum industry in the Middle East continued. Companies have proposed a number of expansions to existing facilities and have renewed discussions on previously proposed greenfield smelters. Work continues on feasibility studies and financing for most of these proposals and includes the following:

- **Dubai** Aluminium Company Limited (Dubal) started studies for a new expansion called the Heron project to increase the capacity of its smelter at Jebel Ali by 75% to 936 000 t/y. The current capacity of 536 000 t/y was reached last year after completion of its earlier Condor project expansion. The estimated cost of Heron is US$1.8 billion. The expansion of this smelter could start in 2001. (Dubal has an Internet site at http://www.dubal.co.ae.)

- In **Oman**, studies for a proposed US$2.5 billion, 480 000-t/y aluminum smelter at Sohar were completed. Contracts were issued for a gas pipeline from central Oman to Sohar that would supply the proposed smelter. The pipeline is to be completed in 2002. Discussions continued with potential partners.

- Aluminium **Bahrain** B.S.C. (Alba) continued construction of a 450 000-t/y coke calcining plant and the upgrading of other facilities at its smelter in Ras Zurrayed. The US$400 million project remained on schedule for start-up in mid-2001. Late in the year, the Government of Bahrain approved a US$1.1 billion program, in principle, to cut costs and expand the smelter from its current capacity of 500 000 t/y to 750 000 t/y. If the financial study is positive, construction could start in 2001 with completion in 2004. (Alba has an Internet site at http://www.aluminiumbahrain.com.)

Asia

China's production of primary aluminum for 2000 is estimated at 2.8 Mt, up 9% from 1999's production of 2.599 Mt following an 11% increase in 1999. This makes China the third largest primary producer in the world. By 2001, with the expected expansions in China and closures in the United States, China is expected to become the second largest aluminum producer in the world. Global Trade Information Services, Inc., publisher of the *World Trade Atlas*, reports that imports of unwrought aluminum (HS 7601) to China were up 71% to 914 130 t in 2000 while exports were up only up 1% to 209 112 t.

The government continued to reorganize its interests in the aluminum industry during 2000. The China Aluminium Corporation (Chalco) was disbanded and the assets were restructured to form the Aluminum Corp. of China (Chinalco). Some assets of Chalco were turned over to regional authorities; Chinalco was left holding six smelters and China's alumina refineries, which produce 4 Mt/y of alumina and 675 000 t/y of aluminum. The company planned to seek stock exchange listings in 2001 to raise additional funding to finance new projects.

China is still a net importer of alumina and aluminum despite the Chinese aluminum industry's efforts to fill this gap over the last five years (Figures 7, 8, and 12). The government continued its efforts to reduce pollution, instructing all smelters to convert to prebaked anodes and to reduction cells with higher current intensities (over 60 000 amps) by 2003. These efforts have resulted in the closure of some small plants, while other plants have expanded or are planning to expand to meet the government's minimum size requirements.

Reported work to increase primary smelting capacity in 2000 included:

- Baise Yinhai Aluminium Co. started construction of a new 52 000-t/y smelter in Guangxi Province;
- Baotou Aluminium started construction on a 50 000-t/y expansion of its capacity to 160 000 t/y;
- Guangxi Yingahai Aluminium Works started construction of a new 55 000-t/y smelter in Guangxi Province;
- Henan Shenhuo Aluminium Power Company completed a capacity expansion to 60 000 t/y from 17 000 t/y;
- Lanzhou Aluminium Co. began construction of a 100 000-t/y smelter in Lianhai, Gansu;
- the Qingtongxia Aluminium smelter in Ningxia continued work on an expansion to 230 000 t/y from 100 000 t/y;
- Sanmenxia Aluminium Works expanded capacity by 32 000 t to 66 000 t/y;
- Taiyuan Aluminium Works in Shanxi started an 80 000-t/y expansion to raise capacity to 111 000 t/y;
- Yichuan Power Group and Xinyuan Industry expected to start construction on a new 100 000-t/y smelter using 300 kA technology in mid-2001 with production to start in 2003;
- the Yunan Aluminium plant completed an expansion from 85 000 t/y to 130 000 t/y;
- the Xiezhou Aluminium plant in Shanxi completed a 40 000-t/y expansion; and
- the Zunyi Aluminium plant in Guizhou was expected to start construction on a 100 000-t expansion to 132 000 t/y in early 2001.

The alumina industry continues to expand, and reported work on expansions and new projects included:

- Pingguo Aluminium Co. obtained approval to double its alumina production capacity to 800 000 t/y and was expected to complete the expansion in 2003;
- Guizhou Aluminium Co. worked on expanding its capacity from 400 000 t/y to 500 000 t/y with completion expected early in 2001;
- the Shandong Aluminium plant completed an expansion to 770 000 t/y;
- Great Wall Aluminum Company worked on an expansion from 800 000 t/y to 1.0 Mt/y;
- the Zhongzhou Alumina plant was working on debottlenecking and an expansion from 300 000 t/y to 450 000 t/y;
- the Guangxi government studied a new 700 000-t/y alumina refinery in Baise and a 100 000-t/y smelter; and
- the city of Nanchuan completed a feasibility study for a 150 000-t/y alumina refinery.

Norsk Hydro ASA opened an extrusion plant, Hydro Aluminium Wuxi, near Shanghai. The plant has a capacity of 2000 t/y and expects to expand to 4000 t/y if sales warrant.

In **Indonesia**, water shortages again reduced the power available to Nippon Asahan Aluminum Co. Ltd.'s Indonesian smelter. At year-end, the smelter was running at 80% of its capacity of 225 000 t/y; the company expected to reach full capacity in 2001.

In mid-2000, Alcan Taihan Aluminum Limited acquired a 95% interest in Aluminium of **Korea** Limited (Koralu) for US$200 million in cash and the assumption of US$95 million in debt. Alcan Taihan expects to double its capacity to 600 000 t/y with a US$100 million-$200 million expansion program in anticipation of expected growth in aluminum casting and rolled products in the region.

Pechiney continued studies on a potential US$1 billion bauxite mine and alumina refinery near Ho Chi Minh City, Landong, in southern **Vietnam**. The project would produce 1 Mt/y of alumina. Transportation infrastructure and power supplies would be required for this new greenfield facility.

The Perak State Development Corporation studied a 500 000-t/y smelter in **Malaysia** and held discussions with potential partners for the project. The facility, near Lumut in Perak State, could cost US$2 billion. Construction could start in 2001 if power supplies can be obtained.

Africa

Billiton Plc completed construction of the 250 000-t/y Mozal smelter in Maputo, **Mozambique**, and the first aluminum was produced in June. The US$1.3 billion smelter was expected to reach its capacity in early 2001. The smelter uses Pechiney AP30 technology, duplicating Billiton's Alusaf Hillside facility in South Africa. It has been designed to easily add a second potline to double its capacity to 500 000 t/y, and Billiton announced that approval had been obtained to conduct feasibility studies for expansions at Mozal (250 000 t/y) and Hillside (125 000 t/y) in **South Africa** where Billiton is installing graphitized electrodes to improve production. Both feasibility studies were expected to be completed in early 2001 and, if positive, construction would take a further 18 months. The Mozal smelter is owned by a joint venture comprising Billiton plc (47%), Industrial Development Corporation of South Africa Ltd. (24%), Mitsubishi Corporation (25%) and the Mozambique government (4%). (Further information on the Mozal project is available on the Internet at http://www.mozal.com.)

The Government of **Guinea** conducted feasibility studies for its proposed Sangarédi alumina greenfield refinery in Boké. The 2.4-Mt/y plant was expected to cost US$2.4 billion. Studies were expected to be completed in mid-2001; if a positive decision is obtained, construction would take five years. The government also discussed management of its bauxite mines with Russky Aluminii, a major user of that bauxite.

The Alumina Company of Guinea started a feasibility study to increase capacity at the Friguia alumina refinery to 1 Mt/y from its current capacity of 640 000 t/y. A decision on the project was expected in mid-2001.

India

In 2000, the Government of India decided to privatize the Bharat Aluminium Company Limited (Balco) and restructured the debts and its ownership in the company to facilitate the sale. Balco operates a 200 000-t/y alumina refinery and a 110 000-t/y smelter in Korba, in the state of Madhya Pradesh. The government planned to sell its interest in three phases and expected to sell the first 51% interest in early 2001. A decision between bids from Sterlite Industries (India) Limited and a joint bid from Alcoa Inc. and Hindalco Industries Limited (Hindalco) was expected in early 2001, although the Chattisgarh state government and company employees had reservations about the sale. The government expects the new owner to upgrade Balco's facilities.

National Aluminium Company Limited (Nalco) continued work on the expansion of its smelter capacity at Angul to 345 000 t/y from 230 000 t/y and expected the plant to be completed in mid-2002. The Government of India approved construction of a 120-MW power plant to provide additional power for this smelter expansion. Work also continued to double the capacity of its bauxite mines at Panchpatmalli to 4.8 Mt/y and to increase the capacity of its alumina refinery at Damanjodi to 1.57 Mt/y from 0.8 Mt/y. Work on these expansions is expected to be completed in 2003. Nalco also acquired International Aluminium Products Ltd., a 50 000-t/y rolling operation, located near the Nalco smelter in Orissa.

Hindalco Industries Limited (Hindalco) purchased Alcan's 54.62% interest in Indian Aluminium Company, Limited (Indal) for approximately US$165 million. Hindalco purchased an additional 20% interest of the publicly traded shares, via the Internet, for a cost of US$60 million. Hindalco has been actively integrating its operations, including:

- Indal has moved some pots from the closed Belgaum smelter in Karnataka to Hirakud to increase that smelter's capacity to 60 000 t/y. It also studied the feasibility of moving the remaining equipment from Belgaum to further increase the capacity.

- Hindalco's expansion of its Renukoot smelter and alumina facilities in Uttar Pradesh State is proceeding. The Renukoot aluminum smelter will be expanded to 342 000 t/y from its current 240 000 t/y; the captive alumina capacity will be raised by 210 000 t/y from its current capacity of 450 000 t/y; and power generation will increase to 769 MW from 619 MW. Hindalco planned to start production at the smelter in early 2001. The US$575 million expansion is expected to be completed in 2002. (Additional information is available on the Internet at http://www.adityabirla.com and http://www.indal.com.)

Alcan and Hydro Aluminium a.s. continued work on a proposed US$1 billion export-oriented alumina project. Although construction was to start in 2001 and the project was expected to be completed in 2005, the level of project activity was reduced to allow local communities to participate in ongoing discussions

and planning for the project. Alcan has provided the technical services for the feasibility study and the technology for the proposed joint venture to be known as Utkal Alumina International Ltd. The proposal is to mine bauxite at Baphilmalli, set up a power plant, and construct a first-phase, 1-Mt/y greenfield alumina plant in the Rayagada region of Orissa. A second phase could increase capacity to 2.5 Mt/y.

The state government in Andhra Pradesh studied a project that includes a bauxite mine with a capacity of up to 3 Mt/y, a 1-Mt/y alumina refinery and a 250 000-t/y smelter. However, the local community objected to the proposal and the required land transfer, and it was expected that the project would not proceed. (Additional information is available on the Internet at http://www.andhrapradesh.com.)

Australia

Comalco Limited decided on a Queensland location for a proposed 1.4-Mt/y alumina refinery and conducted a final feasibility study on constructing the plant in Gladstone. The refinery was expected to cost US$830 million and to take 30 months to construct. A decision on construction was expected in early 2001. Comalco indicated that it would build the project to be easily expanded to 4 Mt/y. Energy supplies will be needed for the plant, which could be provided by a proposed pipeline for Papua New Guinea gas. The federal and state governments have offered A$350 million in government funding for the facility. During the year, Rio Tinto plc purchased the remaining 28% interest in Comalco that it did not already own. (Additional information is available on the Internet at http://www.comalco.com.au/, http://www.isr.gov.au, http://www.riotinto.com and http://www.statedevelopment.qld.gov.au.)

Aldoga Aluminium Proprietary Ltd. conducted studies on a US$1.6 billion, 500 000-t/y smelter to be located near Aldoga, 25 km west of Gladstone, Queensland. The company held discussions with Alcoa for technology and with the State for the required 800 MW of power. If successful, the company hopes to have construction completed in 2002.

Early in 2001, Alcan completed the purchase of a 30% interest from CSR Ltd. and AMP Life Ltd. in the 1.8-Mt/y Gove alumina refinery and bauxite mine in Northern Territory and it now owns all of the Gove refinery. The US$393 million purchase resulted from a right of first refusal from Alusuisse's partnership in Gove Aluminium Ltd. with CSR and AMP and followed an earlier agreement for the sale between CSR and Billiton. The Gove facilities offer Alcan an opportunity to maintain its low-cost supplies of bauxite and alumina along with opportunities for expansion. An expansion of the refinery to 2.0 Mt/y is currently under way.

Pechiney signed an Option to Purchase Agreement on the purchase of a 15.5% interest in the Tomago smelter in New South Wales from AMP Life Ltd. for US$220 million. When exercised, Pechiney will hold 51.55% of the smelter. (Additional information is available on the Internet at http://www.tomago.com.au.)

Alcoa of Australia Limited, owned jointly by WMC Limited (39.25%) and Alcoa Inc. (60%), restarted 40 000 t/y of idled capacity at the 345 000-t/y, Alcoa-operated Portland aluminum smelter in Victoria, bringing it up to full operating capacity. After receiving government approvals, Alcoa purchased Eastern Aluminium for US$108 million. Eastern holds a 10% interest in the Portland smelter.

Alcoa also restarted 20 000 t/y of idled capacity at its wholly owned 180 000-t/y Point Henry smelter, bringing that smelter up to its full operating capacity.

In January 2001, Alcoa completed the US$1.49 billion sale of Reynolds Australia Alumina, Ltd. LLC, which holds Reynolds' 56% interest in the Worsley alumina refinery in Western Australia, to Billiton Plc. Billiton now owns an 86% interest in the refinery; the remaining 14% is owned by Kobe Alumina Associates (Australia) Pty Ltd., Nissho Iwai Alumina Pty Limited and Itochu Corp. Worsley Alumina Pty. Ltd. completed an expansion of the refinery's capacity to 3.1 Mt/y from 1.8 Mt/y in mid-2000. Worsley Alumina expects this facility to be the lowest-cost alumina refinery in the world. (Additional information is available on the Internet at http://www.wapl.com.au and www.alcoa.com.)

VAW Aluminium AG purchased the 150 000-t/y Kurri Kurri smelter, located in New South Wales, from Capral Aluminium Limited for US$288 million. VAW planned to expand the smelter's capacity to 165 000 t/y from 150 000 t/y by 2003. (The companies have Internet sites at http://www.capral-aluminium.com.au and http://www.vaw.de.)

RECYCLING

Recycled aluminum is often referred to as "secondary" aluminum. While this latter terminology reflects a use beyond the primary use and production, the term is confusing to many people as aluminum can be recycled many times and the product obtained and used in new products meets the specifications of new material for that application. The use of "secondary" has thus been replaced in this publication by "recycled."

When used in most applications, the aluminum metal is not destroyed or consumed by the application. The metal and the energy inherent in the scrap and used

products, both industrial and consumer, remain valuable resources. The recycling of aluminum requires less than 5% of the energy used to make the original metal. As a result, energy represents only 2% of an aluminum recycling smelter's operating cost compared to 22-30% for a primary smelter. As an example, the recovery of 2 kg of aluminum from used material (compared to primary production) saves more electricity than that used in one day in an average Canadian home using an alternative heat source. (Details on Canadian household energy consumption are available on the Internet at http://oee.nrcan.gc.ca.)

The automotive industry is the largest user of recycled aluminum, using some 80% of recycled production. As requirements and demand for lighter vehicles increase, it is likely that demand for recycled aluminum and automotive alloys will also increase significantly.

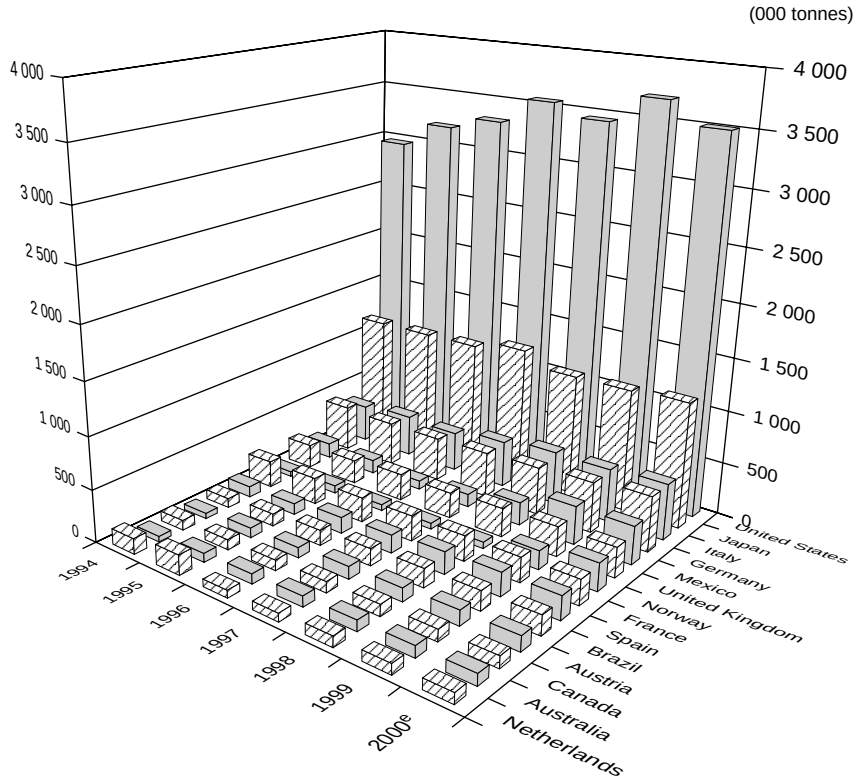
There has been a general increase in recycled aluminum production attributable to continued improvements in scrap collection systems and increased recycling of consumer products. The World Bureau of Metal Statistics reports Western World production of recycled aluminum on a monthly basis. Production increased slightly to an estimated 8.2 Mt in 2000, compared to a reported 8.1 Mt in 1999. (The World Bureau of Metal Statistics has an Internet site at http://www.wbms.dircon.co.uk.)

In 2000, the largest recycled aluminum producers were the United States with an estimated 3.4 Mt, Japan with 1.2 Mt, and Italy and Germany with 0.6 Mt each.

Canadian companies recycle aluminum from both post-consumer materials and scrap produced in production and manufacturing processes. Significant quantities of recycled aluminum, generally in ingot or liquid metal form, are used in the production of semi-finished and finished products. In addition, there is significant trade in scrap between Canada and other countries. Canada is a net exporter of scrap.

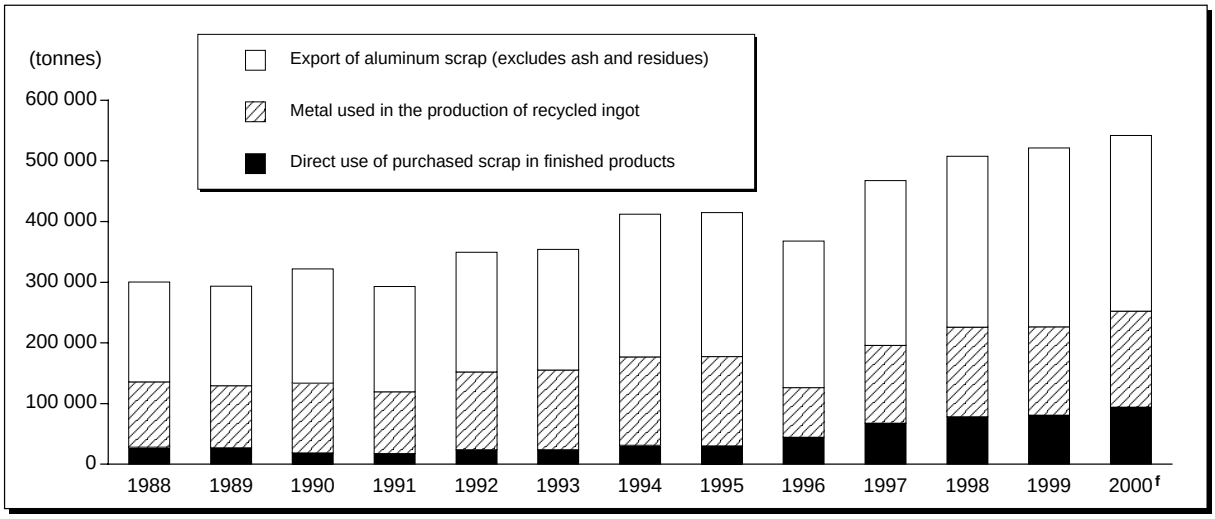
Reported Canadian use of outside scrap (i.e., scrap aluminum obtained from other companies) for the direct production of semi-finished or finished products was 80 689 t in 1999, up from a revised figure of

Figure 5
Production of Recycled Aluminum, 1994-2000
Top 14 Countries (96% of Total Amount Recycled)



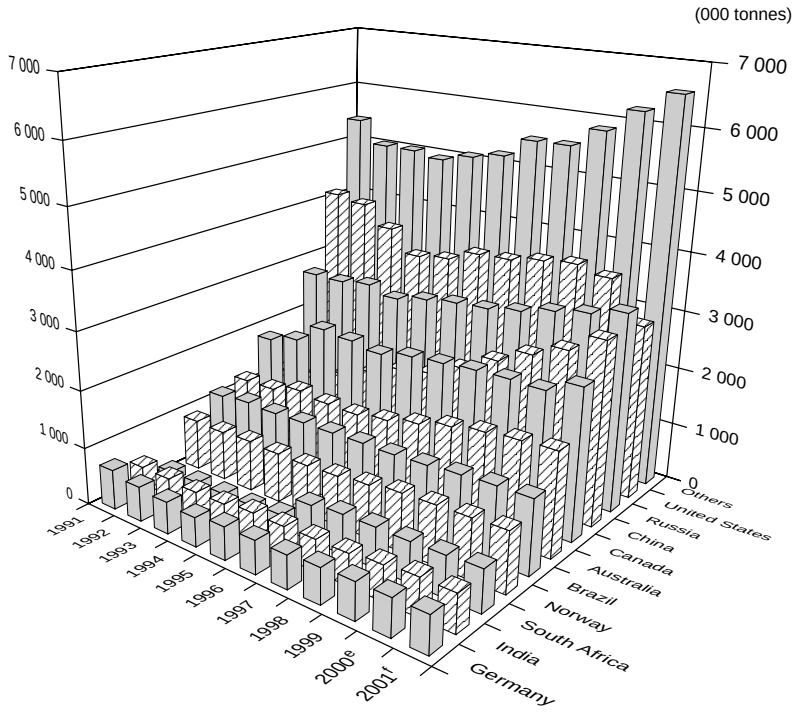
Sources: Natural Resources Canada; World Bureau of Metal Statistics.
e Estimated.

Figure 6
Recycling of Aluminum in Canada, 1988-2000



Source: Natural Resources Canada Annual Survey of Aluminum Metal Use in Canadian Establishments.
f Forecast.
Notes: Export figures are obtained from Canadian government trade data. Data on metal use are obtained from responses to questionnaires sent to aluminum-using companies. In 2000, over 160 Canadian companies used primary, recycled and scrap aluminum. Companies surveyed include: primary metal producing, recycling, casting, rolling, extruding and foundry operations.

Figure 7
Primary Aluminum Production, Top 10 Producers, 1991-2001



Sources: Natural Resources Canada; World Bureau of Metal Statistics; International Consultative Group on Nonferrous Metals Statistics; International Primary Aluminium Institute.
e Estimated; **f** Forecast.

78 298 t in 1998. The use of outside scrap in 2000 is estimated to be above 94 000 t. The reported use of purchased recycled aluminum ingot was 199 429 t in 1999 compared to 158 355 t in 1998. The reported use of aluminum metal, including scrap used in the production of recycled aluminum ingot, was 145 959 t in 1999, down from the 147 847 t used in 1998. The estimated quantity used for this purpose in 2000 is 157 794 t (Table 1a).

Although there are no major facilities in Canada to remelt used aluminum beverage cans (UBC) and reform the metal into new can sheet, UBCs are collected and shipped to facilities in other countries. For example, in 1999, about 1.5 billion scrap aluminum cans were recovered and exported to the United States to be recycled into can sheet. This represents approximately 45 000 t of aluminum.

PRODUCTION AND USE

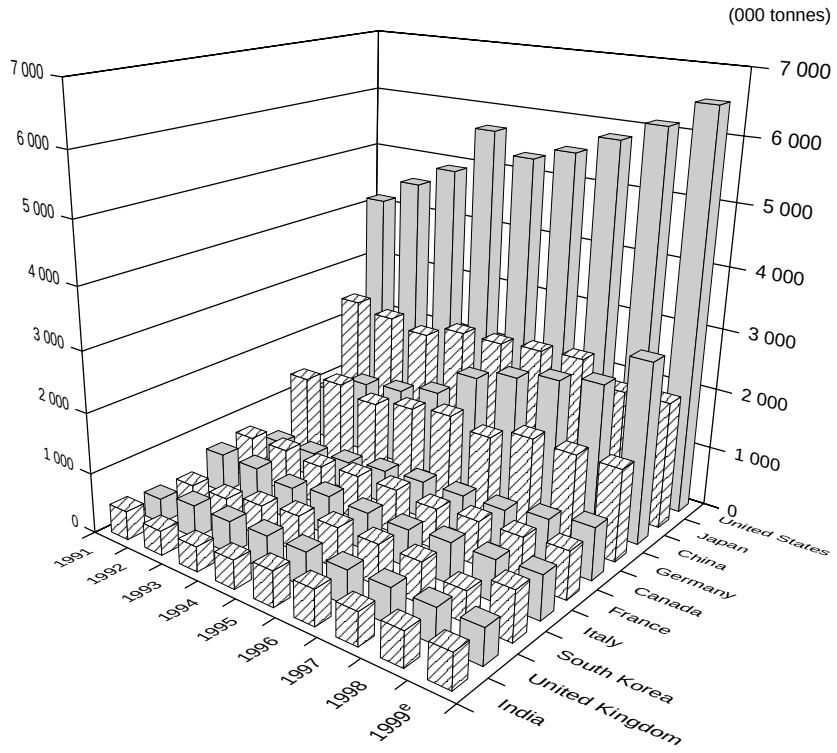
World production of primary aluminum increased to 23.7 Mt in 1999, up from 22.6 Mt in 1998. World production in 2000 is estimated to have increased by over 3% to 24.4 Mt. Western World production is expected to increase to over 17.5 Mt in 2000, up from 17.2 Mt in 1999. Primary aluminum production in 2000 is expected to be 3.9 Mt in Western Europe, 3.7 Mt in the United States and 3.3 Mt in Russia. Recent production and capacity increases have occurred in China, Russia and Australia; the most notable decrease occurred in U.S. production (Table 8).

Total world use of primary aluminum was 23.8 Mt in 1999, about 8% higher than the 22.0 Mt recorded in 1998.

Technology

The production processes for aluminum from bauxite are well documented in most encyclopedia and many web sites, which can be found through any search engine (see, for example, http://www.worldaluminium.org).

Figure 8
Apparent Use of Primary Aluminum, Top 10 Countries, 1991-99



Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics.
e Estimated.

In general, the Hall-Héroult method of smelting aluminum discovered in 1886 has been refined since discovery to reduce emissions and pollution and increase efficiency. Some of the recent gains in efficiency have been obtained through the use of larger cells with higher electrical current density. In 2000, Pechiney announced plans to offer its new AP50 technology, which will use 500 kA amperage in cells, up from the currently used 300+ kA in AP30 technology. Pechiney expected this cell to achieve current efficiency of 95-96% and to reduce both operating and capital costs. The technology was expected to be available for new smelters that started construction in 2001.

During 2000, several announcements were made and patents were issued on new technological advances, inert anodes and wettable cathodes that, when perfected, will further improve the process. Alcoa has been a leader in this research and has indicated that it will be conducting trials in commercial cells with its new anode materials in early 2001. If successful, efficiencies could be increased by 10-20% and production costs could be reduced by 10-20% with less greenhouse gas generation. It may be several years before such technology becomes feasible on a wide scale. (Additional information is available on the Internet at http://www.alcoa.com or http://www.oit.doe.gov.)

Research continues on other methods of production. For example, the University of Ohio announced that it had received patents to apply fuel cell technology to aluminum smelting. The process would use natural gas in zirconia tubes to directly reduce the alumina with significant power and emissions reduction. Additional research is required to perfect and apply this development to commercial smelters.

OCCURRENCE, CHARACTERISTICS AND USES

Aluminum is the most abundant element in the earth's crust (estimated at 8% of it). Aluminum does not occur naturally in its native (metal) or pure state, but is found in oxides, hydroxides, halides, sulphates, silicates and as complexes with organic matter.

Both igneous and sedimentary rocks can contain up to 20% aluminum, predominantly in the form of aluminum silicates. Aluminum-containing silicates are also a major component of soils (contained in clay minerals, sand and rock fragments), glacial tills and the underlying bedrock. The aluminum content of C horizon soils and glacial tills averages approximately 8% and ranges from 3.5% to more than 10%. Although other minerals can be, and are, used for aluminum production, aluminum oxide, combined with water and other impurities and known as bauxite, is the main ore of aluminum.

Aluminum compounds move through the environment by both anthropogenic (human) activities and natural processes. The quantity of aluminum moved by natural processes far outweighs the direct anthropogenic redistribution of nonmetallic aluminum in the environment. The chemistry of aluminum in the environment is complex and dependent on many factors. The mobility and subsequent transportation of aluminum ions and compounds are dependent on various factors, including the geological weathering environment, chemical speciation (form), soil-water interaction, other elements and compounds present, and the composition of the underlying bedrock. The mobilization of aluminum compounds in the environment by human activity results predominantly from often distant activities that produce acidic precipitation. In general, a lowering of pH results in the increased mobility of some forms of aluminum.

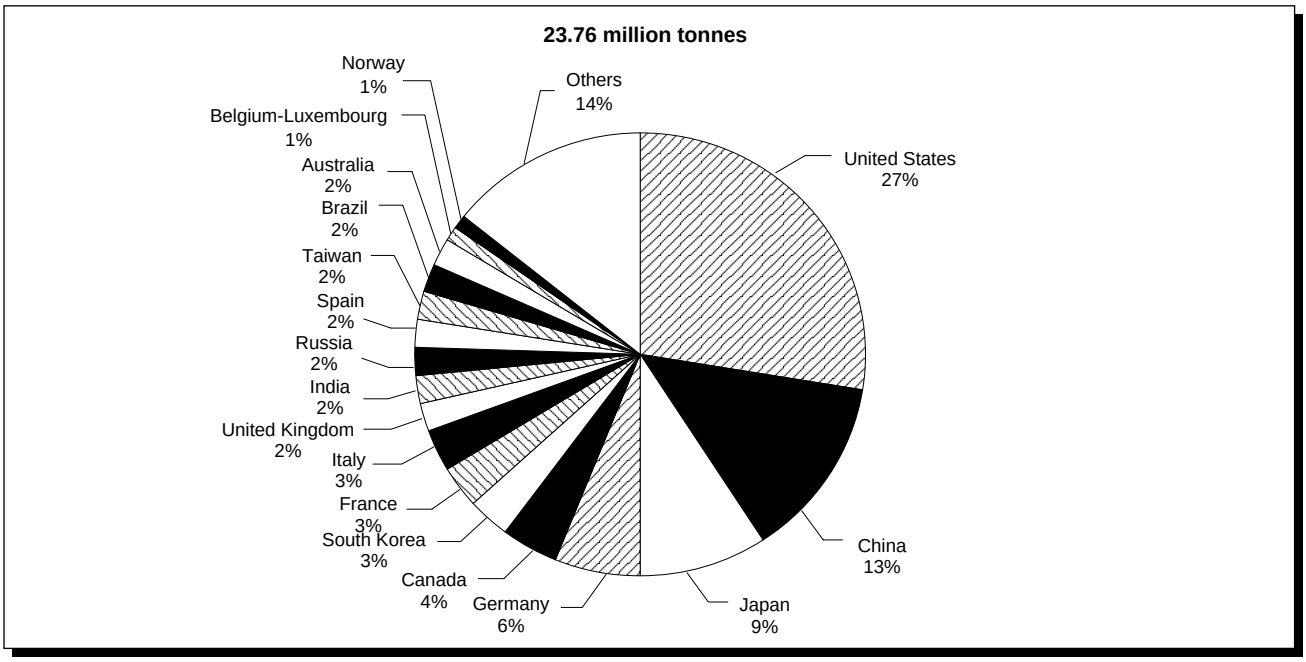
Pure aluminum is a silver-white, malleable, ductile metal with one third the density of steel. Aluminum's dull lustre results from a thin coating of oxide that forms instantly when it is exposed to air. The oxide, which adheres tightly to the metal, accounts for aluminum's resistance to corrosion. Gram for gram, aluminum has twice the electrical conductance of copper. Aluminum is also an efficient conductor of heat and a good reflector of light and radiant heat.

Combining metallic aluminum with other metals produces alloys with enhanced characteristics and increased versatility. The most common metals used in aluminum alloys are copper, magnesium, manganese, silicon, lithium and zinc. Aluminum's tensile strength, hardness, corrosion resistance, and heat-treatment properties improve when alloyed with one or more of these metals. The tensile strength of some copper-aluminum alloys, for example, can exceed that of mild steel by as much as 50%.

Aluminum, in both its pure metallic and alloyed form, is used to make a wide variety of products for the consumer and capital goods markets. Aluminum's largest markets are transportation (29%), packaging (22%), building and construction (13%), electrical (7%), consumer goods (7%), and machinery and equipment (6%). Geographically, North America accounted for 32% of total world demand in 1999 while Asia accounted for 31% and Europe for another 29%. The United States uses the largest amount followed by China and Japan.

The substitution of aluminum for iron and steel in automobile manufacturing helps reduce weight while maintaining vehicle size. Fuel use and, consequently, greenhouse gas emissions are decreased. The lowered weight can also increase safety by reducing stopping distances and improving cornering. Transportation uses are one of the fastest-growing areas of aluminum use, growing at a rate of about 4%/y.

Figure 9
Major Aluminum-Using Nations, Total Apparent Use of Primary Aluminum, 1999



Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics.

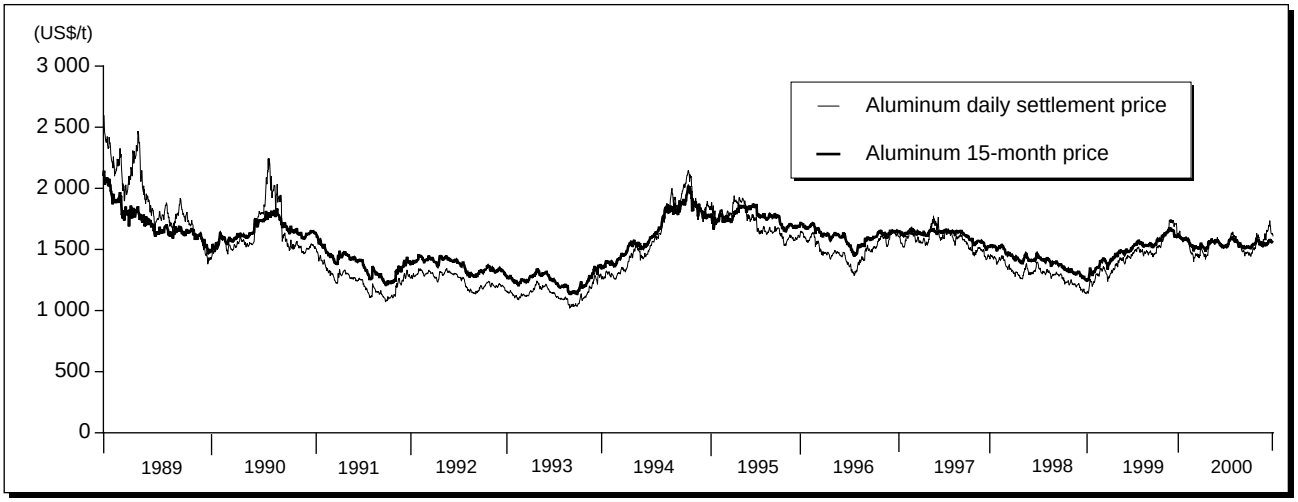
Demand for automotive aluminum is expected to increase from about 110 kg of aluminum per vehicle now to over 150 kg or more within 10 years. This demand will likely be fueled by petroleum price increases and by the number of government and joint government-industry initiatives around the world to focus attention on the ways to reduce automotive weight. Initiatives include the Canadian Lightweight Materials Research Initiative (http://climri.nrcan.gc.ca), the Partnership for a New Generation of Vehicles (PNGV), the Auto Aluminum Alliance (http://www.uscar.org), the Aluminum Association Inc.'s Auto and Light Truck Group (http://www.autoaluminum.org) and the United States Automotive Materials Partnership (USAMP), and the European Council for Automotive Research and Development Agreement (EUCAR).

PRICES AND WORLD OUTLOOK

Large users of aluminum often invest in smelters on a joint-venture basis, taking a share of the metal proportional to their ownership for their own use. These arrangements and others, such as long-term supply agreements between non-related producers and users (such as those between the primary producers and the automotive industry), can provide a certain measure of price stability and certainty for both producers and large users. Through these initiatives and by focusing on value-added operations to produce metal products with higher margins, primary producers can stabilize the short-term volatility of primary aluminum prices to reduce the risk in investment decisions. One side effect of this longer-term planning is that production may be allocated and can make the availability of metal unpredictable on a short-term basis to users with unforeseen needs or to those without such sources.

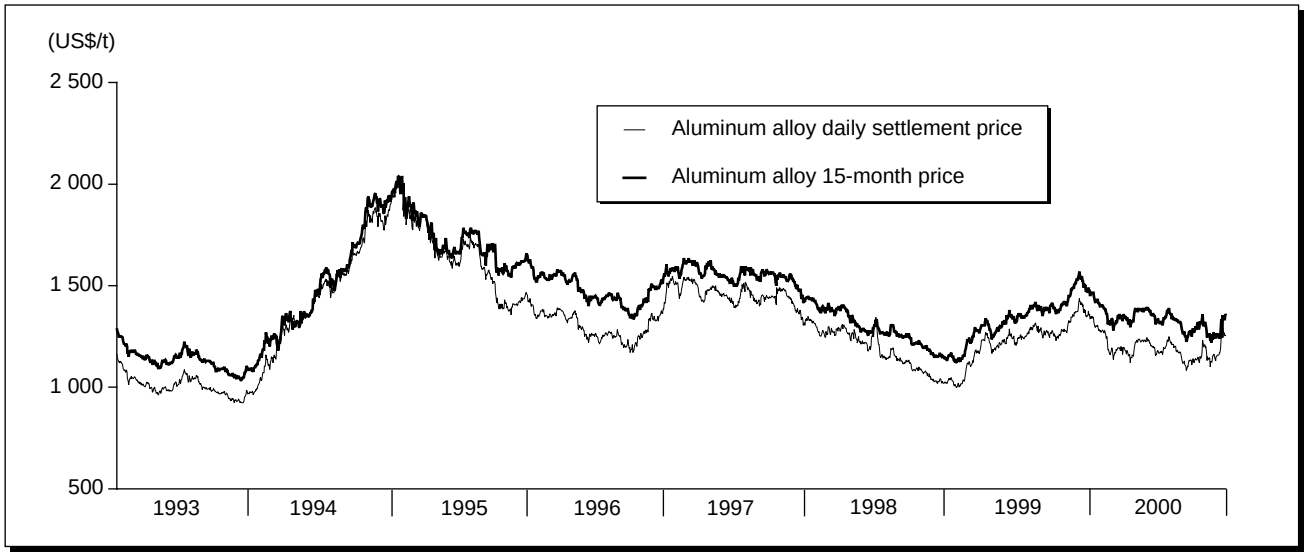
As discussed earlier, cash settlement prices for primary-grade aluminum remained volatile through the year and averaged US$1550/t (US70¢/lb), compared to an average of US$1362/t (US62¢/lb) in 1999. For 2001, continued volatility in aluminum prices is expected. The cash price during the early part of the year has peaked at above US$1700/t, but there is some uncertainty for the rest of the year. On the one hand there is the possibility of metal shortfalls resulting from the U.S. closures while, on the other, net new orders for aluminum mill products fell throughout 2000 and, should this trend continue, along with a reduction in the overall economy, decreased North American demand could cover the production shortfall. As a result, aluminum prices could easily span almost the full expected longer-term price range of between approximately US$1200 and $1800/t (US55¢ and 82¢/lb), although the average price during 2001 may be in the lower portion of that range at about US$1450-$1500/t (US65¢-70¢/lb). Metal prices can be obtained from various news services, journals and

Figure 10
London Metal Exchange Aluminum Prices, 1989-2000



Sources: Natural Resources Canada; London Metal Exchange; Reuters; Metalprices.com.

Figure 11
Aluminum Alloy Prices, London Metal Exchange, 1993-2000



Sources: Natural Resources Canada; London Metal Exchange; Reuters; Metalprices.com.

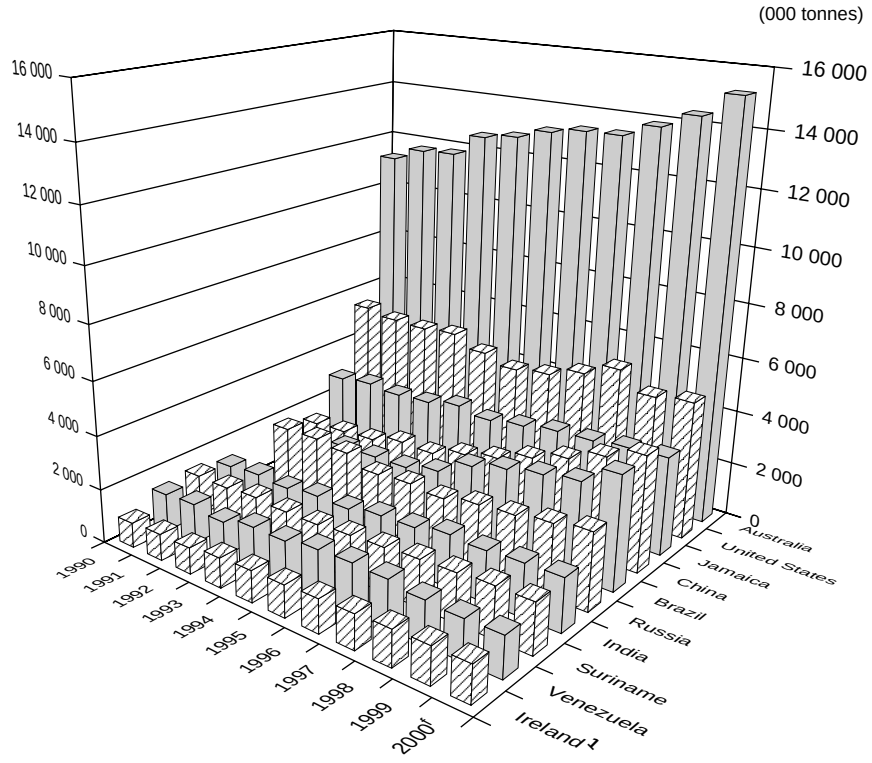
newspapers, as well as from the London Metal Exchange (LME) Internet site at http://www.lme.co.uk and from http://metalprices.com.

Daily settlement prices on the LME for aluminum alloy reflected a weakened general trend of primary aluminum prices. Aluminum alloy settlement prices started 2000 at US$1358/t (US62¢/lb) and have traded in a declining range from US$1438/t (US65¢/lb) established in January to US$1082/t (US49¢/lb) in October, closing the year at US$1143/t. For 2000, alloy prices averaged approximately US$1218/t (US55.3¢/lb), compared to an average of US$1192/t (US54.1¢/lb) in 1999. Aluminum alloy stocks in LME warehouses started the year at approximately 78 000 t and increased steadily to end the year at approximately 88 000 t.

Most alumina is sold on long-term contracts, often at a fixed percentage of the LME metal price, while only a small portion of world production is sold on a cash or spot basis. During the early part of 2000, the spot alumina market continued to feel the impact of the closure of Kaiser's Gramercy plant, but the effect steadily diminished during the year. Spot prices for alumina started the year above US$500/t but steadily declined to the US$160-$180/t level at the end of the year as increases in production from refineries in Australia, Brazil, China and Russia balanced the lost U.S. production. During 2001, prices are expected to remain flat or to trend lower from this level assuming there are no further production disruptions, especially if smelter cutbacks in the western United States are maintained and there are no further cutbacks in alumina production, such as Alcoa's cuts at facilities in the U.S. Virgin Islands and Texas.

World production of primary aluminum increased to an estimated 24.4 Mt in 2000, up 3.2% from the 23.654 Mt produced in 1999. For 2001, world production of primary aluminum is expected to increase by about 2% to 24.8 Mt, which is consistent with

Figure 12
World Alumina Production, Top 10 Producers, 1990-2000
(80% of Total Production)



Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics; International Primary Aluminium Institute.

f Forecast.
1 Calcined.

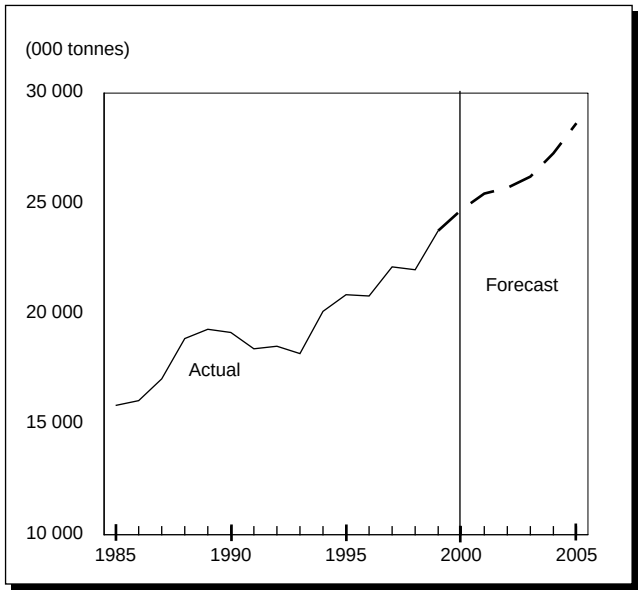
aluminum's growth rate over the last 20 years. In the longer term, annual growth of 1-3% is forecast for the early part of this decade. The transportation and packaging markets are expected to lead the increase in demand for aluminum to the year 2005 and perhaps beyond.

IAI figures show that the world primary production capacity of its members is expected to increase about 2.7% to 22.8 Mt in 2001 from 22.2 Mt at the end of 2000, with slightly lower increases in the following years. Taking into account projected increases from non-IAI members, world primary production was expected to rise approximately 2% in 2001.

Notes: (1) Information in this review was current as of February 28, 2001. (2) Lorraine Ralph of the Minerals and Mining Statistics Division prepared Tables 2 and 3 and she and others in that Division have provided assistance in generating the new summary tables on Canadian aluminum. (3) Various Internet sites have been identified in this article. Please note that Natural Resources Canada has no control over the content of the web sites of other organizations, which may be modified, updated or deleted at any time. (4) This and other reviews, including previous editions, are available on the Internet at http://www.nrcan.gc.ca/mms/cmy/index_e.html.

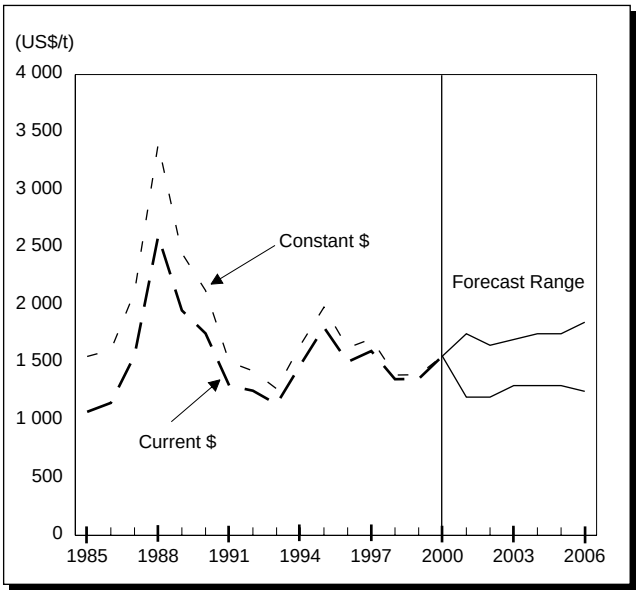
NOTE TO READERS

Figure 13
World Primary Aluminum Demand, 1985-2005



Sources: Natural Resources Canada, World Nonferrous Metal Statistics Group.

Figure 14
Aluminum Settlement Prices, 1985-2006



Source: Natural Resources Canada.

TARIFFS

Item No.	Description	Canada			United States	EU	Japan[1]
		MFN	GPT	USA	Canada	MFN	WTO
2606.00.00	Aluminum ores and concentrates	Free	Free	Free	Free	Free	Free
2818.20.00	Aluminum oxide, other than artificial corundum	Free	Free	Free	Free	4.0%	Free
7601.10	Unwrought aluminum, not alloyed	Free	Free	Free	Free	6%	Free
7601.20	Unwrought aluminum alloys	Free	Free	Free	Free	6%	Free
7602.00	Aluminum waste and scrap	Free	Free	Free	Free	Free	Free
76.03	Aluminum powders and flakes	3.5-5%	Free	Free	Free	5.1-5.3%	3%
76.04	Aluminum bars, rods and profiles	Free-5%	Free	Free	Free	7.5%	7.5%
76.05	Aluminum wire	Free-4%	Free	Free	Free	7.5%	7.5%
76.06	Aluminum plates, sheets and strip, of a thickness exceeding 0.2 mm	Free-6.5%	Free-5%	Free	Free	7.5%	Free-2%
76.07	Aluminum foil not exceeding 0.2 mm	Free-6.5%	Free-5%	Free	Free	10%	7.5%
76.08	Aluminum tubes and pipes	Free-5%	Free	Free	Free	Free-7.5%	7.5%
7609.00	Aluminum tube or pipe fittings	5.5%	3%	Free	Free	7%	3%
76.10	Aluminum structures (excluding prefabricated buildings of heading no. 94.06) and parts of structures, aluminum plates, rods, profiles, tubes and the like, prepared for use in structures	6.5%	5%	Free	Free	6-7%	Free-3%
7611.00	Aluminum reservoirs, tanks, vats and similar containers, for any material	Free-6.5%	Free-5%	Free	Free	6%	3%
76.12	Aluminum casks, drums, cans, boxes and similar containers, for any material	6.5%	2.5-5%	Free	Free	6%	3%
7613.00	Aluminum containers for compressed or liquefied gas	6.5%	5%	Free	Free	6%	3%
76.14	Stranded wire, cables, plaited bands and the like, of aluminum, not electrically insulated	4.5%	3%	Free	Free	6%	3%
76.15	Table, kitchen or other household articles and parts thereof, of aluminum	6.5%	Free-5%	Free	Free	6%	Free
76.16	Other articles of aluminum	Free-6.5%	Free-5%	Free	Free	6%	3%

Sources: *Customs Tariff*, effective January 2001, Canada Customs and Revenue Agency; *Harmonized Tariff Schedule of the United States*, 2001; *Worldtariff Guidebook on Customs Tariff Schedules of Import Duties for European Union* (40th Annual Edition: 2000); *Custom Tariff Schedules of Japan*, 2000.
[1] WTO rate is shown; lower tariff rates may apply circumstantially.

TABLE 1a. CANADIAN ALUMINUM PRODUCED AND TRADED, 1999 AND 2000

Item No.		1999		2000p	
		(tonnes)	($000)	(tonnes)	($000)
PRODUCTION		2 389 834	. .	2 373 460	. .
IMPORTS					
2606.00	Aluminum ores and concentrates				
	Brazil	1 840 420	59 773	1 293 334	43 403
	Guinea	150 084	7 941	499 469	20 079
	Australia	493 985	18 630	322 257	12 962
	United States	110 736r	7 509r	187 411	11 296
	Guyana	372 917	11 891	244 871	8 747
	Bermuda	–	–	163 096	5 166
	Other countries	95 906	4 842	127 831	6 310
	Total	3 064 048r	110 586r	2 838 269	107 963
2620.40	Ash and residues containing mainly aluminum	4 191	4 027	4 213	4 144
2818.20	Aluminum oxide (excluding artificial corundum)				
	Australia	1 633 614r	401 499r	1 790 055	497 325
	United States	1 098 207r	324 150r	1 205 260	393 017
	Jamaica	632 511	164 319	579 176	159 363
	Brazil	25 591	6 653	89 129	26 003
	Venezuela	–	–	25 315	7 106
	China	8 156	2 887	8 142	4 420
	Germany	1 444	2 724	1 836	3 733
	Austria	1 214	3 552	1 339	2 966
	Other countries	4 694r	4 472r	31 237	9 401
	Total	3 405 431r	910 256r	3 731 489	1 103 334
2818.30	Aluminum hydroxide	16 337	10 106r	8 233	6 818
7601.10	Unwrought aluminum, not alloyed				
	United States	46 473r	101 135r	42 799	100 649
	Argentina	–	–	1 304	3 516
	Russia	1 110r	1 964r	651	968
	Other countries	2 578r	4 973r	523	1 330
	Total	50 161r	108 072r	45 277	106 463
7601.20	Unwrought aluminum, alloyed				
	United States	184 718r	334 447r	215 263	376 504
	Russia	9 531	16 309	12 113	21 281
	United Arab Emirates	99	244	954	2 382
	Australia	147	367	883	2 373
	United Kingdom	1 353	2 836	403	957
	Other countries	2 572	4 971	1 398	3 306
	Total	198 420r	359 174r	231 014	406 803
7602.00	Aluminum waste and scrap	123 864r	168 811r	127 055	182 609
76.03	Aluminum powders and flakes	2 187r	8 433r	2 136	8 809
76.04	Aluminum bars, rods and profiles				
7604.10	Of aluminum, not alloyed				
	United States	8 357r	30 499r	12 028	47 237
	Belgium	798	4 274	829	3 912
	Panama	658	1 632	1 215	3 241
	Austria	230	736	692	2 797
	Other countries	735r	3 439r	1 067	4 288
	Total	10 778r	40 580r	15 831	61 475
7604.21 to	Of aluminum alloys				
7604.29	United States	26 430r	129 506r	30 312	145 862
	China	491	1 614	3 759	12 866
	South Korea	460	1 742	890	3 313
	France	238	1 312	393	2 100
	Germany	131	918r	244	1 661
	Other countries	686r	3 856r	928	5 183
	Total	28 436r	138 948r	36 526	170 985
76.05	Aluminum wire	7 704r	28 089r	8 093	35 243

TABLE 1a (cont'd)

Item No.		1999		2000p	
		(tonnes)	($000)	(tonnes)	($000)
IMPORTS (cont'd)					
76.06	Aluminum plates, sheets and strip, of a thickness exceeding 0.2 mm	473 122r	1 542 690r	483 424	1 731 679
76.07	Aluminum foil not exceeding 0.2 mm	50 251r	227 575r	43 874	217 436
76.08	Aluminum tubes and pipes	10 778r	52 907r	12 660	62 071
76.09	Aluminum tube or pipe fittings	. .	38 361r	. .	53 872
76.10	Aluminum structures and parts of structures, aluminum plates, rods, profiles, tubes and the like, prepared for use in structures	. .	87 558r	. .	96 592
		(number 000)		**(number 000)**	
76.11	Aluminum reservoirs, tanks, vats and similar containers, for any material	8	32 143	4	34 891
76.12	Aluminum casks, drums, cans, boxes and similar containers, for any material	863 268r	159 943r	815 905	165 959
76.13	Aluminum containers for compressed or liquefied gas	106	12 602r	98	15 230
		(tonnes)		**(tonnes)**	
76.14	Stranded wire, cables, plaited bands and the like, of aluminum, not electrically insulated	299r	1 196r	183	777
76.15	Table, kitchen or other household articles and parts thereof, of aluminum	. .	88 659r	. .	93 768
76.16	Other articles of aluminum	. .	253 967r	. .	268 492
EXPORTS					
2606.00	Aluminum ores and concentrates				
	Switzerland	–	–	141	60
	United States	–r	–r	100	15
	Greece	–	–	6	5
	Total	–r	–r	247	80
2620.40	Ash and residues containing mainly aluminum	14 381	8 156	17 786	9 603
2818.20	Aluminum oxide (excluding artificial corundum)				
	United States	52 359	42 108	60 991	50 811
	Other countries	72	172	134	455
	Total	52 431	42 280	61 125	51 266
7601.10	Unwrought aluminum, not alloyed				
	United States	589 576r	1 220 225r	556 959	1 315 008
	Netherlands	129 292	259 693	115 289	243 790
	South Korea	17 256	37 779	35 278	87 971
	Mexico	9 821	21 381	28 607	70 225
	Japan	43 160	79 415	32 819	67 061
	France	6 051	12 235	22 260	44 380
	Other countries	9 721	20 549	13 705	32 012
	Total	804 877r	1 651 277r	804 917	1 860 447
7601.20	Unwrought aluminum alloys				
	United States	920 535r	2 112 695r	882 069	2 309 181
	Japan	103 009	212 626	109 563	249 559
	South Korea	21 347	47 810	27 477	72 351
	United Kingdom	3 075	8 072	4 713	13 738
	Netherlands	212	491	3 265	8 301
	Ireland	2 253	5 708	1 932	5 792
	Other countries	6 409	15 547	3 230	9 923
	Total	1 056 840r	2 402 949r	1 032 249	2 668 845

TABLE 1a (cont'd)

Item No.		1999		2000p	
		(tonnes)	($000)	(tonnes)	($000)
EXPORTS (cont'd)					
7602.00	Aluminum waste and scrap				
	United States	278 028r	459 696r	274 064	494 102
	China	4 568r	5 319r	8 404	11 893
	Japan	2 152	3 206	4 106	9 208
	Netherlands	1 922	3 994	1 268	3 076
	Hong Kong	1 005	1 141	554	883
	South Korea	4 895	10 441	592	836
	Other countries	1 900	3 075	938	1 628
	Total	294 470r	486 872r	289 926	521 626
76.03	Aluminum powders and flakes	1 546r	3 209r	1 835	3 318
76.04	Aluminum bars, rods and profiles	83 911r	370 755r	81 821	391 031
76.05	Aluminum wire	94 435	240 133	90 031	257 079
76.06	Aluminum plates, sheets and strip, of a thickness exceeding 0.2 mm	335 726r	985 755r	345 776	1 116 568
76.07	Aluminum foil not exceeding 0.2 mm	39 392r	179 358r	41 322	206 429
76.08	Aluminum tubes and pipes	8 162r	37 924r	7 483	40 908
76.09	Aluminum tube or pipe fittings	. .	15 301r	. .	12 503
76.10	Aluminum structures and parts of structures, aluminum plates, rods, profiles, tubes and the like, prepared for use in structures	. .	244 853r	. .	337 134
		(number 000)		**(number 000)**	
7611.00	Aluminum reservoirs, tanks, vats and similar containers, for any material	1r	1 379r	18	1 042
76.12	Aluminum casks, drums, cans, boxes and similar containers, for any material	684 844r	110 993r	589 040	99 263
7613.00	Aluminum containers for compressed or liquefied gas	581	4 093	760	5 793
		(tonnes)		**(tonnes)**	
76.14	Stranded wire, cables, plaited bands and the like, of aluminum, not electrically insulated	9 708	30 398	9 275	31 013
76.15	Table, kitchen or other household articles and parts thereof, of aluminum	. .	67 374	. .	68 308
76.16	Other articles of aluminum	. .	184 482r	. .	194 286

Sources: Natural Resources Canada; Statistics Canada.
– Nil; . . Not available or not applicable; p Preliminary; r Revised.
Note: Numbers may not add to totals due to rounding.

TABLE 1b. ALUMINUM PRODUCTION, INVENTORIES, TRADE, RECYCLING AND USE (BY QUANTITY), 1990-2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
						(tonnes)					
CANADIAN PRODUCTION OF ALUMINUM											
Production of aluminum	1 567 395	1 821 642	1 971 843	2 308 868	2 254 681	2 171 992	2 283 210	2 327 188	2 374 118	2 389 835	2 373 461
Alloying metals added	16 968	20 138	19 114	19 744	27 591	27 495	29 912	41 324	43 682	48 822	39 965
Total shipments of aluminum (available primary/alloyed primary aluminum)	1 564 485	1 808 038	1 970 041	2 284 554	2 292 055	2 171 389	2 296 367	2 392 842	2 411 393	2 422 351	2 379 806
CANADIAN INVENTORIES OF ALUMINUM											
Change in year-end primary smelter inventories (increase/decrease)	2 835	14 052	4 985	20 311	(16 944)	25 401	(8 383)	(25 369)	(848)	(667)	13 703
Reported year-end inventories of primary alloyed and unalloyed material by Canadian using companies[1]	13 461	13 753	13 221	15 716	18 255	16 986	15 720	16 701	17 630	21 340	. .
Change in year-end user inventories	(5 424)	292	(532)	2 495	2 539	(1 269)	(1 266)	981	929	3 710	. .
Change from previous year in total inventories (increase/decrease)	(2 589)	14 344	4 453	22 806	(14 405)	24 132	(9 649)	(24 388)	81	3 043	. .
Reported year-end inventories of recycled ingot by Canadian companies[2]	4 121	4 670	4 803	6 182	5 930	4 351	5 198	5 315	5 995	5 415	. .
Reported year-end inventories of scrap originating outside plant by Canadian companies[2]	5 905	6 583	5 929	6 442	9 022	5 763	3 958	7 142	8 206	13 833	. .
TRADE IN ALUMINUM											
Imports of unwrought aluminum	84 863	74 128	85 481	109 121	148 459	134 046	140 255	177 018	202 116	248 584	276 292
Domestic exports of unwrought primary/alloy	1 282 076	1 472 607	1 604 964	1 846 451	1 877 046	1 717 153	1 817 543	1 886 036	1 856 094	1 861 715	1 837 168
Imports of semi-fabricated mill products	328 877	299 847	336 721	370 944	427 443	445 054	414 420	469 177	502 369	583 549	602 737
Domestic exports of semi-fabricated mill products	194 866	215 215	244 452	296 624	350 438	384 587	409 617	453 469	497 268	572 882	577 543
CANADIAN RECYCLING OF ALUMINUM[2]											
Direct use of purchased scrap in finished products	18 617	17 768	24 009	24 084	31 469	30 441	44 555	67 447	78 298	80 689	94 326
Metal used in production of recycled aluminum	115 112	101 503	127 818	131 174	145 661	146 987	81 629	128 515	147 847	145 959	157 794
Imports of dross	1 750	1 923	3 379	2 331	3 065	3 183	3 305	1 774	4 520	4 191	4 212
Domestic exports of dross	49 546	25 820	7 103	3 709	3 018	18 859	10 762	13 021	11 403	14 381	17 786
Imports of scrap	52 645	46 433	52 674	53 466	63 309	56 207	67 625	92 600	107 917	123 862	127 054
Domestic exports of scrap	188 382	173 653	197 560	198 954	234 817	237 162	241 475	271 258	281 160	294 468	289 926
Imports of recycled aluminum[3]	. .	. .	. .	. .	. .	. .	. .	5 376	71 094	91 227	140 957
CANADIAN USE OF ALUMINUM											
Canadian apparent use of primary aluminum[4]	364 683	423 903	455 012	570 030	549 063	612 414	609 430	654 060	686 402	721 036	. .
Canadian use of aluminum[5]	637 599	598 569	690 069	752 617	832 260	803 624	758 868	919 764	987 900	1 044 071	. .
Reported Canadian use of aluminum	453 257	446 239	481 089	568 854	635 024	635 402	676 935	764 438	889 973	999 242	. .

Source: Natural Resources Canada.

. . Not available.

[1] Data include use of metal and reported year-end inventories of primary and alloy by companies surveyed by NRCan. The number of respondents changed along the length of the series due to business changes. As of 2000, approximately 160 companies were surveyed. [2] HS Code 76.01 "Unwrought aluminum" includes 7601.20.00.21 "Remelt Scrap Ingot." It also includes grain, slabs, wire bar and granules cut from ingots (for use in cleaning compounds), blocks and notched bars. [3] HS Code 7601.20.00.21 Imports of recycled aluminum - Unwrought Ingots: "Remelt scrap ingots" became active in 1998. (In 1997, the active code was 7601.20.10.21; from 1990 to the end of 1996, the active code was 7601.20.10.93, but also included data next reported under 7601.20.10.29 and now reported under 7601.20.00.29; from 1988 to 1990, the active code was 7601.20.10.40.) [4] Canadian Apparent Use of Primary Aluminum = Shipments of aluminum less exports (HS Code 76.0.1) plus imports (HS Code 76.01) less imports of "Remelt Scrap Ingot" (HS Code 7601.20.00.21) plus year-end inventory change. (Note: Earlier years' data for trade in recycled aluminum are not available or included.) [5] Canadian Use of Aluminum = Shipments of aluminum plus imports (HS Code 76.01), less exports (HS Code 76.01) plus imports semi-fabricated (HS Code 76.02) less exports (HS Code 76.02) plus use of scrap in finished products plus use of aluminum in recycled ingot plus inventory change (primary and recycled).

TABLE 2. CANADA, ALUMINUM SMELTER CAPACITY

Company	As of December 31, 2000
	(tonnes/year)
Alcan Aluminium Limited	
Quebec	
Grande-Baie	186 000
Arvida, Jonquière	238 000
Isle-Maligne	–[a]
Alma	400 000[b]
Shawinigan	88 000
Beauharnois	49 000
Laterrière	210 000
British Columbia	
Kitimat	272 000
Total Alcan capacity	1 443 000
Canadian Reynolds Metals Company, Limited (Alcoa)	
Quebec	
Baie-Comeau	418 000
Aluminerie de Bécancour Inc.	
Quebec	
Bécancour	390 000
Aluminerie Alouette Inc.	
Quebec	
Sept-Îles	244 000
Alcoa Aluminerie Lauralco Inc.	
Quebec	
Deschambault	240 000
Total Canadian capacity	2 735 000

Source: Natural Resources Canada.
– Nil.
[a] The last potline closed in March 2000. [b] Will reach full capacity in mid-2001.

TABLE 3a. USE[1] OF ALUMINUM METAL[4] IN CANADA AT FIRST PROCESSING STAGE, 1997-99

	1997[r,a]	1998[r,a]	1999[r,a,5]
		(tonnes)	
METAL USED IN CASTINGS[6]			
Permanent mould	104 691	128 966	129 574
Sand	3 351	3 262	4 442
Die and other	152 244	166 763	205 781
Total	260 286	298 991	339 797
METAL USED IN WROUGHT PRODUCTS			
Sheet, plate, coil and foil	181 005	208 563	229 139
Extrusions, including tubing	149 958	188 610	234 843
Other wrought products (including rods, forgings and slugs)	134 132	149 451	153 936
Total	465 095	546 624	617 918
METAL USED IN OTHER PRODUCTS			
Destructive uses (deoxidizer), non-aluminum base alloys, powder and paste and other uses	39 057	44 358	41 526
Total used	764 438	889 973	999 242
Aluminum metal used for the production of recycled aluminum[2]	128 515	147 847	145 959

	Metal Entering Plant			On Hand at December 31		
	1997	1998	1999	1997	1998	1999
Primary aluminum and alloys	572 217	663 468	733 569	16 701	17 630	21 340
Recycled aluminum	138 771	159 234	198 370	5 315	5 995	5 415
Scrap originating outside plant	213 482	248 068	253 985	7 142	8 206	13 833
Total	924 471	1 070 770	1 185 925	29 159	31 831	40 588
Aluminum shipments[3]				32 604	31 001	33 674

Source: Natural Resources Canada.
r Revised.
a Increase in number of companies being surveyed; therefore, the closing inventory of the previous year does not equal the opening inventory of the current year.
1 Available data as reported by users. 2 Aluminum metal used in the production of recycled aluminum is not included in usage totals. 3 Aluminum metal shipped without change. Does not refer to shipments of goods of own manufacture. 4 Aluminum metal refers to primary aluminum and alloys, purchased recycled aluminum, and outside aluminum scrap. 5 For 1999 this table is compiled from Natural Resources Canada's annual survey, "Consumption of Aluminum Metal" from data for 169 Canadian users. 6 Metal reported used in casting may contain runaround scrap. Work is under way to revise the questionnaire for 2001.
Note: Numbers may not add to totals due to rounding.

TABLE 3b. USE[1] OF ALUMINUM METAL[2] IN CANADA, BY TYPE AT FIRST PROCESSING STAGE, 1988-99

	1988[a]	1989[a]	1990[a]	1991[a]	1992[a]	1993[a]	1994[a]	1995	1996[a]	1997[r,a]	1998[r,a]	1999[r,a,4]
							(tonnes)					
Type of aluminum metal used in products other than recycled aluminum												
Primary aluminum and alloys	381 106	393 027	351 877	355 010	369 185	447 997	485 845	490 000	512 865	558 139	653 320	719 124
Purchased recycled aluminum	70 633	75 031	82 763	73 461	87 896	95 774	117 710	114 961	119 515	138 852	158 355	199 429
Outside aluminum scrap	28 039	27 306	18 617	17 768	24 009	25 084	31 469	30 441	44 555	67 447	78 298	80 689
Total used in products other than in recycled aluminum	479 779	495 363	453 257	446 239	481 089	568 854	635 024	635 402	676 935	764 438	889 973	999 242
Type of aluminum metal used in recycled aluminum[3]												
Primary aluminum and alloys	13 307	22 383	x	x	x	x	x	x	x	14 650	x	10 879
Outside aluminum scrap	94 308	79 716	x	x	x	x	x	x	x	113 865	x	135 081
Total used in recycled aluminum[3]	107 615	102 098	115 112	101 503	127 818	131 174	145 661	146 987	81 629	128 515	147 847	145 959

Source: Natural Resources Canada.
[r] Revised; x confidential.
[a] Increase in number of companies being surveyed.
[1] Available data as reported by users. [2] Aluminum metal refers to primary aluminum and alloys, purchased recycled aluminum, and outside aluminum scrap.
[3] Aluminum metal used in recycled aluminum is not included in "Total used in products other than in recycled aluminum" above.
[4] For 1999 this table is compiled from Natural Resources Canada's annual survey, "Consumption of Aluminum Metal" from data for 169 Canadian users.
Note: Numbers may not add to totals due to rounding.

TABLE 4. AVERAGE ALUMINUM PRICES

Year	Month	LME Cash Settlement[1]	*Metals Week* U.S. Markets[1]
		(US$/t)	(US¢/lb)
ANNUAL AVERAGES[2]			
1987		1 560.90	72.3
1988		2 597.80	110.1
1989		1 951.50	87.8
1990		1 751.80	75.0
1991		1 302.70	59.5
1992		1 254.60	57.5
1993		1 139.40	53.3
1994		1 477.20	71.2
1995		1 806.10	85.9
1996		1 506.00	71.3
1997		1 599.70	77.1
1998		1 357.80	65.6
1999		1 361.09	65.7
2000		1 549.14	74.6
MONTHLY AVERAGES			
1999	January	1 218.80	58.8
	February	1 187.25	57.6
	March	1 181.96	58.7
	April	1 278.55	62.4
	May	1 323.79	64.5
	June	1 315.64	63.1
	July	1 404.16	67.5
	August	1 431.69	68.6
	September	1 492.86	71.3
	October	1 474.79	70.8
	November	1 473.09	70.6
	December	1 554.80	74.7
2000	January	1 680.70	80.1
	February	1 670.67	80.3
	March	1 577.41	76.2
	April	1 457.61	70.6
	May	1 467.19	70.9
	June	1 506.73	72.7
	July	1 563.88	76.3
	August	1 528.02	74.4
	September	1 601.60	77.2
	October	1 500.66	72.3
	November	1 474.23	70.1
	December	1 565.87	74.3

Sources: Natural Resources Canada; *Metals Week*.
1 Highest grade sold. **2** Primary ingots, minimum 99.7% purity; prior to October 1988, minimum 99.5% purity.

TABLE 5. AVERAGE ALUMINUM ALLOY (RECYCLED) PRICES

Year	Month	LME Alloy[1] Cash Settlement
		(US$/t)
ANNUAL AVERAGES		
1993		1 005.2
1994		1 452.9
1995		1 656.0
1996		1 302.8
1997		1 461.0
1998		1 203.8
1999		1 191.2
2000		1 216.9
MONTHLY AVERAGES		
1999	January	1 024.3
	February	1 022.7
	March	1 058.5
	April	1 161.4
	May	1 232.3
	June	1 200.8
	July	1 239.0
	August	1 240.2
	September	1 287.8
	October	1 266.3
	November	1 257.7
	December	1 303.4
2000	January	1 387.4
	February	1 345.8
	March	1 273.9
	April	1 171.4
	May	1 181.3
	June	1 190.7
	July	1 223.5
	August	1 176.7
	September	1 212.4
	October	1 143.6
	November	1 128.5
	December	1 167.5

Sources: Natural Resources Canada; *Metals Week.*
[1] Alloy ingots meeting LME specifications.

TABLE 6. WORLD MINE PRODUCTION OF BAUXITE, 1996-2000

	World Rank in 2000	1996	1997	1998	1999	2000e
				(000 tonnes)		
Australia	1	43 063.0	44 465.0	44 553.0	48 493.0	51 200.0
Guinea	2	18 282.0r	19 250.0	17 000.0	17 200.0	17 500.0
Brazil	3	11 060.1	11 162.8r	11 961.1r	13 838.8	13 850.0
Jamaica	4	11 828.6	11 987.3	12 646.4	11 688.5	11 300.0
China	5	8 878.8	9 000.0	9 000.0	9 500.0	9 500.0
India	6	5757.5	5 800.3	5 980.1	6 712.2	7 800.0
Venezuela	7	4 806.9	5 083.9	4 825.6	4 471.6	4 950.0
Russia	8	3 928.0	3 991.0	3 488.4	3 500.0	3 900.0
Kazakhstan	9	3 345.9r	3 416.0	3 436.8	3 606.5	3 700.0
Suriname	10	3 695.3	3 877.2	3 889.6	3 714.6	3 300.0
Guyana	11	2 475.5	2 470.9	2 267.4	2 359.3	2 600.0
Greece	12	2 451.7r	1 876.6r	1 823.0	1 882.5	1 950.0
Indonesia	13	842.0	808.7	1 055.6	1 116.3	1 120.0
Hungary	14	1 055.8	742.6	908.9r	935.2	1 050.0
Serbia and Montenegro	15	323.0	470.0	226.0r	500.0	500.0
Ghana	16	473.2	519.2	442.5	353.3	380.0
Turkey	17	544.5	369.5	458.0	207.7	210.0
Malaysia	18	218.7	279.1r	160.3	222.7	150.0
Irane	19	100.0	100.0	100.0	100.0	100.0
United States	20	100.0	100.0	100.0	100.0	100.0
France	21	165.0	164.0	80.0	70.0	70.0
Pakistan	22	4.1	4.9	5.0	35.7	35.0
Vietnam	23	30.0	30.0	30.0	30.0	30.0
Mozambique	24	11.5	8.2	6.1	7.9	8.0
Romania	25	175.2	127.5	161.9r	–	–
Total world		123 616.3r	126 104.7r	124 605.7r	130 645.6	135 273.0
% change from previous year		4.5	2.0	–1.2	4.8	3.5

Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics.
e Estimated; r Revised.

TABLE 7. WORLD PRODUCTION OF ALUMINA (HYDRATE), 1995-2000

	World Rank in 2000	1995	1996	1997	1998	1999	2000e
				(000 tonnes)			
Australia	1	13 147.0	13 349.0	13 385.0	13 853.0	14 378.0	15 200.0
United States3	2	4 533.0	4 700.0	5 093.0	5 592.0	4 928.0	5 100.0
China	3	2 222.7	2 490.0r	2 922.8	3 327.4	3 823.0	4 290.0
Brazil	4	2 142.9	2 759.0	3 088.0	3 222.1r	3 515.1	4 200.0
Jamaica	5	3 030.2	3 199.5	3 394.2	3 440.2	3 569.6	3 640.0
Russia	6	2 254.3	2 148.0	2 379.8	2 465.4	2 657.1	2 850.0
India	7	1 672.0	1 706.0	1 940.0r	1 855.0r	1 930.0	1 950.0
Suriname	8	1 588.8	1 642.9	1 725.9	1771.9r	1 853.1	1 850.0
Venezuela	9	1 742.0	1 775.0	1 730.4	1 553.4	1 476.6	1 500.0
Ireland1	10	1 185.6	1 233.5	1 272.8	1 323.0	1 350.0	1 350.0
Ukraine	11	1 198.0	1 159.5r	1 074.5	1 290.7	1 230.2	1 300.0
Canada2	12	1 064.0	1 060.0	1 165.0	1 229.0	1 233.0	1 240.0
Kazakhstan	13	1 022.0	1 083.4	1 094.2	1 084.5r	1 157.7	1 210.0
Spain	14	1 094.8	1 094.8	1 110.3	1 110.0r	1 112.0	1 110.0
Italy	15	857.0	881.0	914.0	935.0r	973.0	975.0
Germany	16	994.0	792.0	850.0	778.3	800.0	800.0
Japan	17	743.2	718.9	728.0	737.6	736.6	740.0
Greece	18	629.7	619.8	615.7	649.4	633.0	640.0
Guinea	19	630.4	622.0	527.0	600.0r	569.0	600.0
France	20	525.0	542.0	589.0	520.0	556.0	560.0
Romania1	21	322.8	258.5	279.5	250.3r	277.4	280.0
Hungary	22	353.5	358.7	350.0r	160.0r	200.0	200.0
Turkey	23	172.0	159.3	164.3	156.8	159.1	160.0
Serbia and Montenegro	24	35.3	105.0	159.5r	152.6r	156.0	160.0
United Kingdom	25	108.0	99.0	100.0	96.0	115.0	115.0
Azerbaijan	–	26.1	–	–	–	–	–
Slovakia	–	65.0	56.0	46.8	–	–	–
South Korea	–	–	100.0	70.0	–	–	–
Total world		43 359.3	44 712.8r	46 769.7r	48 253.6r	49 388.5	52 020.0
% change from previous year		3.8	3.1	4.6	3.2	2.4	5.3

Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics; World Bureau of Metal Statistics; International International Aluminium Association; media reports.
– Nil; e Estimated; r Revised.
1 Calcined. 2 Alumina equivalent. 3 Calcined equivalent.

TABLE 8. WORLD PRODUCTION OF ALUMINUM, 1995-2001

	World Rank in 2000	1995	1996	1997	1998	1999	2000[e]	2001[f]
					(000 tonnes)			
United States	1	3 375.1	3 577.2	3 603.4	3 712.7	3 778.6	3 668.0	3 000.0
Russia	2	2 789.8[r]	2 871.6[r]	2 906.0	3 004.7	3 146.4	3 250.0	3 400.0
China	3	1 676.1	1 770.9	2 035.0	2 335.7[r]	2 598.5	2 830.0	3 150.0
Canada	4	2 172.0	2 283.2	2 327.2	2 374.1	2 389.8	2 373.0	2 600.0
Australia	5	1 292.6	1 370.3	1 490.1	1 626.2	1 719.3	1 770.0	1 800.0
Brazil	6	1 188.1	1 197.4	1 189.1	1 208.0	1 249.6	1 280.0	1 285.0
Norway	7	846.7	862.3	918.6	994.2	1 009.0	1 020.0	1 040.0
South Africa	8	233.3	617.0	682.9	692.5	686.9	700.0	725.0
India	9	536.5	530.6	544.9	542.8[r]	600.2	650.0	650.0
Germany	10	575.2	576.5	571.9	612.4	633.8	640.0	640.0
Venezuela	11	627.9	634.9	640.8	586.5	571.0	575.0	575.0
Bahrain	12	453.9	464.5	489.9	501.3	502.6	510.0	510.0
Dubai	13	247.4	258.5	377.7	386.6	441.0	510.0	540.0
France	14	364.5	380.1	399.4	423.6	455.1	435.0	455.0
Spain	15	361.9	361.8	359.9	360.4	363.9	365.0	365.0
New Zealand	16	273.3	284.5	310.3	317.4	326.7	330.0	330.0
United Kingdom	17	237.9	240.0	247.7	258.4	269.7	300.0	320.0
Netherlands	18	215.6	227.0	231.8	263.7	287.4	290.0	300.0
Tadjikistan	19	237.0	198.3	188.9	195.6	229.1	270.0	280.0
Argentina	20	185.5	183.9	187.2[r]	186.7	206.4	265.0	265.0
Iceland	21	100.2	103.4	122.9	173.4	221.5	225.0	250.0
Egypt	22	180.3	179.2	178.2	187.2	186.7	190.0	190.0
Italy	23	177.8	184.4	187.7	187.0	186.5	190.0	190.0
Romania	24	140.5	140.9	161.9	174.0	174.4	175.0	180.0
Ghana	25	135.4	137.0	151.6	56.1	114.0	160.0	160.0
Greece	26	130.9	130.9	132.6	146.1	159.9	160.0	165.0
Iran	27	117.0	80.1	92.3	119.0[r]	130.0	135.0	135.0
Indonesia	28	228.1	223.1	219.4[r]	133.4	111.7	130.0	130.0
Ukraine	29	95.1	89.9	100.5	106.7	112.4	115.0	115.0
Slovakia	30	59.0	111.5	110.2	108.0	109.2	110.0	110.0
Bosnia	31	–	–	8.0	30.0	70.0	100.0	120.0
Sweden	32	94.5	98.3	98.4	95.7	98.5	100.0	100.0
Cameroon	33	79.3	82.3	90.9	81.6	91.9	95.0	95.0
Slovenia	34	70.2	65.8	74.4	70.8	77.2	90.0	117.0
Serbia and Montenegro	35	17.0[r]	37.4[r]	65.7[r]	60.1[r]	72.5	80.0	85.0
Mexico	36	10.4	61.5	66.4	61.8	62.7	63.0	63.0
Turkey	37	61.5	62.1	62.0	61.8	61.7	62.0	62.0
Mozambique	38	–	–	–	–	–	60.0	220.0
Poland	39	50.8	51.5	51.5	51.5	46.7	45.0	45.0
Switzerland	40	20.7	26.6	27.3	32.1	34.4	35.0	40.0
Hungary	41	34.9	33.5	32.5	33.7	33.6	34.0	34.0
Japan	42	18.0	17.0	16.7	16.3	10.9	10.0	10.0
Nigeria	43	–	–	2.5	25.5	15.9	10.0	–
Suriname	44	28.1	26.0	23.1	27.1	6.6	–	–
Azerbaijan	–	11.0	–	–	–	–	–	–
Total world		19 751.0[r]	20 832.9[r]	21 779.4[r]	22 622.4[r]	23 654.1	24 405.0	24 846.0
% change from previous year		3 .3	5.5	4.5	3.9	4.6	3.2	1.8

Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics; World Bureau of Metal Statistics; International Primary Aluminium Institute.
– Nil; [e] Estimated; [f] Forecast; [r] Revised.

TABLE 9. PRIMARY ALUMINUM, QUANTITY USED BY COUNTRY, 1995-99

	World Rank in 1999	1995	1996	1997	1998	1999
				(000 tonnes)		
United States	1	5 300.0	5 500.0	5 800.0	6 100.0	6 500.0
China	2	1 942.0r	2 142.5r	2 290.0r	2 421.0r	2 972.9
Japan	3	2 336.4	2 392.6	2 434.3	2 079.9	2 099.7
Germany	4	1 510.0	1 355.0	1 558.0r	1 519.0r	1 520.0
Canada	5	611.9	619.9	628.2	734.1r	860.2
South Korea	6	675.3	674.3	666.3	505.7	813.9
France	7	743.8	671.7	724.2r	733.8r	785.9
Italy	8	631.0	614.0	671.0	674.0r	722.0
United Kingdom	9	576.0r	571.0r	583.0r	579.0r	581.0
India	10	581.0	584.8	544.5	566.0r	570.0
Russia	11	692.2r	444.7r	469.7r	489.2	556.1
Spain	12	350.0	360.0	430.0	435.5r	494.0
Taiwan	13	362.5	310.3	374.3	300.7	464.1
Brazil	14	499.8	497.0	478.6	521.4	463.1
Australia	15	343.0	321.8	352.0	367.1r	358.6
Belgium-Luxembourg	16	340.0	331.0	345.0	370.0r	350.0
Norway	17	157.0	169.0	197.0	155.0r	220.2
Greece	18	162.8	156.4	203.8	212.7r	212.5
Turkey	19	144.0	136.0	164.8	180.7	169.4
Hungary	20	120.6	158.6	183.4	164.8r	165.0
Austria	21	150.0	155.0	162.0	163.0r	165.0
Netherlands	22	150.0	155.0r	162.0r	163.0r	165.0
Switzerland	23	147.0r	140.2	144.0r	164.9	157.0
Thailand	24	235.5	220.2	232.8	129.0	155.3
Bahrain	25	135.0	137.0	137.0	140.0	142.0
Indonesia	26	147.7	161.3	203.0r	75.4	138.7
Sweden	27	116.0	129.0	142.0	177.0	132.2
South Africa	28	119.7	101.0r	124.4r	142.8	125.0
Venezuela	29	183.0	206.9	193.4	179.7	121.8
Romania	30	46.4r	35.7r	62.7r	787.7r	113.5
Iran	31	119.0r	106.0r	104.9r	111.1r	110.0
Malaysia	32	114.0	115.0	148.0	90.0	99.8
Poland	33	79.2	73.2	83.3	86.1r	95.4
Argentina	34	84.0	86.4	95.3	104.7r	92.3
Mexico	35	40.0	92.7	83.2	91.9	87.5
Egypt	36	77.4	79.2	97.9	91.6	82.7
Portugal	37	66.7	58.1	75.4	68.3	82.0
Slovenia	38	56.9	46.5	52.8r	74.6r	75.3
Czech Republic	39	58.9	53.0	62.8	78.9r	65.7
Ukraine	40	50.1	51.0	60.0	60.3	60.0
Israel	41	39.8	37.2	39.5	45.9	43.9
New Zealand	42	38.6	38.9	37.0	34.2	42.8
Denmark	43	27.6	27.0	36.0	38.9	39.4
Finland	44	31.0	30.4	33.1	33.0	37.1
Other Asia	45	35.0	35.0	35.0	35.0	35.0
Philippines	46	31.4	26.3	34.2	24.0	33.6
Singapore	47	39.2	40.0	15.0	33.5	33.5
Colombia	48	33.3	35.3r	42.8r	36.3r	27.4
Slovakia	49	25.0	25.0	25.2	22.2	25.2
Saudi Arabia	50	30.0	25.0	25.0	25.0	25.0
Vietnam	51	13.9	15.0	15.0	12.6	25.0
Croatia	52	24.4	20.7	22.0	24.0	24.0
North Koreae	53	20.0	20.0	20.0	20.0	22.0
Cameroon	54	21.0	18.0	24.7	24.9	22.0
Dubai	55	24.6	19.4	32.1	26.0	20.0
Lebanon	56	7.0	10.0	17.0	17.0	17.0
Ghana	57	16.1	16.1	16.0	16.0	16.0
Chile	58	15.0	13.9	15.5	25.3	15.0
Serbia and Montenegro	59	9.0	17.3	23.7r	19.2r	13.1
Other Africa	60	4.7	9.9	12.0	10.0	12.0
Bangladesh	61	10.0	10.0	10.0	10.0	10.0
Other Americas	62	10.0	12.0	10.0	10.0	10.0
Pakistan	63	13.0	15.0	15.0	15.0	9.4
Belarus	64	–	–	7.4	9.1	9.0
Ireland	65	3.3	3.8	5.8	6.6r	8.2

TABLE 9 (cont'd)

	World Rank in 1999	1995	1996	1997	1998	1999
				(000 tonnes)		
Bulgaria	66	6.0	6.7	7.8	8.0	8.0
Nigeria	67	7.0	7.0	7.0	7.0	7.0
Algeria	68	5.0	5.0	5.0	5.0	5.0
Tunisia	69	3.3	3.5	1.0	3.8	4.0
Morocco	70	2.0	1.6	2.0	3.4	3.1
Macedonia	71	2.0	2.8	2.0	3.0	3.0
Iceland	72	1.0	1.0	1.7	3.0	3.0
Other Europe	73	–	–	2.0	1.5	2.0
Kazakstan	74	–	–	1.6	1.7	2.0
Cuba	75	1.0	1.0	1.0	1.0	1.0
Albania[e]	76	1.0	1.0	1.0	1.0	1.0
Iraq[e]	77	1.0	1.0	1.0	1.0	1.0
Peru	78	4.5	3.6	2.5	2.5	0.9
Hong Kong[1]		40.0	40.0	n.a.	n.a.	n.a.
Total world		20 870.5[r]	20 807.9[r]	22 129.6[r]	22 005.2[r]	23 761.4
% change from previous year		3.8	–0.3	6.4	–0.6	8.0

Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics; World Bureau of Metals Statistics; International Primary Aluminium Institute.
– Nil; [e] Estimated; n.a. Note applicable; [r] Revised.
[1] Starting in 1997, Hong Kong is included with China.