

# POTASH

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**S**ome 15 companies produce potash from operations in 14 countries but just four companies, Potash Corp. of Saskatchewan Inc., IMC Global Inc., Belaruskali and Kali & Salz AG, produce around 60% of world output. Production in Canada, Russia, Belarus and Germany, together, in 2000, accounted for about 75% of the world total.

In order to allow comparison of potassium content between marketable products, production and consumption are often expressed in terms of the oxide,  $K_2O$ . About 93% of potash produced is used in the fertiliser industry where it is the principal source of the nutrient, potassium, which is essential for the healthy development of a range of agricultural crops. The balance is used in glass, ceramics, soaps and detergents, synthetic rubber and chemicals. Most potash is produced as potassium chloride which contains 60-61.5%  $K_2O$ , although soluble grade contains a minimum 62%  $K_2O$ . Products for industrial use contain 62-63%  $K_2O$ . Other potassium-containing salts for fertiliser use are potassium sulphate, potassium magnesium sulphate and potassium nitrate, in which the sulphate, nitrate and magnesium contents are also of value as plant nutrients.

Potash is recovered through the mining of evaporite deposits by conventional underground techniques and by solution mining. Surface and subsurface brines are also important sources of potash. The principal ore mineral is sylvite,  $KCl$ , which generally occurs mixed with rocksalt, or halite, when it is known as sylvinites. Carnallite,  $KCl \cdot MgCl_2 \cdot 6H_2O$ , is harvested from solar evaporation pans in the Dead Sea. Langbeinite,  $K_2SO_4 \cdot MgSO_4$ , is mined in New Mexico to produce marketable potassium magnesium sulphate. Potassium sulphate is

recovered from sulphate-bearing minerals, such as langbeinite, polyhalite and kainite. Potassium nitrate is recovered from caliche deposits in Chile. Both potassium sulphate and nitrate also are produced as secondary salts through reaction of potassium chloride with a source of sulphur or nitrogen.

In 2000, world potash production is estimated to have increased by about 500,000 t  $K_2O$  over 1999 to 26.28 Mt  $K_2O$ . While Canada increased production, output in Russia declined. Marginally higher output was achieved by other producers, although in both the US and in France, production declined. In the US, this is temporary, a result of low ore grades at one producer's operations. In France, output is dropping steadily and is planned to cease by 2004. Although among the smaller producers, output in Chile has increased substantially with the commissioning of new capacity on the Salar de Atacama.

The International Fertilizer Industry Association estimated world fertiliser potash consumption in 1999 (fertiliser year to June 2000) at 22.4 Mt  $K_2O$  and, in December 2000, projected consumption in 2000 at 23 Mt  $K_2O$ . The short-term outlook for potash fertiliser demand may be affected adversely by the cost of natural gas, which impacts nitrogen fertiliser costs for farmers, and by the outbreak of foot and mouth disease in Europe.

On a regional basis, potash demand in agriculture shows significantly different trends. Consumption in North America is mature. Within Western Europe, again, the market is mature, and there is pressure towards efficient usage in response to concerns over excess fertiliser runoff and towards the use of organic manures. Potash demand is expected to decrease marginally

in the European Union but to increase in Central Europe. In the Commonwealth of Independent States (CIS), potash usage remains a fraction of the 6 Mt K<sub>2</sub>O reported prior to the breakup of the Soviet Union. Recovery of potash demand in Russia, particularly, remains hampered by structural problems within the agricultural sector. In contrast, recovery in demand in Belarus is evident and consumption significantly exceeds that in Russia. The developing economies of Asia and South America have provided essentially all of the demand growth for potash over the past decade, and are expected to show continued growth. The US is the largest importer, but is supplied primarily from Canada. China, Brazil and India, which have limited domestic potash resources, hold the second, third and fourth places as importers and are supplied by all major producers. Potash demand in Africa continues to increase, but *per capita* consumption remains extremely low. Demand in Oceania, as in other developed market economies, is essentially static. China has become the world's largest consumer of fertiliser nutrients and, in 2000, accounted for about 28% of total nitrogen demand, 25% of phosphate demand and 15% of potash demand.

Industrial potash demand is increasing and a number of producers are committed to developing their participation in this sector of the market. Potash Corp. of Saskatchewan (PCS) has stated a long-term objective of 'decommoditising' its business, including its potash business. Non-agricultural potash sales by Canadian and US producers in both domestic and export markets accounted for about 12% of total potash (KCl) sales in 2000.

## North America

The Canadian potash industry comprises PCS, the Potash division of IMC Global and Agrium Inc. IMC Global has production facilities in the US where Mississippi Chemical Corp. is also a major producer. Reilly Industries operates a relatively small facility based on subsurface brines in Utah, while Intrepid Oil & Gas LLC (Moab Salt Co.) operates a solution mine producing both salt and potash in Utah.

PCS produced 3.4 Mt K<sub>2</sub>O in 2000 from its five mines in Saskatchewan, Canada, and received a further 440,000 t K<sub>2</sub>O from IMC Global's Esterhazy operation, under long-term reserve ownership agreement. In New Brunswick, the Sussex mine produced 490,000 t K<sub>2</sub>O in 2000 and the surface facilities at Cassidy Lake provided additional capacity for compaction of Saskatchewan potash. PCS operated its own Canadian facilities at a utilisation rate of 57%, compared with only 50% in 1999. Total potash production in 2000 was over 460,000 t K<sub>2</sub>O higher than in 1999.

IMC Global produces potash from its conventional operations, K-1 and K-2 near Esterhazy, and Colonsay near Saskatoon, and from the solution mine at Belle Plaine, Saskatchewan. The water inflow at K-2 remains under control. Capacity at Belle Plaine was increased to 2.4 Mt/y KCl during 2000, under the first phase of a programme that will ultimately take capacity to 2.9 Mt/y, when market conditions permit.

Agrium Inc. operates the Vanscoy mine near Saskatoon. Capacity, at 1.79 Mt/y KCl, is approximately 9% of total Canadian potash capacity.

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Canpotex Ltd, owned by PCS, IMC Global and Agrium, is the export agency for offshore exports of Saskatchewan potash. Canpotex achieved record sales for Saskatchewan producers, at 5.89 Mt KCl (3.6 Mt K<sub>2</sub>O).

In Carlsbad, New Mexico, IMC Global operates a conventional mine which produces both sylvinite and langbeinite ores and has a total capacity of 1.7 Mt/y product (potassium chloride and sulphate, and potassium magnesium sulphate). A solution mine at Hersey, Michigan, is operated on a small scale (160,000 t/y capacity). A solar evaporation facility based on the brines of the Great Salt Lake at Ogden, Utah, produced potassium sulphate and co-product magnesium chloride. At the end of 2000, IMC Global announced that the Ogden facility had been classified as a discontinued operation for accounting purposes. IMC continues to seek a purchaser for this and its salt business. The company's total potash production, in both Canada and the US, in 2000 was 8.4 Mt of product, an increase of 7% on the previous year.

Mississippi Chemical operates two conventional mines near Carlsbad. The company reported an increase in sales volume of 10% in 2000. Operations were affected by lower than anticipated ore grades which, however, the company hopes it has largely mined through. Capacity is just under 0.9 Mt/y KCl. In common with other major potash producers, Mississippi Chemical reported its focus on increased industrial products which account for some 18% of potash sales.

Reilly Industries Inc. produces potassium chloride near Wendover, Utah. Intrepid Oil & Gas operates a solution mine and solar evaporation facility near Moab, Utah, which produces both salt and potash.

The US Geological Survey estimates that 70% of US production is from New Mexico.

The major North American potash producers that also produce phosphate further extended their marketing reach through an agreement between PhosChem (owned by IMC Global, PCS and Mississippi Phosphate and representing them in export markets) and Apatit Fertilizer SA of Russia. The agreement, which follows that between Canpotex and Uralkali, enables PhosChem to market Apatit phosphate products in Asia, Africa and Latin America.

### South America

CVRD, operating at Sergipe, Brazil, is the largest potash producer in South America and has achieved output in the range 350,000 t/y K<sub>2</sub>O over the past three years. Sales in 2000 were 340,000 t K<sub>2</sub>O, down marginally from 1999.

SQM in Chile produced 279,000 t of potassium chloride and 152,000 t of potassium sulphate from the brines of the Salar de Atacama and also has primary potassium nitrate production based on caliche. Expansion of capacity to 650,000 t/y KCl was completed in 2000. At Yumbes, PCS produces secondary potassium nitrate based on natural sodium nitrate from caliche and imported potassium chloride from a new operation. Potassium nitrate production commenced in July 2000 and PCS sold output in the US, Spain and Mexico. Primary nitrate (sodium and potassium) production in Chile is approximately 916,200 t/y.

Atacama Minerals Corp. of Canada, has a project known as Aguas Blancas which it is developing with ACF Minera SA of Chile. Iodine will be the primary product and initial production took place in April 2001. The sodium sulphate and sodium nitrate resources of Aguas Blancas will be developed in the second phase of the project in which total nitrate production is planned at a rate of 100,000 t/y, including secondary potassium nitrate.

### Europe

Kali & Salz, with six mines in Germany, is among the largest potash producers worldwide and has a product range which includes magnesium and sulphate salts. K&S acquired French specialty fertiliser producer, Algoflash SA early in 2001, complementing the earlier purchase of Compo and Fertiva. K&S reports that it holds 13% of the world potash market. Deusa GmbH operates a solution-mining facility near Bleicherode, based on carnallite, which produces both potassium chloride and magnesium chloride.

Cleveland Potash Ltd., owned by Anglo American plc, operates the Boulby mine near Billingham, northeast England. The company reportedly operated normally in 2000 following the significant water inflow experienced in 1999.

Potash production in France by Société Commercial des Potasses et de l'Azote continues to decline, as planned, due to exhaustion of economic reserves. Production will have ceased by 2004.

Iberpotash in Spain, now controlled by Dead Sea Works of Israel, has two mines in Catalonia. DSW intends to expand output in Spain to 1 Mt/y KCl.

### Middle East and Asia

The principal potash producers are located in Israel and Jordan where the brines of the Dead Sea are evaporated in solar ponds to recover carnallite which is then processed to produce potassium chloride. The majority of output is exported to a wide range of international markets. Both Arab Potash Co. (APC) in Jordan and Dead Sea Works Ltd. (DSW) in Israel recover or plan to recover associated magnesium, bromine and other values.

APC plans to increase production capacity to 2.4 Mt/y KCl (approximately 1.5 Mt/y  $K_2O$ ) by 2004. Production in 2000 was just under 1.2 Mt  $K_2O$ . DSW reported output from both Israel and Spain in 1999. It is estimated that

production in Israel was just over 1.7 Mt  $K_2O$  in 2000. Marketing of DSW's potash products will be combined with the activities of integrated phosphate producer, Rotem Amfert Negev.

Capacity of the Qinghai Salt Lake Industrial Corp. is 600,000 t/y KCl, based on the brines of the Cha'erhan salt lake near Golmud in western China. Production in 2000 was approximately 560,000 t KCl.

The Qinghai project in western China appears to be proceeding, although with a capacity of 300,000 t/y KCl, compared with the originally planned 1 Mt/y. Completion is anticipated within three years. Qinghai Salt Lake Industrial Corp. will proceed with the project without foreign participation. Previously, Dead Sea Works of Israel was to have been a joint venture partner in the project. The first, 300,000 t/y phase of the project will be funded by the Industrial and Commercial Bank of China.

### Commonwealth of Independent States (CIS)

There are three major potash production centres in the CIS, one in Belarus and two in Russia. Minor production takes place in Ukraine. The Belaruskali Production Association is the largest individual producer with output estimated at about 3.4 Mt  $K_2O$  in 2000, down from 3.6 Mt  $K_2O$  in 1999. In Russia, JSC Uralkali and JSC Sylvinit had combined output of 3.68 Mt  $K_2O$ , compared with just over 4 Mt  $K_2O$  in 1999. Russia achieved reported exports of 4.62 Mt KCl, down by 0.8 Mt on 1999.

International Potash Co. (IPC) continues to export on behalf of JSC Sylvinit and Belaruskali. Uralkali's marketing agreement with Canpotex was finalised early in 2001 whereby Canpotex will market the Russian producer's potash outside North America and Europe. Generally, Uralkali exports some 2 Mt/y KCl, compared with Canpotex' more than 5 Mt/y.



JSC Uralkali announced construction of a new export terminal at the port of St Petersburg. Ultimate capacity will be 5 Mt/y, with the first 2 Mt/y being available by the end of 2001. Uralkali had previously agreed to participate in a terminal at Ventspils, Latvia, with IPC which handled the export sales of all CIS producers.

### Market Conditions

International potash trade is estimated at just over 21 Mt K<sub>2</sub>O in 2000, up by over 1 Mt K<sub>2</sub>O on the previous year, and higher than any year since 1990. Canada accounted for about 40% of international trade and Russia and Belarus, together, for just under 30%. Germany, Israel and Jordan are the remaining major export suppliers. Imports to Brazil increased by over 1 Mt KCl, and were particularly strong in the second half of the year. Net imports of potassium chloride to China were up by more than 1 Mt, also, reaching 5.4 Mt in 2000. Demand in India, however, was lower than anticipated in the second half of the year. The subsidy rate for imported potash to India in the first quarter of 2001 remains unchanged.

In February 2001, Canpotex concluded an agreement for the delivery of 1.2 Mt KCl to the China National Agricultural Means of Production Group Corp. (CNAMPGC) by August, 2001. Both volume and price are the same as agreed with CNAMPGC for 2000. Generally, however, the major suppliers anticipate a modest softening of import requirements by China, tempered by improved conditions in Brazil. Thus, international trade may be slightly lower than in 2000, but still above 1999. PCS has announced longer shutdowns at its potash mining operations during the first quarter of 2001 compared with the same period last year, an indication that it anticipates lower offtake, at least in the first half of the year.

In mid-2000, fixed duties were imposed on potassium chloride originating from Belarus, Russia and Ukraine by the European Commission. There is no longer a minimum

price provision in addition to the duty which, for standard grade material containing 40-62% K<sub>2</sub>O, is €29.51 to €29.65.

Spot prices reported by Fertecon in December, 2000, were US\$110-129/t KCl for standard grade, fob Vancouver, unchanged since the middle of the year. Prices at Vancouver provide a recognised benchmark for international trade. Prices for standard grade material originating from the CIS, fob Baltic and Black Sea ports, are lower by some US\$20/t KCl, according to Fertecon.

### Supply-Demand Outlook

Total installed potash production capacity exceeds current demand. The majority of this excess capacity is owned by PCS where, in 2000, it operated at an average 57% utilisation rate. PCS estimates that it owns 52% of the world's excess potash capacity and is able to make this capacity available to meet future market demand. Producers in Belarus and Russia also have significant unused capacity, although not all of this could be reactivated easily and over a short time frame. In 2000, most other producers operated at relatively high rates of capacity utilisation.

Global potash demand for fertiliser use is estimated to be growing at some 0.7 Mt/y K<sub>2</sub>O, an average annual rate of approximately 2-3%.

New projects that may be developed to meet future potash demand include Somboon and Bamnet Narong in Thailand, Potasio Río Colorado in Argentina and Qinghai in China.

Among these, Bamnet Narong is the most advanced in that test mine stopes in carnallite have already been completed. Capacity is planned at 1.0 Mt/y KCl. The operator is ASEAN Potash Mining Co. Ltd (APMC) in which the Thai Government is the largest shareholder. Early in 2001, APMC invited expressions of interest from potential strategic investors for joint development of the Bamnet Narong project. The US\$350

million loan from Japan's Overseas Economic Cooperation Fund could not be guaranteed by the Thai Government, thus precipitating the effort to bring in new strategic investors.

Also in Thailand, Asia Pacific Potash Corp., is the operator of the 2 Mt/y KCl Somboon project, based on sylvinite resources sufficient to maintain operations for a minimum of 23 years and located near the city of Udon Thani. The project Environmental Impact Assessment was accepted by the responsible authorities in mid-2000. In November 2000, Asia Pacific received its Promotion Certificate from the Thai Board of Investment which confers certain rights and tax incentives for the project. In March 2001, Asia Pacific announced that Norsk Hydro, which had been expected to take a 20% equity position in the joint venture to develop the project, would place on hold its financial and managerial participation. Final applications for mining permits and public participation programmes are continuing, as are discussions with potential engineering, procurement and construction contractors. Asia Pacific reported that it would continue its discussions with Norsk Hydro and other potential equity investors. Asia Pacific also holds a 100% interest in the Udon deposit, located just to the north of Somboon.

The Potasio Río Colorado project in Argentina is to be developed through a joint venture with Indian Farmers Fertiliser Cooperative and Indian Potash Ltd. Capacity is stated to be 750,000 t/y KCl at a capital cost of US\$130 million.

In addition to the Qinghai project in China, it was reported that Lop Nor Sylvite Co. Ltd had been founded in order to develop the resources of Lop Nur, a large dry saltflat in the Tarim Basin, Xingjiang. Potassium sulphate and nitrate are among the products

with projected output at 200,000 t/y sulphate and 30,000 t/y nitrate.

The Russell project in Manitoba, Canada, owned by Manitoba Potash Corp., a joint venture between the provincial government and Entreprise Minière et Chimique of France, remains on hold.

Australian junior company, Admiralty Resources, announced that it had acquired certain rights to the Salar de Rincón in northwest Argentina, close to the border with Chile and within 100 km of the Salar de Atacama. Potassium salts are among those potentially extractable from the salar. In Bolivia, the government hopes to attract investors to develop the Salar de Uyuni through tax incentives. Like other salars in this region, Uyuni contains lithium, magnesium and boron values, in addition to potassium.

<b>World Potash Production ('000 t K<sub>2</sub>O)</b>			
	<b>1998</b>	<b>1999</b>	<b>2000<sup>e</sup></b>
Belarus	3,451	3,600	3,400
Brazil	326	348	370
Canada	9,195	8,230	9,175
Chile	280	300	320
China	300	300	300
France	417	310	300
Germany	3,582	3,545	3,500
Israel	1,668	1,700	1,700
Jordan	1,079	1,080	1,180
Russia	3,461	4,050	3,680
Spain	497	550	550
UK	608	495	600
US	1,365	1,300	1,200
<b>Total</b>	<b>26,229</b>	<b>25,808</b>	<b>26,275</b>

<sup>e</sup>: Estimated.

Sources: UN Food and Agriculture Organisation, Fertecon, US Geological Survey.