

SALT

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Common salt (sodium chloride) is not only essential to human life but also one of the major and most basic of raw materials for the world's chemical industry. It occurs as the mineral halite in the form of rock salt, which can be mined by either conventional underground methods or by solution-mining techniques. Large amounts of salt are also produced by solar evaporation of seawater or salt lake brines. Because of its solubility, it is rare for there to be surface deposits amenable to open-pit mining operations but these do exist in desert areas. Salt can also be produced as a by-product of potash mining operations. Although a low-cost product, trade in salt can be extensive, especially where there are large coastal operations that can be served by bulk, ocean-going ships, most notably with shipments from East coast Canada to the US, Mexico to the Pacific Rim, and Australia to the Pacific Rim.

Consumption patterns for salt can vary significantly from region to region. For example, de-icing salt consumption in the US was the second largest use accounting for about 34% of demand – about 17 Mt in 2002. However, on a worldwide basis the percentage used in de-icing is considerably smaller with estimates ranging from as low as 8% of demand up to 15%. The difference in estimates can often be explained by the fact that consumption in de-icing varies considerably from year to year depending on the severity of the winter. In some countries consumption in this sector in a severe winter can be as much as four times that in a mild winter.

A source at the US Geological Survey (USGS) noted that climate influences such as El Niño generally result in a drop in salt consumption because winters tend to be milder, but 2002/2003 winter seems to have been an exception in the US as de-icing salt consumption has increased despite early predictions of milder weather because of the El Niño effect. The chloralkali industry is the largest user of all with 41% of US demand into the chemical industry, the vast majority of which was for chloralkalis. The pattern is slightly different in other parts of the world, with similar amounts used in chloralkalis but a further 16% used in the manufacture of soda ash in the Solvay process, which is no longer used in the US as all the soda ash is produced from naturally occurring deposits.

Figures listed in the USGS table of world salt production indicate that output remained stable at 225 Mt in 2002, although the 2001 figures had been revised upwards from 214 Mt. Most revisions were relatively small, although Australian production was increased by 1.5 Mt, Brazilian by 1 Mt and Chinese production reduced by 1 Mt. However the 'All Other' category was increased by 13.2 Mt most likely reflecting the availability of better production figures rather than an actual volume increase. Although there are a large number of producing countries and many small operations for which it can be difficult to

obtain accurate estimates of production, the majority of output comes from large-scale operations, and a few large companies tend to dominate the markets, especially for chemical and de-icing applications.

North America

The US is the largest producer of salt with total production of 43.9 Mt in 2002. Imports were estimated to be a further 10 Mt with exports amounting to 1 Mt giving apparent consumption of 52.9 Mt or about 22% of total world demand. More recent figures indicate the preliminary estimates of imports may have been understated and that apparent consumption may be even higher. The preliminary consumption figures represent the lowest consumption since 1998 after a peak in 2001, a year in which reduced production was more than compensated for by increased imports. There was an increase in consumption of de-icing salt with predictions of a mild winter because of the El Niño effect not materialising.

However, there has been a continuing decline in the use of salt in chemical manufacture and specifically in chloralkalis that consume virtually all but a few percent of the salt used in the US chemical industry. Apart from the general economic situation, factors such as the move towards oxygenated bleaching of paper pulp continue to reduce long term demand for chlorine. Demand for salt from this sector may have declined by as much as 2-3 Mt in the past few years.

Canadian consumption of salt is the highest *per capita* in the world owing to a relatively small population for such a large land mass, and severe winters requiring large quantities of de-icing salt. Consumption can be quite variable depending on the severity of the winter. While the USGS reported production of 13 Mt, National Resources Canada (NRC) only reported 12.3 Mt production for 2002.

This was a decline of 1.3 Mt from the figures reported by NRC for 2001 but still higher than the amount reported for 2000. While there has been a significant loss of consumption following the closure of the last North American Solvay soda ash plant in 2001 the largest influence on consumption is de-icing salt, with chemicals still important but a smaller percentage of consumption. Canada is also the source of the largest volume of salt imported to the US, largely from the Maritime Provinces where there are large operations near deep-water ports.

Mexico is another significant source of imported salt for the US. Production is estimated by the USGS to have fallen in 2002 by 200,000 t to 8.7 Mt. Production is dominated by the Exportadora de Sal solar-salt operation in Baja California, which produces more than 7 Mt/y. This is mainly aimed at export markets to the chemical industry in Asia and the US. Exports to the US are particularly to the chemical industry in western US; and the chloralkalis industry in northwest US has suffered from the reduction in demand for chlorine in paper pulp bleaching. Other producers in Mexico tend to supply the local chemical and food markets, with little need in the country for de-icing salt.

Europe

There was very little change in the Western European salt industry during 2002. Production was similar to that of 2001 and consumption patterns did not change significantly. Production levels for Europe as a whole are estimated to have been around 40-41 Mt in 2002. Consumption in the chemicals industry, including both chloralkalis and soda ash, is estimated to have remained steady. The change from chlorine to oxygen bleaching of paper in Europe happened several years ago and its effect on the salt and chloralkalis consumption is now largely complete. The consumption in road de-icing, as always, is very variable from a low of 2 Mt up to 6 Mt/y. Last year was looked on as an average year, with sales probably in the middle of the range. Production in the Netherlands and Belgium is not listed separately, although it is estimated that production in the Netherlands is of the order of 5 Mt/y. Belgian production is also large, with considerable quantities used directly by Solvay in its soda-ash production.

Akzo has announced that its salt plant at Stade in Germany is to close in July 2003. However, this is an internal restructuring by Akzo and production will be increased at its Dutch plant at Hengelo and its Danish plant at Mariager. Essentially, the Stade plant is being closed as the other two plants are considered lower-cost producers, with energy costs specifically cited as being important.

The EU will have a number of new members joining in the next few years. Of the first group of these, Poland, with production of about 4.3 Mt/y is by far the largest producer of salt. Elsewhere in Eastern Europe production is relatively modest. Production in Turkey, which is also applying for EU membership, is also significant.

In the countries of the Former Soviet Union, it is estimated that Russian production in 2002 rose to 3 Mt from 2.8 Mt (a figure revised down from the original estimate of 3 Mt) and Ukrainian production rose to 2.4 Mt. These figures seem rather low, especially for a country the size of Russia. With its severe winters, it might be expected that the consumption of de-icing salt would be much more than the current production. It should be noted that salt production in Russia is significantly below historical levels.

Asia Pacific

The largest producer in this region is China with production estimated to have risen to 35 Mt, although it should be noted that production figures from China are commonly subject to considerable revisions as information becomes available. China in general is a booming economy. As such, its consumption of raw materials has been increasing rapidly. The next largest producer in Asia is India with estimated production of 14.8 Mt, an increase of 300,000 t over the previous year. Australian production is mainly from the operations of Dampier Salt, the majority owner being Rio Tinto, with the remainder owned by the Japanese companies, Marubeni, Nissho Iwai and Itochu. Total Australian production is estimated to have been 10 Mt in 2002 compared with 9.5 Mt in 2001, the figure for 2001 having been revised upwards by the USGS from only 8 Mt. Of the 2002 total, 7.19 Mt was produced by Dampier, with the

rest from a number of other operations. Dampier's production has risen substantially from 4.6 Mt in 2000 following the acquisition of the 3 Mt/y capacity Port Hedland operation from Cargill in 2001. Dampier reported that demand for salt in its main markets in Southeast Asia were flat throughout the year, particularly in Japan. However, the company's efforts to diversify markets resulted in several shipments being made to China, its first substantial sales into this market, which is seen as a major potential area of growth.

There is considerable production of salt throughout the Asia Pacific region, generally on a smaller scale, but in aggregate large, and this is the largest producing and consuming region in the world. The chemical industry is the leading market but a large proportion is for human consumption in this most populous region of the world. Total consumption is estimated to be of the order of 60 Mt.

Rest of the world

Brazil is the only country in the rest of the world that makes the list of the largest producers. Production for 2002 has been estimated as 7 Mt. However, estimated production of 7 Mt for 2001 was revised downwards to 6 Mt the same as in 2000. Chile is another country in Latin America with significant production, much of it as by-product or co-product from salars from which lithium, potash and iodine are recovered. Apart from local and regional consumption, Chile has been a significant exporter of salt to the US in recent years. Argentina is the other large producer in the region but, with its current economic problems, it is believed that production has fallen.

In Africa, production is largely for human consumption, with some exceptions in South Africa and in certain North African countries that are more industrialised. There are a large number of sometimes very small operations in Africa, which in aggregate produce several millions of tonnes annually, but it is difficult to obtain precise estimates of total production.

Corporate activity

After some consolidation of the industry in recent years, there was little activity during 2002. In California, Cargill Salt has finalised the sale of 16,500 acres (6,677 ha) of its saltworks along San Francisco Bay, which will be turned into wetlands. The State of California, private foundations and the US Federal Government have all contributed to the cost. Cargill will continue to produce salt from its remaining ponds to supply its Newark processing facility.

Outlook

The outlook for the salt industry and many other industry sectors is perhaps more uncertain than usual. The unpredictability of the de-icing market was typified by the situation in the US, with a severe winter despite predictions to the contrary, and suppliers having to work hard to keep up with demand. There are continuing objections to the use of salt on roads by environmental groups, but no viable large-scale alternative has so far proved to be acceptable.

The chloralkalis industry demand can be described as flat at best and probably declining in North America. The one bright spot would seem to be the rapidly growing Chinese economy, although the outbreak of the SARS virus is being viewed as a potential threat to economic growth, especially in Asia. In the long term, there are further environmental threats to the chloralkalis industry that may result in a reduction in salt consumption, although on a worldwide basis there is probably still room for some growth. There is also continuing pressure from various governments and health authorities for a reduction in the intake of salt by humans. The pressure is increasing in countries such as the UK and France, although there are counter-arguments from the salt industry and industry associations.

Production (Mt)

Country	2001	2002
US	44.8	43.9
China	31.0	35.0
Germany	15.7	15.7
India	14.5	14.8
Canada	12.5	13.0
Australia	9.5	10.0
Mexico	8.9	8.7
France	7.0	7.1
Brazil	6.0	7.0
UK	5.8	5.8
Poland	4.2	4.3
Italy	3.6	3.6
Spain	3.2	3.2
Russia	2.8	3.0
Ukraine	2.3	2.4
All other	53.2	48.0
Total	225	225