

The Development of the Salt Market in Western Europe

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ABSTRACT

The paper is a survey of the development of the West European salt market. Production and consumption in the various countries are presented statistically and an attempt is made to underline the trends in various areas of use.

INTRODUCTION

Sodium chloride plays an important role in the world today and deserves, more than ever, to be called by the name that it is often given, "the fifth natural element". The best evidence of this is the development of world salt production since the beginning of this century (Table 1).

TABLE 1

Estimated World Salt Production (In Million Metric Tons)

	1900	1925	1950	1960	1970	1975
Estimated world total	10	24	49	85	145	160

The extraordinary rate of growth of the chemical industry is the chief reason for this trend. In fact, it is estimated that at present 65% of the world salt tonnage is used for manufacturing sodium carbonate, chlorine, caustic soda and sodium sulphate. The sodium alkali, chlorine and chlorine derivatives industries alone account for 60% of world sodium chloride consumption.

At the beginning of the century, chlorine production was still one tenth that of sodium alkali. Between 1900 and 1925, the two products advanced at the same rate. However, since 1925, the rate of growth in chlorine has exceeded that of sodium alkali; this tendency became even more marked after the second World War during the boom in plastics derived from chlorine.

Yet in recent years, there has been a distinct slackening in the growth rate of salt consumption in the chemical industry for several reasons. The exploitation of "trona" deposits has resulted in a decline in the production of synthetic sodium carbonate from sodium chloride. Since the oil crisis of 1974, the growth rate of plastics derived from chlorine has slackened significantly, and with respect to the

sodium sulphate industry, the present trend is, if anything, towards stagnation.

Another market sector which has also opened up some sizeable outlets to the salt industry is the deicing sector. This use which has been known for a long time, made no real progress until after the second World War: the rapid growth in the number of cars and the necessity to ensure normal traffic flow in winter conditions were the main reasons for this development. De-icing currently represents 10-12% of world salt outlets, at least in years when weather conditions so dictate. By its very nature, this market sector is subject to fluctuations and irregularities, and is largely determined by geographical location.

Still more recent is the use of salt as an ion-exchange resin regenerator in water softening processes. This market has already become important in North America and Europe.

Most of the other uses of salt, on the other hand, have not developed appreciably since the beginning of the century and some have even declined relatively. The most notable of these is salt for human consumption which has remained more or less stable, despite the increase in population. From the preceding comments the present distribution of the world salt market can be estimated, as shown in Table 2.

TABLE 2

Distribution of the World Salt Market
(As a Percentage of Total Production)

Uses	Relative Share (In %)
Basic chemical industry	65%
Other ind's and water softening	12%
Snow clearing	12%
Human, agricultural & animal consumption	11%
	100%

THE POSITION OF THE SALT INDUSTRY IN WESTERN EUROPE

Production. Western Europe has a very old salt-producing tradition. Significant deposits of rock salt lie concealed in the substrata and the climate of the southern coastal regions is suitable for saline exploitation. Throughout its history, much evidence can be found to support the long tradition and dynamism of its salt industry. Until the beginning of the century, salt production in Western Europe was divided amongst a large number of works, often modest in size. But, with the emergence of the enormous requirements from the European chemical industry, large companies gradually formed and the map of production establishments was completely reshaped, as production began on an intensive scale. Whereas around 1920 when there were still more than 150 firms producing or processing salt, there are now less than 25, which are mostly very large.

In 1960, total salt production in Western Europe was about 20 million tons. This has expanded at an average rate of 5.8% per year up to the beginning of the 70's. Its subsequent production has simultaneously felt the effects of a decline in the demand for salt for snow clearing as a result of 5 mild winters in succession (from the end of 1971 to the beginning of 1975) and the distinct drop in chlorine production and its derivatives following the oil crisis at the end of 1973. In 1976, total production in Western Europe rose to about 41 million tons and its present rate of growth has fallen to about 2.5 to 3% per year. This corresponds to roughly 25% of total world production.

In comparison with these figures, it should be noted that the installed production capacity is approximately 52 million tons a year. Thus, from now on, Western Europe will have at its disposal sufficient capacity to meet simultaneously the expected growth in the requirements for its chemical industry and the extreme and severe fluctuations in the de-icing sector.

As already mentioned, the countries of Western Europe situated on the fringe of the southern coasts of the continent (France, Italy, Spain, Turkey, Portugal) enjoy climatic conditions that are favorable to the installation of large-capacity salinas. Furthermore, in Spain, a solar evaporation plant of greater than 1 million tons a year unit capacity is supplied not only with seawater, but also with highly concentrated brine from boreholes. This relatively recent technique allows for higher yields for the same evaporation surface.

In addition virtually all the countries of Western Europe exploit vast deposits of fossil rock salt by the classic method of mining or by sinking boreholes. The brines extracted from these deposits are used directly in their natural state by the chemical industry, or subjected to an evaporation process which produces refined salts. The open-pan evaporation technique has practically disappeared from the

European continent, whereas vacuum installations have developed significantly.

The Federal Republic of Germany, UK, Italy and France are working highly mechanized rock salt mines. Several are reaching a very high unit capacity, up to 4 million metric tons a year in Germany, while in the Netherlands, production of crystal salt has been centered exclusively on vacuum salt with the installation of two saltworks with a unit capacity of over 2 million tons a year. The Federal Republic of Germany, UK, France, Italy, Switzerland, Belgium, Denmark, Spain and Austria have large vacuum plants at their disposal which are sufficient to meet the requirements of their respective evaporated salt markets and generally having sufficient capacity for export.

TABLE 3

Production Capacity in Western Europe
(In Million Metric Tons)

Type	Installed Capacity
Rock salt	16
Evaporated salt	12
Solar salt	6
Brine (non evaporated)	18
	52

As one can see, the salt industry in Western Europe utilizes simultaneously all classic methods of salt production and is in a position to supply a wide range of grades according to demand. On the other hand, it is worth noting that several European brine producers have well-developed controlled dissolution methods which makes it possible for them to create strategic stock cavities for gas and oil storage. In Germany, an old unworked rock salt mine is also being used for stocking nuclear waste.

SALT MARKETS IN WESTERN EUROPE

Overall opportunities in large-scale industry. The needs of the chemical industry form by far the most important outlet for the European salt industry. In the production of sodium alkalis and chlorine alone, total consumption in Western Europe has developed as shown in Table 4.

TABLE 4

Salt Consumption in the Chemical Industry in Western Europe

Year	Salt Consumption for the Production of $\text{Na}_2\text{CO}_3, \text{Cl}_2$ & Na_2SO_4 (In Million Metric Tons)
1960	11.3
1965	15.6
1970	22.1
1976	27.2

TABLE 5
Outlets for the Salt Industry in Western Europe (In Million Metric Tons)

	1960		1965		1970		1976	
		%		%		%		%
Chemical industry	11.3	57	15.6	60	22.1	62	27.2	69
Nutritional & domestic uses	2.8	14	2.9	11	3.0	9	3.2	8
De-icing	0.4	2	2.0	8	4.8	14	3.2	8
Miscellaneous & export	5.2	27	5.3	21	5.5	15	6.0	15
	19.7	100	25.8	100	35.4	100	39.6	100
Average rate of growth: % p.a.	5.6%		6.5%		1.9%			

Supplies to soda works generally come from brine borings. In the case of the electrolytic chlorine and caustic soda industry there has been a relative decline in the use of solid salt feedstocks for about the past ten years, as a result of the development of electrolytic techniques using cells equipped with a diaphragm which can be fed directly with brine from boreholes.

The caustic soda being supplied by these cells is concentrated by an evaporation process which results in the inevitable production of crystal salt, which in turn is used to feed mercury cells close by.

The chlorine industry in Europe is not yet using on an industrial scale the membrane cell process which uses crystal salt, but there has been nothing to prevent the latter from appearing in its turn on the market. Consequently, the European salt industry is, from the present moment, in a position to meet any development in either direction without having to resort to new sources of production.

Deicing salt. The use of salt for clearing snow from the roads actually increased in Europe after 1960 with the emergence of "bare pavements" techniques. The growth in the number of cars on the roads and the well-known inefficiency of treating roads with abrasives brought about a complete reappraisal of the old road deicing methods. The "bare pavement" techniques effectively began in the UK. The other countries followed almost immediately.

In 1960, deicing salt consumption in Western Europe was still at a level of about 400,000 tons. The figures for 1976 showed approximately 3.3 million tons, after experiencing significant fluctuations owing essentially to a succession of several mild winters. During a prolonged winter season, the potential amount of salt used for deicing is currently about 6 million metric tons a year (Table 5). As it is sometimes difficult to supply instantly a highly increased demand, the administrative services in charge of roads and highways' winter maintenance would be well inspired if they endeavored to develop the storage of deicing and snow clearing salt in the areas of utilization before winter.

The Scandinavian countries are not, as one might expect, the largest consumers of salt for deicing; the size of their

road networks and the low traffic density over the greater part of their country restrict the general spread of deicing in these areas.

Food grade salt and salt for domestic purposes. In the course of recent years total consumption of this type of salt has made very little progress in Western Europe. The total outlets in this market sector have in fact risen from 2.8 million tons in 1960 to some 3 million tons currently, although the population has increased by 16.4% over the same period (Table 5). Again, it should be noted that present figures include a considerable proportion of salt used for "domestic deicing" (e.g. pavements, private accesses) and for regenerating ion-exchange resins in domestic water softening systems. In both instances the tonnage in the 60's were very low, but have been substantially developed during the past fifteen years.

The market for table and kitchen salt in small packs has shown the greatest decline in terms of relative value, particularly in heavily industrialized areas. Today, if compared to the level reached in 1940, consumption per capita of these two types of salt has declined by nearly 33%.

General uses and export. Sodium chloride is sometimes called the "product with 10,000 uses". It is therefore difficult to provide an accurate statistical breakdown regarding outlets for sodium chloride. Nevertheless, one can see that the market for most of these uses of salt is static or in slight decline (Table 5). The present statistics available to us do not distinguish clearly between the amount of salt actually used for deicing and the increasing amount used for water softening. At most we can say that the tonnages of salt involved in a wide variety of uses, and the tonnages of salt intended for export outside Western Europe amounted to approximately 5.2 million tons in 1960 and approximately 6 million tons in 1976.

FUTURE OUTLOOK FOR EUROPEAN SALT INDUSTRY

One can deduce from the above observations that the salt industry in Western Europe was prepared for a significant development in the demands of traditional markets for sodium chloride (Table 5). Unfortunately, events proved

this optimism to be unfounded, particularly since the beginning of the oil crisis which dealt a severe blow to the chemical industry, the industry's principal customer.

In the deicing sector, the salt producers in Western Europe had also sanctioned sizeable investments, especially on the logistics side, so as to be able to meet consumption peaks. A succession of five mild winters has put the profitability of these investments in a precarious position. Developments in the winter of 77/78 fortunately interrupted a series which was causing anxiety.

We have seen how the nutritional salt sector is tending towards stagnation, and in fact towards a relative decline.

The European salt producers intend to consider the arguments presently against them in their true perspective.

Apart from the water-softening sector, miscellaneous uses of salt are quite stable, but regenerating salts for ion-exchange resins should still be open to considerable development.

In a relatively depressed market, the salt industry in Western Europe holds at its disposal a production capacity that is not only sufficient but in excess. It is therefore able to satisfy through its own means in a fair international competitive market, an ever increasing demand in every branch of its activity.