

# THE DEVELOPMENT STATUS AND TRENDS OF CHINESE SALT MAKING INDUSTRY

Zhi FAN

**Abstract:** This paper summarizes the current status of Chinese salt industry. It also discusses the problems of salt industry in China and the development trends of this industry.

**Key words:** Development status of salt industry, trends

## 1 The development status of Chinese salt industry

Salt is an important commodity related with the national economy and the people's livelihood. Industrial salt is the main raw material for chemical industry; table salt is a necessity for people's survival and development. The salt industry in China has been the implementation of program management since establishment of state. It has begun to implement monopolizing policy since 1994. The industrial salt market was opened in 1995.

China has very rich salt resources. The distribution of salt is wide. 23 provinces distribute the sea salt, lake salt and rock salt resources. China has very rich sea salt resources. The coastline of China is long, 18,000 kilometers in length. The tidal flats of salt beach cover an area of 2900 square kilometer. These tidal flats have the advantages of taking seawater and solar sea salt. Ocean water salinity is generally 30‰-35‰. According to the shoreline type and weather conditions, salt field can be broadly divided into northern and southern sea salt district. North of the mainland coast of Hangzhou Bay is basically a "muddy coastal-based," these

coast is plain coast. Some big and medium salt fields are located in northern sea salt fields, including Liaoning, Tianjin, Hebei, Shandong, Jiangsu salt fields. It is dry in these areas, the annual evaporation is higher than precipitation. It is ideal place to solar salt. These areas are the main sea salt producing areas in China. South sea salt areas in south of Hangzhou Bay include Zhejiang, Fujian, Guangdong, Guangxi, Hainan and Taiwan provinces, the coastal type is "rock based coast" and "bio-coast." The average temperature is higher than the south, the evaporation is higher than the precipitation annually, and the precipitation is also large. It usually uses the continuous sunny day to produce salt. It is distributed the salt lake rock bed in northwest. Lake rock beds are mainly distributed in Qinghai, Xinjiang, Tibet and Inner Mongolia. Shaanxi, Gansu, Ningxia, Shanxi, Kyrgyzstan and other provinces are also small distribution of salt lake. According to the salt lake investigation, there are 91 salt lakes of area of one square kilometers, NaCl reserve is about 51.5 billion tons. The basic NaCl reserve of NaCl is about 439.3 billion tons. Large and huge salt lakes are distributed in Qaidam Basin in Qinghai. It is only a small number of large, extra large salt lake rock salt deposits in Xinjiang, most of them are small

and medium-sized rock salt deposit. Tibet, Inner Mongolia and other provinces, are all small and medium-sized rock salt deposit. The earliest development of salt lake rock deposits was Yuncheng Salt Lake in Shanxi, it has 5000 or 6000 years history. Some of the salt lake rock deposits have been developed and produced salt. Some commensal minerals have also been developed, such as potassium salt, Glauber's salt, trona, borate and lithium carbonate. Rock salt is widely distributed in China. 21 provinces have been found ancient rock salt minerals, including Shaanxi, Sichuan, Xinjiang, Hubei, Henan, Jiangsu, Qinghai, Shandong, Yunnan, Jiangxi, Hunan, Chongqing, Hebei, Anhui, Guangdong, Ningxia, Gansu, Tibet, Zhejiang, Shanxi, and Inner Mongolia. It is estimated that NaCl resources have 146000 trillion tons, the basic NaCl proven reserve is 57 billion tons. The salt resources/reserves are more than 10 billion tons in above 11 provinces (regions), accounting 99.9% total national output.

Since the new century, China achieved rapid development of industrial salt production at an average annual growth rate of about 8%. Salt production in China in 2005 exceeded 50 million tons, becoming the first salt production in the world. The salt production was more than 60 million tons in 2007. The production was almost the same in 2008 with in 2007 because of the international financial crisis. The reason why China's salt industry achieved rapid development was mainly due to the rapid development of Chinese economy and China's rapid development of heavy chemical industry. From 2000 to the first half of 2008, China's economic remained at nearly 10 percent growth rate, which led the rapid development of the basic chemical field. Two alkali productions grew at the rate of more than 11%, PVC compound annual growth rate of more than 20%. Downstream of the rapid development of salt industry has greatly boosted the consumption of salt, the two alkali industry to the needs of salt every year to maintain the growth rate of more than 10%. Rapid consumer demand and weather factors had made the situation had been unable to meet

the demand from half of 2004 to the first half of 2005. Since the second half of 2008, China's economy was facing great difficulties by the international financial crisis. Great impact has been met by the two alkali industries. It is estimate that it will be a low level development of Chinese salt industry in 2009 and 2010. The salt industry will again find the new opportunity with the rebound of Chinese economy.

According to the different resources, Chinese salt industry can be divided into sea salt, lake salt and well mineral salt. Sea salt is the dominating type in Chinese salt production. With the economic development of the continuous occupation of an area of sea beach, with the exception of Shandong Province (sea salt is mainly from underground salt brine in Shandong), the other areas sea salt is shrinking. The proportion of sea salt production is steady declined. In contrast with the development trend of sea salt is the well mineral salt. The development of the well mineral salt in China gained rapid progress. The well mineral salt advanced rapidly after the vacuum salt making equipments in large scale. The production of well mineral salt developed from less than 10 million tons in 2002 to 30 million tons in 2008. The ratio of sea salt, well salt and lake salt is 46%: 45%: 9% at present. The use of salt in China is mainly in the two alkali industry. The salt consumption of two-alkali industry is about 50 million tons, accounting for about 80 percent of all consumption. The table salt consumption is about 8.3 million tons, accounting for the 13% entire consumption, and the other salt is about 7%.

The rapid development of salt industry has brought the improvement of salt making technology and equipments. Sea salt area created the plastic film covering crystalline pool technology to improve the yield and the ability to withstand natural disasters. A number of large enterprises introduced and digested the foreign advanced technology and equipment in well mineral salt districts. The production of new projects is all 600 thousand tons after Jintan Company introduced the vacuum salt making equipment of 600 thousand tons/year



capacity. These brought revolutionary effect to the Chinese well mineral salt. The large and medium scale enterprise adopted joint salt mining machine and salt mining ship to substitute manual operation and to improved production efficiency. Nearly 50 specific fruits have been made though "eighth five-year plan" and "ninth five-year plan" key projects. The resource of utilization has been carried out by "chemical brine", "salt field biological" work. The salt industry utilized the resource advantage of brine, tidal flat and salt field to adjust the industry structure since seventh five-year plan. Chemical brine made great progress. The industry structure was set up with bittern as the raw material to produce, R&D and development. At the same time, salt chemical products were produced though symbiosis and concomitance minerals. The product pattern was formed by potassium chloride, bromide, magnesium chloride, mirabilite and its deep processing products. The biology resources of salt field and salt lake are utilized and developed gradually with the further understanding of salt field biology. The biology formed developed capacity includes single-cell algae, rotifers, artemia (egg) and so on. The study of *dunaliella* is strengthened, some remarkable fruits were achieved in *dunaliella* culture, extraction carotene and other active substances from *Dunaliella*, the development of relative health food, etc..

## 2 The facing problems of Chinese Salt Industry

Chinese Salt Industry has received great achievements through these years' developments, and has become the world's first salt country. Salt production can meet the requirement of table salt need and industrial need. However, the overall level is still low; we cannot say we are powerful salt country. These problems are:

(1) Organization structure is irrational. There are more than 400 salt enterprises. The production capacity of 90% enterprises or above just has 50 thousand tons. The industrial concentration is low. The overall status is the

existence of many, small, scattered, weak, chaotic state. Many small enterprises wasted a lot of resources, had poor management level, backward technology, poor product quality, low economic efficiency, resulting the low overall quality and competition.

(2) The irrational industrial structure, the comprehensive utilization of salt resources is low. At present, salt making is the predominant in Chinese salt industry. The resources utilization efficiency is low. The depth and width of salt industrial development are not enough, including the integration of salt and alkaline, brine chemical industry, aquaculture, and salt field biology. The waste of resources associated with mining is serious. The recycling economy is not established, and the formation of industrial group is not strong.

(3) Irrational product structure, less variety and do not form a product chain, and low added value. Although the development of dozens of health care, and more varieties of salt seasoning series in recent years, the yield is no more than 100 thousand tons. The multipurpose salt development has not met the market requirement, such as melting snow on the roads, animal husbandry, water treatment, bath salt, etc. Liquid salt utilization is still at a relatively low level, the output accounted for only 10% of the total salt production; sodium, potassium, bromine, magnesium and other chemical products brine is also limited to a few varieties, and its deep processing series of products, such as potassium and magnesium fertilizer, flame retardants, pesticides, pharmaceutical intermediates do not form large-scale and industrialization.

(4) Low technological innovation capability, relatively low salt making level and the equipments setting, and high energy consumption. At present, the theory and application research of salt crystallization is in a disadvantage status, the key production technology and key equipments manufacturing, new products trial and automatic control are all in a disadvantage status. The mechanization rate of large and medium-sized enterprises northern sea salt fields has only 60%. The capacity of acceptance, transportation, storage

and insula service is small. The extent of automation is low. The average yield of production area is only 50 tons/hectares, less than the advanced international level of 1/4. The balance of salt field eco-system and control technology is still in the exploratory stage. For the large well salt enterprises, the recovery of salt rock is about 15 percent, only half of foreign level. The evaporation heat economy is around 2.8, which is lower than foreign salt enterprises of 1.5. The overall energy consumption is 200 kg of standard coal, is 2-3 times higher than the foreign levels.

(5) Uneven production development. The salt resource is distributed in 23 provinces. The salt making enterprise mainly locate the eastern seaside, and its production capacity and output is of 65-70% of the total, the central and south-west accounts for 20-25%, 10% of the north-west. The resource development lacks of designing and planning. Due to the lower economic development of the central and western regions, the resource can lagging behind, unable to make full use of resources; wells mineral imbalance in regional development areas; the above-mentioned situation has seriously affected the coordination and orderly development of the region.

### **3 The outlook of Chinese salt making industry**

(1) The development of salt industry in China is very rapid, although it is the world's largest salt making presently, it still has great potential for development. By the salt level of total consumption, China's per capita consumption of salt is only 45 kilograms, and the United States (per capita consumption of 220 kilograms), France (per capita consumption of 110 kilograms), Japan (per capita consumption of 75 kilograms). We still have great gap comparing these developed countries. At the same time, with the global industrial transfer and further development of the Chinese economy, China's salt industry will continue to usher in new development stage. In the new development stage, China's salt industry must

transfer from big salt making country to the powerful salt country.

(1) China's salt industry will continue to grow. By the international financial crisis, the two alkaline will face the low demand, low price, the surplus production capacity, shortage of capacity utilization. These make Chinese salt industry in a very hard situation. However, the transfer trends of the world industry will not change, the process of the heavy chemical industry in China will not change. The Chinese salt industry will continue to usher in opportunity for development as the world economic recovery and China's economy back on the fast track of development. It is expected 2009 and 2010 will be the most difficult two years, it will usher the recovery period after 2011. The development rate will keep at 6%.

(2) The organizational structure is adjusted, industrial concentration is increased, leading enterprises play a leading role in the industry. The important task is to adjust the structure when we transfer the big salt country to powerful salt country. It must be very difficult to change the industrial structure, product structure and technology structure if they have some certain scale. Therefore, it must adjust the organization structure of the enterprise, improve the concentration of salt industry before the adjustment of industrial structure. To enhance the industrial concentration, the National Development and Reform Commission introduced the structural adjustment programs for China salt industry to strength the policy guidance, and at the same time, to encourage the salt industry leaders as the core, to construct the covering the whole country, and efficient operation of modern salt distribution networks, to play a leading role in the salt industry reform and development process. CNSIC as the leading salt enterprise, it focuses on pushing the adjustment of industrial organization structure and industrial structure, the enterprises joint and merge, technology and equipment improvement. At present, the sub-enterprises of CNSIC are basically belonging to the national key salt making enterprises. 7 of them production are above 1 million tons. The technology and



equipments lead the development direction. With the development of salt industry and the baptize of this finical crisis, the concentration of salt industry will be improved further.

(3) The integration of salt and alkaline will be further deepened. The development of along the industrial chain is the trend of the joint, especially to the upper industrial chain. Salt and alkali is a large tonnage, low-value commodities. It is uneconomical to separate the salt and base in the development. China has two rounds of salt and alkaline joint. The first round was in the 90s last century. The main features was the alkaline joint of salt, that is, in accordance with the principle of regional and territorial, and some large sea salt and lake salt field belonged to the local alkaline plants. Such as Yangkou salt field in Weifang, Shandong, it was merger into the Haiuha Group by Weifang Alkaline plant. Tanggu and Hangu salt fields belong to Bohai Group. Fuzhou Bay salt field belongs to Dahua Group. Salt is in a weak at that round joint. The second joint is occurring now. The main feature is salt and chlorine industry joint. The salt and alkaline joint originated from the breakthrough of CNSIC strategy. As the leading enterprise of salt industry, CNSIC has the natural advantage of developing the downstream salt chemical

industry. Therefore, CNSIC broke the development situation and pushed the salt and salt chemical codevelopment strategy. It also developed the salt chemical industry actively. This leads to the new salt and alkaline joint. Some of the salt chemical enterprise joined the CNSIC, such as Jilantai Salt Chemical, Zhuzhou chemical, Nanfeng chemical and Anhui chlorine alkaline. Some salt enterprises in some developed provinces also try to develop to the downstream, and merge the chlorine and alkaline enterprises. This joint round is still further developed. Along with the development of economic globalization, the tide of large-scale merging and purchasing of enterprises have been raised one after another. Various social and economic resources speed up the steps to enter the superior enterprises which have higher efficiency. Industry markets have been dominated by a minority of large multinational corporations. Gradually, industrial concentration trend has already taken shape, no matter in traditional or new hi-tech industries. For Chinese salt industry, the improving of industrial concentration, which has important significance for the industrial structure adjustment and enhancing international competitive power, is imperative under the situation.