III-6 Government policy and its influence on yellow phosphorus industry

From 2004, Chinese government began to manage yellow phosphorus production strategically, for the production of yellow phosphorus is of high energy consumption, and moreover, phosphorus ore is an un-renewable resource. Uncontrolled production of yellow phosphorus will accelerate the exhaustion of yellow phosphorus resource in China. Government policies that may heavily influence the yellow phosphorus industry are introduced as follows:

- **Change of export tax**

China has cancelled the export tax rebates of yellow phosphorus from January 2005, and from June 2005, the export tax has been increased from 10% to 20%. This change of export tax blocks the export of yellow phosphorus, because higher cost makes China's yellow phosphorus less competitiveness in international market. Statistics shows that the export of yellow phosphorus has declined yearly in the past 3 years. Now many traders and manufacturers suspended their export of yellow phosphorus. The decrease of export causes the increase of supply in domestic market, thus the decline of the price and the operation rate of yellow phosphorus in China. However, in some sense, the increased supply of yellow phosphorus improved the development of phosphorus chemical in China.

- **Supply and pricing of electric power**

Yellow phosphorus is a higher energy consumption industry and 14,000 KWh electric power is required when one tonne of yellow phosphorus is produced. As discussed in part Ⅰ of this report, hydropower electric power, limited by rainfall, account for a considerable amount of total electric power in these main yellow phosphorus production areas such as Yunan Province, etc. To ensure the electric power supply for resident, other industries, and transmission to other provinces in dry season or intensive electric supply periods, the supply of electric power for yellow phosphorus is restrained. Apparently, the restraining of electric power supply causes the decline in output and therefore the increase in price. Yellow phosphorus market in the year 2004 was in such situation, and the price of yellow phosphorus once rose to over RMB 20,000/t in domestic market, and this is one of the reasons that many manufactures expand or newly launch production of yellow phosphorus.

In 2006, yellow phosphorus is classified as one of the high energy consumption industries by the government and it differential pricing of electric power will be conducted to enterprises within this industry. Production installations are classified into 4 types for their production scale:

- ✓ To be phased out
- ✓ To be restrained
- ✓ To be unchanged
- ✓ To be encouraged

Different policies on the price of electric power in these types are adopted. Usually, the smaller

production scale, the higher price of electric power is. However, the criterion of classification varies in provinces.

Policy of differential pricing of electric power can greatly influence yellow phosphorus producers, and production efficiency can be improved, for those small scale production with low efficiency would be phased out. Detailed cost analysis could be seen part III-7 in this report.

- **Rectification of companies involved in phosphorus ore exploitation**

In order to standardize the exploitation of mineral resources, a series of polices & measures have been put forward in many provinces. For example, in 2006, Hubei Province closed up 139 phosphorus mines, whose qualification was beyond the requirement, and the total number of phosphorus mines is reduced to 145, but it was 284 in 2000; Mines without license were closed legally before June 2007 in Yunnan Province. All these measures on phosphorus mine promote the effective utilization for phosphorus resources and therefore the ordered supply of phosphorus ore, raw material of producing yellow phosphorus.

Yunnan Province stopped issuing new yellow phosphorus production license from January 2005. From October 2005 to May 2006, almost all of the yellow phosphorus manufacturers stop production in Yunnan Province. Because manufacturers in Yunnan provide about half of the yellow phosphorus in China, the stopping of their production inevitably influences the yellow phosphorus supply greatly. What's more, the operation rate of the yellow phosphorous in most of the phosphorus manufacturers in China was about only half of their capacity in 2004 and 2005.

III-7 Influences of energy (water, electricity and coke) supply on the production of yellow phosphorus

The principle of yellow phosphorous production is that phosphorous ore is heated with silica until it is melted and then the melted phosphorous ore is reduced into yellow phosphorous.

The raw materials consumption varies from manufacturer to manufacturer.

Table III-7.1 General consumption of raw materials for yellow phosphorous production in China

Raw material	Consumption volume
Phosphorus ore with 30% of qualified P_2O_5 in content	8~10t/t
Coke with 84% of qualified carbon in content	1.3~2.3t/t
Graphite electrode	0.016~0.054t/t
Or self baking electrode	0.047~0.06t/t
Or silica	1.5-3.0t/t
Processing water	20 m^3/t
Electricity (used by electric stove)	13,000-16,000KWh/t
Steam	1.5~7.0t/t

The most important factor influencing domestic yellow phosphorus industry is the supply and price of electricity, because the unit consumption of electricity is RMB13,000-16,000KWh/t and the cost of electricity accounts for 50-60% of total production cost.

In dry season most producers stop yellow phosphorus production because of the tight supply electricity, which is caused by the shortage of water.
The relation among yellow phosphorus, water and electricity is that water supply influences the generating capacity of electricity, and the supply and price of electricity is the most important factor influencing domestic yellow phosphorus production.

- ✓ Hydroelectricity plays an important role in China. The installed capacity of hydroelectricity is about 138 million MW in 2006 accounting for 22.2% of total installed capacity which is about 622 million MW in 2006.
- ✓ The unit consumption of electricity is RMB13,000-16,000KWh/t and the cost of electricity accounts for 50-60% of total production cost.

Since China is short of power in recent years, the supply of electricity especially hydroelectricity affects the operating rate of yellow phosphorus production. Yellow phosphorus can only operate with half capacity because of the electricity shortage. In dry season these producers who only depend on hydroelectricity have to stop yellow phosphorus production because of the tight supply of hydroelectricity which is caused by the shortage of water.

Currently the supply of coke greatly exceeds the demand, and it almost has no influence on domestic yellow phosphorus production. Only the price of coke does little impact on production cost of yellow phosphorus.