SILICON METAL MARKET ANALYSIS

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A B S T R A C T

Silicon metal differs from the ferroalloys in many respects, particularly in its growth potential.

Present capacity is not fully used, but additional capacity will be needed by 1990. A major factor of the if and when is the uncertainty in the demand/supply equation caused by the varying export/import position of the Communist countries.

The industry has difficulties to cope with the shock waves of the market. There is no leadership. Interests and strategies of the producers are very different.

Furnace size implies production steps, which are too large to be smoothly absorbed by either the market or the producer. Modern rectangular furnaces or minimum sizes of greenfield projects exceed the marketing potential of the companies that run them.

Nevertheless, there is a frightening number of scenarios, which may attract investors to the silicon metal industry, even in spite of investment costs and break-even levels that do not correspond to to-day's market prices.

Any profitable period may just last for the construction time of newly built or converted ferroalloy furnaces.

The industry has several options to determine or at least influence its future path, among them voluntary and forced capacity shutdowns, promotion of silicon metal consumption, rationalization and cooperation.

The author will analyze them and submit his conclusion.

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SILICON METAL - A MARKET ANALYSIS

The silicon metal industry, which enjoys a market position distinctly different from the ferroalloys, has not been able to play the market successfully in recent years, - and even its future looks bleak.

Why is silicon metal different ? Authors and publishers usually count silicon among the ferro-alloys, although is has neither a ferrous component, nor is it an alloy. The closest it comes to the ferroalloys is its very similar production process, types of raw materials and plant equipment. Contrary to other metals, notably chrome and manganese, silica ores are plentiful to unlimited. Their occurrence is wide-spread all over this earth.

One has always to bear in mind that, due to these factors, almost every small to medium-size ferroalloy furnace in the whole world, with a relatively small investment and delay, can be converted into a silicon metal furnace and can usually be supplied with local raw materials. There is basically no other limitation to the production of silicon metal than technical know-how and skills as well as competitive costs, determined mainly by electric power, transportation and capital. Quality restrictions exist with regard to high purity metal, particularly chemical grade silicon, but again, availability of low-impurity raw materials and of purification technology are not a problem, though its cost. The evident conclusion is that the supply side of silicon metal can generally be considered as very flexible.

What makes silicon metal different from ferroalloys is its independence from the steel world and its high past growth record, but particularly its outstanding future growth potential.

Measuring growth as the difference of consumption in the average of the typical four-to-five-year cycles, silicon has accompanied aluminium from its hey-days of 10 to 7% growth to the present more modest 5 to 3% rates, which are still well ahead of steel's 1.5 to 0%.

The chemical industry is too young a customer to have established already a well documented statistical track record of silicon metal requirements over an extended period of time. Forecasts which, only some years ago, have fluctuated around plus 15%, have come down to 8 to 12%. But there is enough room for innovation and new product development in this industry that the down-limit should not be more than 10%, with some positive surprises being always possible.

A very special aspect of silicon metal is the existence of a potentially important new market of high purity applications in the area of electronics and photo-voltaic cells. Substantial research investment sums are presently spent by major companies, which gives us good reason to assume that by 1990 the technology will, at least,

be sufficiently competitive to generate power on the spot, in remote areas with relatively small power requirements, at lower cost than power produced in traditional plants supplied via long transmission lines.

Estimates exist for an annual volume of 3,000 to 5,000 tons within 10 years. Added value of the high purity grades will be significant. The quantity aspect for commercial production is at this point, however, not yet existing, but it may become so, particularly when progress in the purification process will pave the way to other high-technology applications.

The Chase Econometrics Study of 1981 and other forecasts talk of a growth rate for silicon alloys (ferrosilicon and silicon metal combined) of about 3,0%, silicon metal alone can be expected to show a growth in consumption of 6% average until 1990.

If we assume that the total consumption of silicon metal in 1982 was 420,000 tons in the Western world, including the net balance of exports and imports from and into the Communist countries, a number on which most analysts appear to agree, a growth of 6% per year would lead to a production requirement of 640,000 t in 1990.

My personal assessment is slightly different. I could imagine that, in 1983, we should be able to pick up most of the 60,000 tons of sales that we have lost from the 1979/80 level, continue to grow at 6% for another three years in average, but then I would see the next cycle be slower at a rate of 5 to 6%. Any such pattern would lead us to 670,000 tons in 1990 instead of 640,000, eventually not a major difference, which may be taken as our planning range. It certainly matches quite well with those of our base markets: aluminium and silicones.

What is the present availability of silicon metal ? Nominal capacity of all existing furnaces is known to be between 600,000 and 650,000 tons, say 625,000 tons.

Not every furnace will operate at any given time: irregular power supply or prohibitive power costs at certain times of the year, relining shut-downs, labour unrests, technical and financial problems and many other reasons let us conclude that 80% of capacity or 500,000 tons can be described as readily available capacity.

If consumption in 1982 has been estimated to have arrived at about 420,000 tons, then this amount would have represented 84% of the effective capacity or 67% of the nominal capacity, down from 480,000 tons in 1979/80 or 96% of the effective and 77% of the nominal capacity. The excess capacity is substantial, therefore, if you look at the nominal capacity, not so frightening, though, if you look at the effective capacity. How much of the difference can be mobilized if markets recover ? Everybody's guess, but the answer to this question will have a decisive impact on our balance sheets very soon.

A major factor of uncertainty in the demand and supply equation is

the balance of exports and imports from and to Communist countries.

Without any doubt the reduction of Russian imports and the appearance of Chinese silicon in Western markets in 1981/82 is responsible for more than half of the statistical drop of apparent Western consumption. This surprising new development has previously not been taken into account, but fluctuations of Eastern metal positions as consequences of their political decisions, currency availability and, unfortunately, even droughts and floods in China and the USSR will remain a permanent phenomenon of our industry.

Will the industry be flexible and, at the same time, strong enough to absorb the shock waves of the markets ? We have to admit that we are in a weak position. With 30 producers in 20 countries we represent an atomized supply basis. No producer is potent enough to be able to practice any significant leadership.

The interests of the silicon metal producers do not follow the same guidelines. Much has been said recently about the trench between privately and government-owned industries.

Although I may be accused of speaking 'pro domo', when I claim, as a representative of a company that is eventually state-owned in its majority, that ownership is of no importance whatsoever, as long as the management principles adopted by the state-owned company correspond to those of its private competitors, as long as there are no open or hidden subsidies and as long as profit is the common benchmark of efficiency and success, I still think that this statement is right and can easily be proven to be right. The dividing line between the silicon metal producers runs, in fact, a bit different.

We have those for whom profitability is the first priority - and we have those, where non-profitability priorities govern, for example the priority of employment or the priority of earning foreign currency. In both cases the rules of competition are abandoned, the supply of metal is artificially inflated. During the last 18 months every market participant, not only in the silicon market, but in every other ferroalloy market has seen so many illustrations of this subordination of economic to political decision that I do not have to go into any more details.

One other aspect has greatly disturbed the balance of the market place: this time I am speaking of the technical development. The furnace size becomes too large for the size of the industry. Each standard conventional 20 MW furnace, producing 10,000 tons of silicon per year, represents more than 2% of the active world capacity. Several independent management decisions, which cumulatively go into the same direction, may, by coincidence, swing the world market and create price-influencing supply variations. Contrary to aluminium, for example, where one potline represents less than .1% of Western world capacity, adjustments in small steps are not possible with large silicon metal furnaces.

The new type of very efficient 6-electrode rectangular furnaces of

35 MW, and perhaps even more, will present an even larger problem. Two or three furnaces of this type would cover the entire potential market growth between now and the year 1990.

The pressing question immediately springs up: who will build these furnaces ? Where and when will they be built and does the new investor belong to the group of profitability-oriented producers or will the new furnaces be the results of subsidies, of public financial support, or, in one word, of political rather than market requirements ?

Let us turn to the question 'who may be interested in the expansion of the silicon metal production' and investigate which interests may induce an investor to channel capital into an industry with a notoriously low rate of return.

We may exclude the present producers. Capital costs of a minimum of $ 3,000 per ton of installed capacity and break-even prices of a minimum of $ 1,500/ton, net at the production plant, should prevent any producer, who wants to make a profit, from trying the old recipe of dividing high fixed costs by more tonnage. There is, of course, a risk which cannot be excluded, that projects of this type, or, what has an even higher degree of probability, conversion of ferro-alloy producing furnaces to silicon metal furnaces will mushroom as soon as market prices cross the 1,600 $ line, which is not likely today, but may still happen any day following a scenario of special but not completely unlikely circumstances, leading to a temporary shortage with a short-term overreaction of prices. The silicon metal industry has an unfortunate record of investment decisions, binding a lot of capital to the long term, based on short term price fluctuations.

Who else could be interested in a new silicon metal furnace ? Aluminium smelters ? Their retreat from the silicon production is evident and should not be seen reserved for many well known reasons.

The silicone industry may be more interested in backward integration. Dow Corning, in the business once and having gone out, may have set the pace with its reentry into the industry by acquiring the Springfield, Oregon, plant of Kawecki. Development and research for specialty or high purity qualities may be interesting enough to be kept for ones own, and this may even justify higher-than-market-price-cost.

There are several governments developing their energy potential in Central Africa, South America, Iceland and the Middle East. Countries with an excess of electric energy and not many other development prospects have good reason to look at silicon metal, an international commodity, which freely travels the world markets.

The most dangerous situation for an overexpansion of silicon metal production may result from the combination of governments looking for energy-related development projects plus promoting offers from trading, engineering or any other multi-interest areas.

It is not difficult to conclude that the many widely varying sce-

narios for investors in our industry result in a great likelihood that more furnaces will be built, in spite of the frightening losses and business failures of the present time. If growth resumes, the likelihood will become even stronger, and when the furnaces to be built within these projects will be big, there is little hope for sustained recovery, but more bad news around the corner: any profitable period may just last for the construction time of newly built or converted ferroalloy furnaces.

What can be done to improve the situation of the industry ?

Voluntary adjustments of production would be excellent to balance supply and demand. Recognizing the structure of the industry, they have no chance. Who will shut down his furnace, which means almost always 50% or even 100% of the company's capacity, mainly to the benefit of those who continue production ?

Can we promote consumption of silicon ? For aluminium, low prices of silicon do neither increase aluminium consumption as a whole nor the use of silicon in aluminium alloys.

Silicones compete with petrochemicals. Price sensitivity to silicon metal is substantial and influences positively the sales volume. If we want to benefit from the growth of the chemical industry, we have to be farsighted in our price policy. The prices quoted to the silicone industry will have an impact on future volume requirements.

The use of silicon metal in the fields of solar cells, if seen realistically, will have no impact on the next cycle, and probably not on the next one after that.

Remains the slow and painful way of reducing supply by competition. We face a situation in the industry where cost differences are not all that decisive. A 'stalemate' supply curve, looking at variable costs, at plant, between 850 and 1,100 $ per ton, indicates that the price reduction necessary to bring the net return below the variable cost of the marginal producers in order to force them out of business, will not allow even the lowest cost producers to cover their full costs.

Different degrees of subsidies, financial group support or national protection, as well as different exposure to currency risks and dumping practices make it almost impossible to forecast, who is going to survive this (or the next) crisis.

Previous predictions, especially when cost-oriented and based on economic rules, have been wrong. Comebacks after reorganization offer chances to those who have failed.

We may conclude that the industry should not rely on the capability of resolving its problems by forcing capacity out of business. My personal judgement is that the best prospect should be to overcome the crisis by cooperation.

Antitrust and cartel laws have certainly to be fully respected, but it should be worthwhile to investigate, which legal possibilities they still allow, to form larger production units, where one furnace is not 50 or 100%, but perhaps 10% of the corporate capacity, in order to allow flexibility of supply.

It should be possible, under the law, to rationalize and temporarily eliminate unprofitable capacity from current production, but still preserve capacity, which may soon be needed to avoid price exaggerations. Would it not be helpful to find out whether we cannot integrate non-integrated producers with little marketing staff or export experience ?

Overcapacity has been our problem in 1982, not because of too much capacity increase, but of shrinking demand to which we have not found the proper reaction, in time. Overexpansion is a serious threat for a sustained recovery. We are too inflexible, too limited in our resources and so dispersed that we are really stripped of any marketing power.

A solution is not readily available and cannot be found by anyone of the producers on his own. Infacon 1983 offers, however, an opportunity to explore, by talking to each other, in good faith, any possibility that may exist, to bring the silicon metal industry onto a safer path towards prosperity.

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more research.