SILICON METAL SUPPLY AND DEMAND SITUATION IN THE PERIOD 1986 - 1991, AND ITS PROBABLE IMPACT ON THE INTERNATIONAL MARKET SITUATION

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Summary

This paper examines the present and projected western world consumption of silicon metal in the various market segments over the next five years.

The available production capacity is described and its probable development in the near future is examined.

Finally, the probable impact of the projected supply/demand situation on the international silicon metal market is discussed.

Introduction

The Danish philosopher Piet Hein has coined this modern proverb: "It is difficult to forecast anything - especially the future. He has a point, of course, so why should we stick our necks out with a forecast that many of you may remember 5 years from now?

The basic problem is, of course, that forecasting, or some vision of the future, however imperfect, is necessary in today's world. The time lag between conception and production for a new Silicon Metal project is often 3 - 5 years, with a projected economic life of perhaps 20 years after that. So, even if we don't trust them, we cannot do without forecasts. In Elkem we have reasoned that as a major supplier of technology for Silicon Metal smelting, and as the largest producer and marketer of this metal, we know the business as well as anyone does, and our evaluation of the near and medium term prospects for Silicon Metal should have some validity.

This is not the first time we have attempted to do this. Four years ago, in 1982, here in Rio de Janeiro, we presented a paper at ILAFA's Ferro Alloys Conference on "The Ferro Alloys Industry Today - Problems and Cures", where we included some viewpoints on the Silicon Metal situation in the years ahead. Our conclusion and projection at that time on the supply/demand situation in the period 1975 - 1990 was that "there has been an oversupply during this period, and this oversupply is likely to continue for the rest of this decade". Let us take a look at the situation as it appears today, and see how close we came in our projections 4 years ago.

Present and Projected Silicon Metal Demand

Table 1 contains Elkem's estimates of Silicon Metal consumption in the western world in 1985, the average annual growth rate for the various market segments, and the resulting consumption in 1991.

The "Chemicals" segment comprises Silicones, Fillers and Polysilicon for Semiconductors and Solar Cells.

Based on these estimates the relative importance of the Aluminium segment will decline somewhat in relation to Chemicals, but in terms of tonnages it will still be the largest market 5 years from now.

We do not expect large changes in demand by geographical area in the coming 5 years, as shown in Table 2.

The main markets, accounting for 84% of consumption, will still be Western Europe, USA and Japan.

Western World Shippable Silicon Metal Capacity

Based on the best available information in Elkem, we have listed in Table 3, by country, the shippable Silicon Metal capacity in 1985, and the projected shippable capacity in 1991.

We have assumed shippable capacity to be 90% of rated capacity, thus allowing for capacity reductions as a result of uncompetitiveness at the prevailing market prices, due to power shortages, scheduled overhauls of equipment and unforeseen stops for technical or other reasons.

The most distinctive trend in table 3 is the tremendous increase in Brazil's production capacity in the five year period.

Table 4 specifies in more detail the assumptions underlying the figures for Brazil.

We know that in Brazil today even more Silicon Metal projects are being discussed, without having reached the maturity of the projects in Table 4.Such projects may, however, bring in additional capacity during the time-frame we are considering.

The enormous expansion of Silicon Metal capacity in Brazil in the coming years means that Brazil, from being a small producer only a few years ago, will become the second largest exporter of Silicon Metal in the world, trailing a few thousand tons behind Norway in 1991, and probably passing Norway to become the largest Silicon Metal exporting country in the world shortly after that.

With respect to the other capacity expansions included in Table 3, we have assumed that two greenfield plants will come on stream in Australia, but that the projects for greenfield plants in Iceland and Sweden will not be realized in the 5 year period we are considering. Our colleagues in Iceland and Sweden may not share our view.

The other capacity changes are basically additions to existing plants, partly by converting Ferrosilicon capacity to Silicon Metal production.

The general pattern is, however, very clear. Capacity increases in the coming five year period will clearly be considerably higher than the expected increase in consumption.

Supply/Demand Balance

In order to evaluate the true supply/demand balance, we have to correct some of our numbers for demand and for production capacity. As production capacity figures for the Eastern Bloc countries are difficult to ascertain with any accuracy, we have chosen to adjust our figures for Western

World consumption by taking into account exports to the Eastern Bloc. This is a fairly straightforward correction. No correction has been made, however, for possible Western World imports from China.

Based on these assumptions, the supply/demand situation for Silicon Metal in the Western World is shown in Figure 1, and the gap between shippable capacity and demand is shown in Figure 2.

We see that the oversupply situation worsened in the years 1980 - 1982, mainly because of reduced consumption, and then gradually improved up to the present time, mainly because of an increase in consumption. The extremely weak market situation in the early 80's also tended to delay capacity additions.

From this point on and up to 1990 the oversupply is seen to increase, because capacity expansions exceed the increase in consumption.

If we for a moment go back to our projections from 4 years ago, we find that our figures for projected consumption in 1984 and 1985 were 7% and 11% too high and our estimates for shippable capacity were 6% and 1% too low. The gap between demand and shippable capacity thus has been wider than projected at that time. Today we foresee a larger gap in 1991 than we did in 1982.

Even if our figures from four years ago are off the mark, our main conclusion from that time still holds true, we have an overcapacity situation that will persist.

What will be the impact of the projected situation in the international Silicon Metal Market ?

If it is difficult to forecast the future supply/demand situation, it is no less than hazardous to try to forecast the market implications. As our crystal ball is no clearer than most others, let us try to sum up some of the experiences from the past and apply these to the expected future market situation.

Price elasticity for Silicon Metal

For the main market segment, Aluminium, we can safely assume that the price elasticity is low. Lower prices will not significantly influence consumption.

For silicones we can assume that in the medium/long term the elasticity is higher, as Silicon is a considerable factor in the total price picture, and as the products are competing with other materials.

For Solar Cell applications, the total market depends very much on the Silicon unit price. Unfortunately, the total market so far is insignificant, and the

Metallurgical Silicon price is only a small fraction of the price of Silicon untis in Solar Cell applications.

The relative price level of Silicon Metal, within reasonable limits, therefore has little influence on the total consumption.

Gap between Supply and Demand

It is reasonable to assume that an increase in shippable capacity in excess of the increase in demand will lead to increased competition and a lowering of the Silicon Metal price level.

More important than shippable capacity, however, is the level of actual production, which brings us to our next item.

Importance of stocks

How stocks influence the market situation seems generally to be underestimated by producers. One reason for this may, of course, be that reliable figures for stocks are not readily available.

Figure 3 shows the development in producers' stocks and the prices obtained for Silicon Metal in a certain geographical area of the world in 1985. Rising stocks led to falling prices. Figure 4 shows a similar picture for 75% Ferrosilicon during 1984 and 1985. Again rising stocks led to the same result - falling prices.

It is our general impression that price sensitivity to movements in stocks at producers and consumers has increased over the last years.

In order to avoid an undesired development, seen from the producers point of view, two things are necessary:

- reliable information about the stock situation
- willingness of producers to keep stocks at a reasonably low level

The first item, information, should not represent a large problem. It is difficult to see that it can be anything but advantageous for the producers to declare stocks, against receiving such information from all others. Let us hope that the ferro alloy associations in various parts of the world can start an efficient collaboration on this point.

The second item is not as easy to find a solution for. Producers are very good at finding reasons why they should go on producing full speed, while their competitors should reduce production. On this point we can only hope for two things to happen:

- that all producers understand and accept the effect of stocks on prices

- that our industry globally is operated according to free market and not political conditions

You have to be very much of an optimist to hope that this will be case in the coming 5 years.

Conclusions

Looking at the probable situation we have in front of us, with capacity additions exceeding the increase in demand, we can foresee an intensely competitive Silicon Metal market in the years to come. On this basis we should also prepare ourselves for depressed Silicon Metal prices, and, over time, some shake-out of the least competitive producers.

It would be to the benefit of the producers if a collaboration on swift and reliable stock figures could be established, and if producers would be willing to react quickly to avoid unnecessary high stocks, which inevitably lead to lower prices.

Reference:
G. Viken, A. G. Arnesen, A. Holas, "The Ferro Alloys Industry Today - Problems and Cures", paper presented at ILAFA 1982, Rio de Janeiro.

TABLE 1

Western World Present and Projected Silicon Metal Consumption in the various Market Segments 1985 - 1991

Market Segment	Consumption in 1985 (1000 t)	Estimated average growth rate (% per year)	Projected Consumption in 1991 (1000 t)
Aluminium	310	1 - 2	330
Chemicals	160	6 - 7	230
Steel and misc.	10	0	10
	480	3,5	570

TABLE 2

Western World Present and Projected Silicon Metal Demand in the various Geographical Areas, 1985 - 1991

	1985 (1000 t)	%	1991 (1000 t)	%
Western Europe	165	34	180	32
North America	160	33	200	35
Japan	90	19	95	17
Net export to Comecon countries	40	8	45	8
Rest of the W. World	25	6	50	8
TOTAL	480	100	570	100

TABLE 3

1985 Shippable Capacity and 1991 Projected Shippable Capacity for Western World Silicon Metal Producers

Country	Capacity 1985 (1000 t/year)	Projected Capacity 1991 (1000 t/year)
USA	153	168
Canada	25	25
Total North America	178	193
Argentina	4	4
Brazil	39	130
Total Latin America	47	134
France	70	80
West Germany	12	12
Italy	24	29
Norway	125	140
Portugal	35	35
Spain	12	12
Sweden	22	22
Switzerland	10	10
Yugoslavia	40	40
Total Western Europe	346	380
South Africa	42	45
India	5	5
Australia	0	55
TOTAL WESTERN WORLD	622	812

TABLE 4

Present and Projected Silicon Metal Production Capacity in Brazil

Company	Capacity 1986 1000 t/year	Projected capacity 1991 1000 t/year
Camargo Correa	0	32
CBCC	6	12
CIE Fluminense	1,5	1,5
Eletroila	0	18
Eletrometalur	10	28
Italmagnesio	6	12
LIASA	19,5	40
TOTAL	43	143,5
90% shippable	39	130

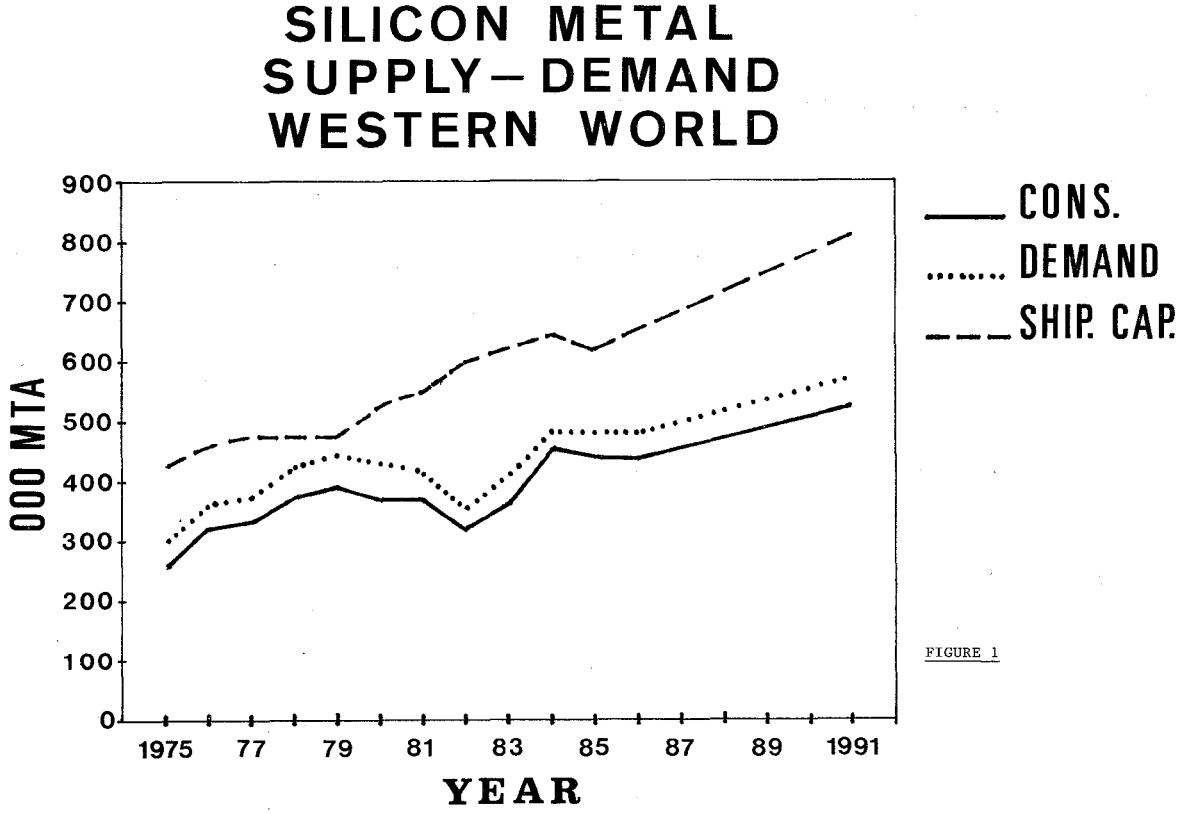

FIGURE 1

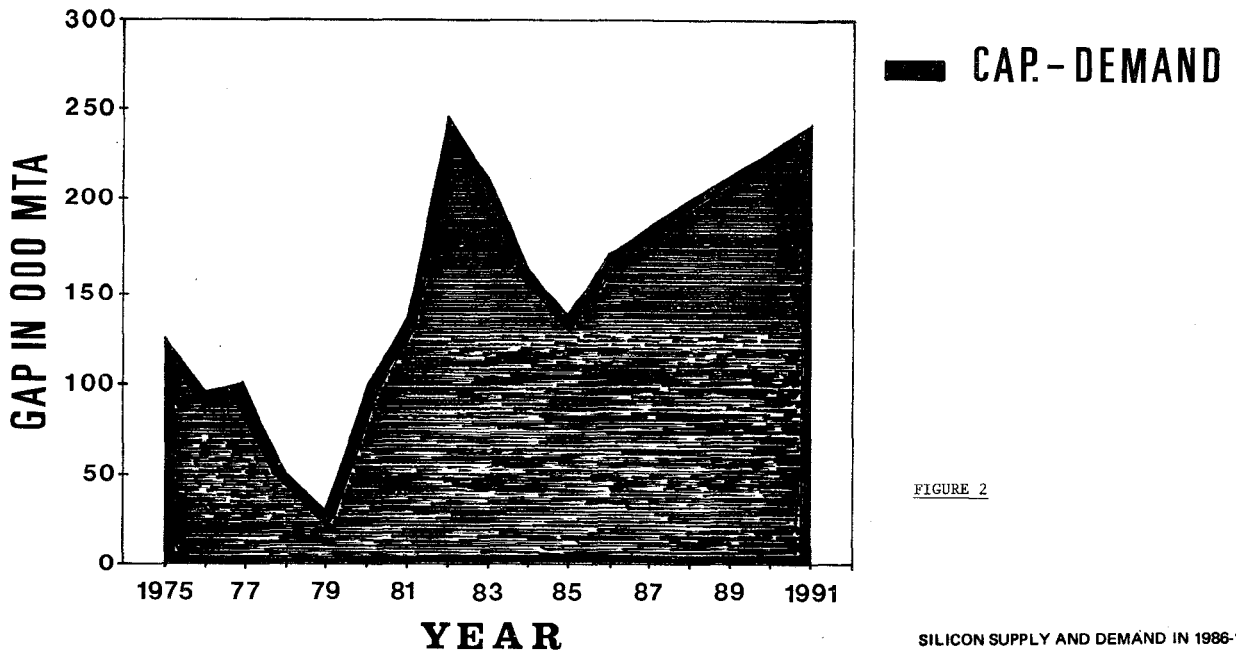

FIGURE 2

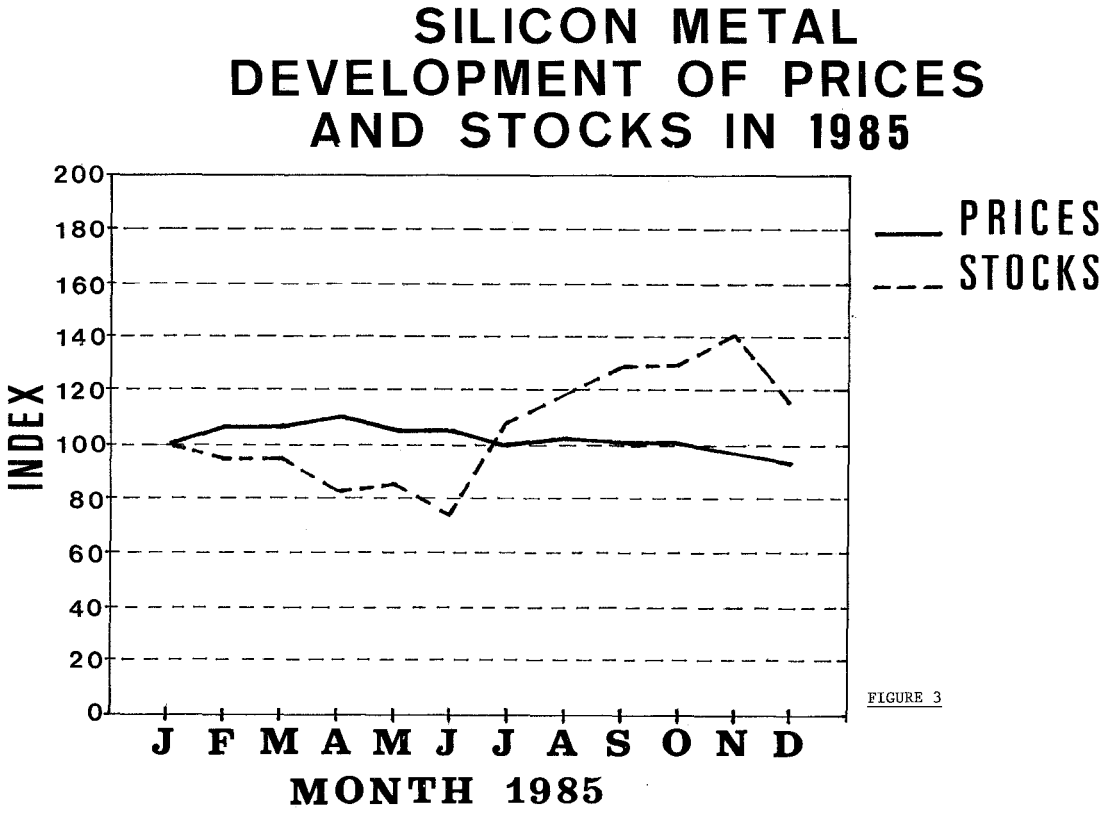

FIGURE 3

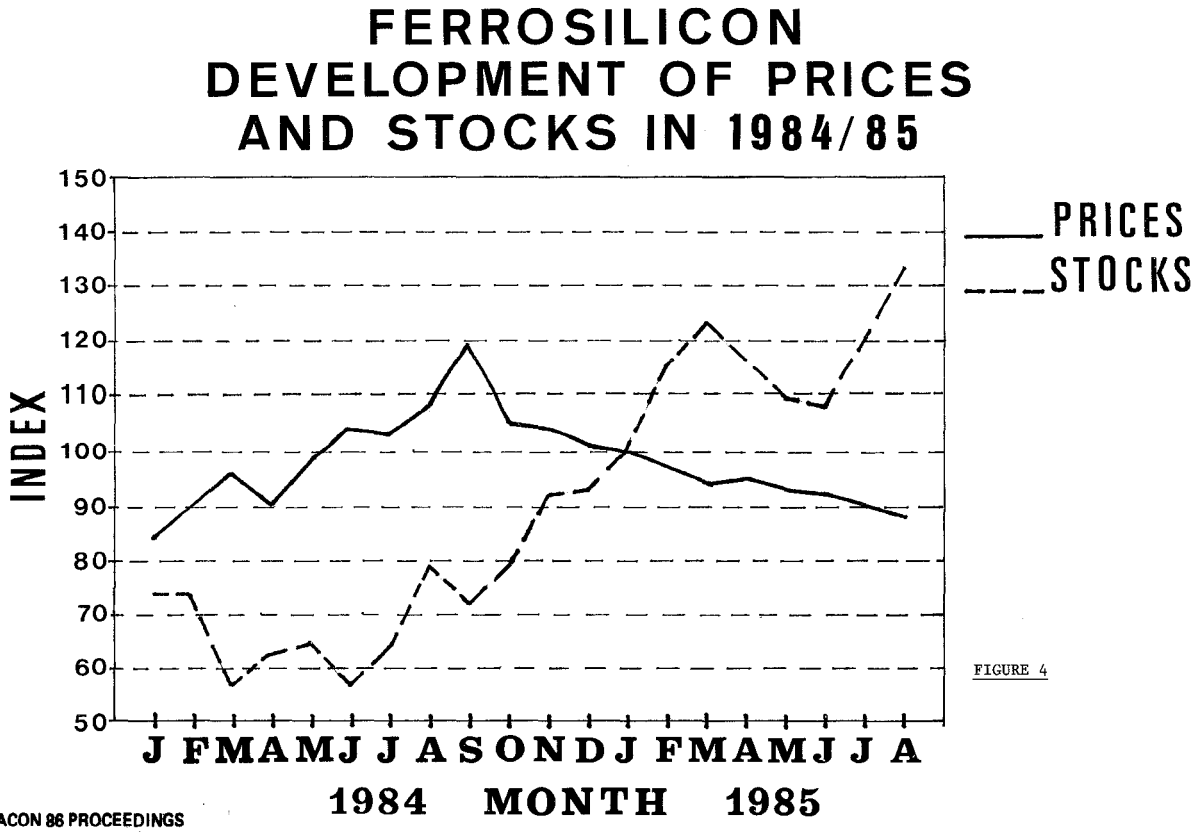

FIGURE 4