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FUTURE LOCALIZATION AND STRUCTURE OF THE FERROALLOY INDUSTRY

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ABSTRACT

The structural changes that occurred in world ferroalloy production, consumption and trade patterns between 1980 and 1992 are examined. An outlook is provided for the year 2000, taking developments in three key areas -- 1) world steel production, 2) energy and the environment and 3) trade -- into account. The analysis concludes that increased demand for ferroalloys is likely to be met largely through higher production from Latin America, Africa (including the Middle East) and Asia (including Oceania). Production in Europe and North America, on the other hand, is seen as likely to decline further.

INTRODUCTION

We at the OECD are delighted to have been invited to participate in this conference on ferroalloys. It has presented an interesting challenge to us, as we are very much industry outsiders. We have no activity that deals specifically with ferroalloys at the OECD, nor do we have significant expertise in the area. Before proceeding, I would also like to point that the presentation that follows is one that was prepared by the Secretariat and does not represent the views of the Organisation.

The topic that we were asked to examine -- future localization and structure of the ferroalloy industry -- was an ambitious one for us. After all, you in the industry will be the ones that determine where investments are made in new facilities and where plants will be closed. You are the ones that will develop marketing strategies that determine production and trade flows. If we had access to each company's intentions and a great deal of time, we could probably piece together an interesting analysis. But we don't have this information, nor do we have the considerable time and resources that would be required to analyse it.

What I will therefore do today is first take a look at the current structure of the industry in terms of production, consumption and trade and comment on how it has changed over time. I will then examine how changes in three key areas: consuming markets, energy and the environment, and trade are likely to affect the future structure of the industry, again in terms of production, consumption and trade. The analysis will stop there since we do not have the depth of industry knowledge that would be required to explore issues such as how

technological change in the industry and changes in customer requirements are likely to affect industry structure. In a more comprehensive assessment, these factors would have to be addressed.

STRUCTURE OF THE INDUSTRY

From a global perspective, one could argue that not much changed in the ferroalloy industry between 1980 and 1992, which are the two years chosen for comparison. In both years 16-17 million tonnes of ferroalloys[1] were produced and consumed (Figure 1). This is not to say that there wasn't any variation between the two years. In fact, production fell to as little as 13 million tonnes in 1982 and 1983 rose to as much as 20 million tonnes in 1989.

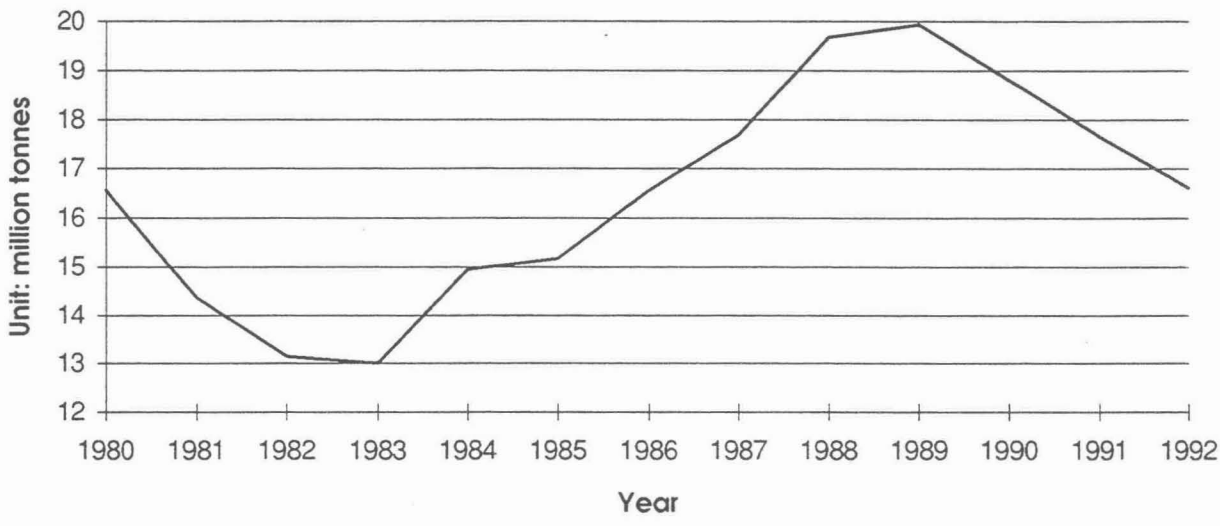

FIG. 1. World ferroalloy production, 1980-92

A comparison of the specific ferroalloys produced and consumed in the two years again suggests little change. World ferromanganese (including silico-manganese) and ferrosilicon production levels were slightly lower, while increased stainless steel production resulted in slightly higher ferrochromium (including silico-chromium) production and consumption. Production and consumption of the noble alloys also appear to have increased, albeit slightly, reflecting an increase in the production of alloy steel in many countries.

The apparent stability of the industry at the global level, however, masks a tremendous amount of change in production, consumption and trade patterns at the national level.

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[1] Including silicon metal and spiegeleisen.

Consumption

Turning first to consumption, shifts in world steel production, by far the ferroalloy industry's largest customer, led to corresponding shifts in ferroalloy consumption away from OECD countries and Eastern Europe (including the former Soviet Union) to other areas. The decline in Eastern Europe and the former Soviet Union was close to 30 per cent, while that in the OECD area totaled 10 per cent. In comparison, ferroalloy consumption elsewhere doubled, with the biggest increases occurring in China, the Republic of Korea, Brazil and India (Table 1)[2].

Production

Shifts in ferroalloy production patterns were in some instances even more pronounced. The implementation of more stringent environmental regulations and the development of the ferroalloy industry in areas possessing relatively low cost electricity contributed to a 35 per cent reduction in ferroalloy production in the OECD area between 1980 and 1992. In contrast, production in Eastern Europe (including the former Soviet Union) and elsewhere grew by 7 and 57 per cent, respectively. China, the former Soviet Union, Brazil and India were the areas where the largest tonnage increases occurred (Table 2).

Also to be noted in the shift in production patterns is the growing concentration of ferromanganese and ferrochromium production in those countries mining manganese ore and chromite. This reflects the fact that, all other things equal, it is significantly less costly per unit of contained metal to ship finished ferroalloy products than more bulky ores. In both instances, the top five ore-producing countries increased their share of ferromanganese and ferrochromium production, respectively, from less than, to more than, 50 per cent. Even in these ferroalloys, however, low cost energy was an important factor influencing shifts in production. China and Norway became increasingly important ferrochromium producers, for example, despite having to import most, if not all, of their chromite (albeit from nearby countries).

Trade

The shifts that occurred in ferroalloy production and consumption during the 1980s greatly increased the importance of trade. Measuring how the importance has grown, however, is difficult due to the lack of comprehensive data. To provide insights, we have estimated net trade on a country-by-country basis by comparing national ferroalloy production with

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[2] In this paper, Western Europe is defined to include all OECD European countries, as well as the former Yugoslavia. Eastern Europe includes Albania, Bulgaria, the Czech Republic, Hungary, Poland, Romania and the Slovak Republic. North America includes Canada and the United States.

TABLE 1. World ferroalloy consumption, by country, 1980 and 1992

Country	1980	1992	Change 1992/1980	Share of total 1980	Share of total 1992
	Thousand tonnes			Percent	
Former Soviet Union	3,423	2,711	(21)	21	16
Japan	2,578	2,255	(13)	16	14
United States	2,348	1,938	(17)	14	12
China	859	1,860	117	5	11
Germany	1,184	913	(23)	7	5
Republic of Korea	198	645	226	1	4
Italy	613	571	(7)	4	3
Brazil	355	550	55	2	3
India	220	416	89	1	3
France	536	413	(23)	3	2
All other	4,246	4,343	2	26	26
Total	16,561	16,615	-	100	100

- : Less than 1 per cent
Note: Figures might not add to totals shown due to rounding; calculations made using unrounded figures.

Source: Estimated by the OECD Secretariat.

TABLE 2. World ferroalloy production, by country, 1980 and 1992

Country	1980	1992	Change 1992/1980	Share of total 1980	Share of total 1992
	Thousand tonnes			Percent	
Former Soviet Union	3,621	4,212	16	22	25
China	999	2,650	165	6	16
South Africa	1,576	1,330	(16)	10	8
Brazil	552	1,023	86	3	6
Japan	1,923	1,013	(47)	12	6
Norway	878	959	9	5	6
United States	1,403	773	(45)	8	5
France	1,020	641	(37)	6	4
India	249	602	142	2	4
Germany	583	237	(59)	4	1
All other	3,758	3,174	(16)	23	19
Total	16,561	16,615	-	100	100

- : Less than 1 per cent
Note: Figures might not add to totals shown due to rounding; calculations made using unrounded figures.

Sources: US Department of the Interior, Bureau of Mines; British Geological Survey, *World Mineral Statistics: 1980-84* and estimates of the OECD Secretariat.

consumption. For those countries that were net-exporters, exports exceeded imports by6.2 million tonnes in 1992. This 6.2 million tonnes of net exports was 44 per cent higher than the comparable figure for 1980 (Table 3). As a result, net exports increased their share of ferroalloy production, from about 26 to 37 per cent. At the same time there were notable shifts in trade patterns. Net exports from the former Soviet Union grew sharply when declining steel production resulted in lower internal needs in the area. Two other countries -- Brazil and China -- also became far more prominent traders.

The situation in each of the major ferroalloys was similar, with the largest increases in trade occurring in ferrosilicon and ferrochromium. In the case of ferrochromium, net exports represented 63 per cent of total production in 1992. Much of the additional export trade that occurred emanated from the former Soviet Union (namely Russia and Kazakhstan), India, Norway and Finland.

On the import side, major steel producing countries that were net importers of ferroalloys in 1980 tended to increase their reliance on imports (Table 4). By 1992, net import dependence ranged from 50 to 75 per cent in these countries. In most instances, this was at least twenty percentage points higher than in 1980.

FACTORS INFLUENCING THE FUTURE STRUCTURE OF THE INDUSTRY

The structure of the ferroalloy industry is likely to continue to change in the next several years in response to changes in the political and economic environment. On the demand side, the level of steel production has traditionally been the principal determinate of ferroalloy consumption levels, and it is difficult to see this situation changing. On the supply side, where steel is produced is likely to influence ferroalloy supply patterns, but other factors, such as energy prices and environmental issues, are also likely to have significant effects. In the trade area, exchange rates and the terms and conditions under which merchandise is imported and exported will influence ferroalloy supply patterns.

Steel Production

The good news for the ferroalloy industry is that both the short and medium term outlook for the world steel market are bullish. Forecasts indicate that world crude steel production could rise by 3.5 to 5.5 percent this year. Longer term forecasts made by the World Bank and the International Iron and Steel Institute (IISI) indicate that by the year 2000, steel production could be 750 to 844 million tonnes, compared to less than 730 million tons during 1992-94. If ferroalloy use per tonne of crude steel produced remains constant, overall ferroalloy consumption would rise by a corresponding amount. This may or may not be the case. We can expect that efficiency in the transition economies, and perhaps elsewhere, will increase, which would lower ferroalloy needs. On the other hand, the proportion of stainless and alloy steel production produced in the OECD area is expected to grow, which, all other things equal, would increase ferroalloy use in the area.

TABLE 3. Net exports of ferroalloys by net-exporting countries, 1980 and 1992

Country	1980	1992	Change 1992/1980	Share of total 1980	Share of total 1992
	Thousand tonnes			Percent	
Former Soviet Union	198	1,501	660	5	24
South Africa	1,366	1,122	(18)	32	18
Norway	858	948	11	20	15
China	140	790	464	3	13
Brazil	197	473	141	5	8
France	483	228	(53)	11	4
Zimbabwe	203	199	(2)	5	3
India	29	186	549	-	3
Former Yugoslavia	159	155	(2)	4	2
New Caledonia	131	126	(4)	3	2
All other	525	464	(12)	12	7
Total	4,288	6,192	44[1]	100	100

-: Less than 1 per cent.
1. Average
Note: Figures might not add to totals shown due to rounding; calculations made using unrounded figures.

Source: Estimated by the OECD Secretariat.

TABLE 4. Net imports by net-importing countries, 1980 and 1992

Country	1980	1992	Change 1992/1980	Share of total 1980	Share of total 1992	Net import dependence 1980	Net import dependence 1992
	Thousand tonnes			Per cent			
Japan	655	1,242	90	15	20	25	55
United States	945	1,164	23	22	19	40	60
Germany	601	676	12	14	11	51	74
Republic of Korea	89	476	435	2	8	45	74
Italy	335	417	24	8	7	55	73
Belgium	309	283	(9)	7	5	78	92
Canada	79	243	208	2	4	21	76
United Kingdom	209	226	8	5	4	80	61
Taiwan	7	202	2752	0	3	9	82
Turkey	50	149	197	1	2	85	63
All other	1,009	1,115	11	24	18	50	54
Total	4,288	6,192	44[1]	100	100	42[1]	63[1]

1. Average
Note: Figures might not add to totals shown due to rounding; calculations made using unrounded figures.

Source: Estimated by the OECD Secretariat.

In addition to overall steel production, changes will continue to occur in steel consumption patterns world-wide. These changes will have implications for steel production patterns and, eventually, for the ferroalloy industry. According to the forecast made by the IISI for the year 2000, consumption in Western Europe, which fluctuated considerably from year to year during the 1980s and 1990s, will be equivalent to that reached during peak years (Table 5). In the case of Eastern Europe (including the former Soviet Union), only a small portion of the consumption lost when these economies collapsed in the late 1980s will be recovered by 2000.

On the other hand, growth in steel consumption in Asia, which was vigorous during the 1980s and has been vigorous thus far in the 1990s, is expected to continue to be robust through 2000. Annual increases in consumption have often exceeded 10 million tonnes. The increases would have to be even higher if the forecast level is to be reached. If this occurs, close to half the world's steel consumption could be occurring in this area by the year 2000, compared to about 25 per cent in 1980.

The key question for the world's steelmakers and the ferroalloy industry is who will supply the world's changing steel needs.

Much will depend on the structural changes that occur in the steel industry -- particularly with respect to major investment and disinvestment decisions. Many outcomes are possible. Under one, crude steel production would remain more or less unchanged in Western Europe, where net exports would continue to exceed 10 million tonnes per year (Table 6).

Both Eastern Europe and the former Soviet Union would continue to be net exporters of steel, with those from the latter rising to 18 million tonnes. Modernisation of facilities, including the installation of continuous casting technology, would increase crude steel to finished product yields to 80 per cent in the former Soviet Union and 85 per cent in Eastern Europe. As a result, the countries would be producing significantly higher quantities of finished steel with only slightly higher crude steel production.

In North America, where average yields would increase to 90 per cent, further structural changes would occur as steel minimills increased their capacity while integrated mills continued to reduce marginal melting capacity while focusing investment on rolling mills. Less melting capacity would result in periodic shortages of semifinished steel such as slabs. In such instances, companies would seek to meet peak needs through outside purchases, as they did in 1994, when the United States imported over six million tonnes of steel slabs (and the like). Steel production would remain more or less unchanged from levels attained in recent years.

In Latin America, further capacity expansions would occur, which would enable producers to support both growing consumption in the region and higher net exports. The situation in Africa and the Middle East, on the other hand, would change somewhat as increased capacity and production would result in the region shifting from being a small net importer of steel to a small net exporter.

TABLE 5. Apparent steel consumption, by area, 1980, 1993 and an outlook for 2000

Area	1980	1993	2000	Change 2000/1993
	Millions of tonnes of steel products			Percent
Western Europe	116	114	133	17
Eastern Europe	46	13	19	46
Former Soviet Union	118	59	60	2
North America	96	101	106	5
Latin America	29	27	38	41
Asia and Oceania:				
China	34	104	140	35
Japan	71	75	80	7
Other	42	100	146	54
Subtotal, Asia & Oceania	147	279	366	31
Africa and Middle East	27	23	26	13
Total	579	616	748	21

Sources: International Iron and Steel Institute: *Steel Statistical Yearbook* and *Annual Report of the Secretary General* (October 1994).

TABLE 6. Crude steel production in 1993 and an outlook for the year 2000, by area

Area	Crude steel production		Outlook for 2000		
	1993	2000	Production	Net exports	Consumption
	Million tonnes		Million tonnes of steel products		
Western Europe	158	161	145	12	133
Eastern Europe	30	31	26	7	19
Former Soviet Union	96	98	78	18	60
North America	102	100	90	(16)	106
Latin America	44	60	54	16	38
Asia and Oceania	276	361	325	(41)	366
Africa and Middle East	21	33	30	4	26
Total	727	844	748	0	748

Sources: International Iron and Steel Institute: *Steel Statistical Yearbook* and *Annual Report of the Secretary General* (October 1994); and estimates of the OECD Secretariat.

In Asia, the impressive expansion of steel capacity that occurred in the region during the past fifteen years would continue, but rising steel consumption would make it difficult to close the gap between production and consumption. Despite increasing annual production by an average of 12 million tonnes per year, net imports would increase from 37 to 41 million tonnes by the year 2000. Research that we have conducted at the OECD on investment plans in this region indicate that capacity expansions are most likely in China, the Republic of Korea, India, Taiwan, and Malaysia, in that order.

Increases in steel production along the lines indicated would raise ferroalloy consumption by about 2.2 million tonnes world-wide (based on usage rates calculated for 1992). Most of the increase would occur in the Asian region, with much of the balance occurring in Latin America. The growth in these areas should provide attractive incentives for further investment in the industry, particularly in the case of Asia, which has been a substantial net importer of ferroalloys.

Energy and environment issues

How and where the ferroalloy industry might expand or contract will depend in large measure on the availability and cost of energy, which is a major cost component. An analysis of the average prices paid by industry for electricity indicates that these prices currently vary considerably from area to area (Table 7). While there are exceptions, those countries that rely most heavily on hydroelectric sources for their electricity needs tend to have the lowest average rates.

The importance of energy costs differs considerably, of course, in the production of the different ferroalloys (Table 8). In the case of ferrosilicon, which is the most energy-intensive, energy costs in high-price areas such as Japan appear to exceed the prices being paid for finished ferrosilicon in a number of major consuming markets. It is therefore not surprising to find that ferrosilicon production fell so sharply in many high energy-cost countries between 1980 and 1992. On the other hand, production in lower cost areas -- such as Brazil, Sweden and China -- more than doubled. Shifts have also occurred in ferromanganese and ferrochromium production; in most instances, however, the declines that have occurred have tended to be less pronounced.

The energy outlook for the medium-longer term suggests that further shifts in ferroalloy production to areas with low cost energy sources could well occur. According to an analysis prepared recently by the OECD's International Energy Agency (IEA)[3], world energy demand could be 48 per cent higher in the year 2010 than the level attained in 1991. Growth in electricity demand would be even greater, as it would rise by 70 per cent.

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[3] OECD, International Energy Agency, *World Energy Outlook*, 1994.

TABLE 7. Electricity prices for industry in 1993, by country

Country	Price	Country	Price
	(US cents per kilowatt hour)		(US cents per kilowatt hour)
Russia	1.8	Greece	5.9
New Zealand	3.3	Hungary[3]	6.0
Poland	3.4	Belgium[3]	6.4
Sweden	3.5	United Kingdom	6.7
Norway[1]	3.5	South Korea	6.7
Canada	3.9	Denmark	7.0
Venezuela	4.1	Austria	7.1
Australia	4.2	Taiwan	7.7
Mexico	4.2	Spain	8.5
India[2]	4.2	Germany	8.9
United States	4.9	Italy	9.2
Slovak	5.0	Switzerland	9.3
Netherlands[1]	5.3	Turkey	9.5
Finland	5.7	Portugal	12.1
France[3]	5.8	Japan	16.2
Ireland	5.9		

1. Average price in 1991
2. Average price in 1990
3. Average price in 1992

Source: OECD: International Energy Agency, *Energy Prices and Taxes: Second Quarter 1994.*

TABLE 8. Ferroalloy energy production costs

Price of electricity	Energy cost		
	Ferrosilicon (75% Si)[1]	Ferromanganese (80% Mn)[2]	Ferrochromium (65% Cr)[3]
Cents per kilowatt hour	Dollars per tonne		
1.0	86	27	42
2.0	173	54	85
3.0	259	80	127
4.0	345	107	169
5.0	431	134	211
6.0	518	161	254
7.0	604	188	296
8.0	690	214	338
9.0	776	241	380
10.0	863	268	423
11.0	949	295	465
12.0	1,035	322	507

1. Assuming power consumption of 11,000 to 12,000 kilowatts per tonne of contained silicon.
2. Assuming power consumption of 3,200 to 3,500 kilowatts per tonne of contained manganese.
3. Assuming power consumption of 6,000 to 7,000 kilowatts per tonne of contained chromium.

Source: Estimated by the OECD Secretariat based on information provided by Elkem a/s.

Looking more closely at electricity, the IEA forecast indicates that China would experience the greatest growth in demand, as consumption would more than triple by 2010. Energy is of course likely to remain a very important factor for China's development. The country has a vast potential for hydropower generation, although sources are quite far from industrial centres. As regards nuclear power, until 1993, China had only one small nuclear plant in operation. A much larger one was due to come on stream in 1994, and more are planned. The country's electricity needs, however, are expected to continue to rely predominantly on coal.

In general, growth in power generation in China has not kept pace with electricity demand, and severe power shortages are common, so much so that factories have been known to close for lack of power. A recent report by Asia Minerals, one of China's largest ferroalloy producers, confirmed that this has in fact been the case with ferroalloy producers. According to the company, no major ferroalloy producer has been able to operate at full capacity. On the other hand, energy prices have been advantageous, enabling the company to compete effectively in international markets.

Other areas where electricity consumption is expected to rise significantly (i.e., more than double) include other parts of Asia, which will continue to rely heavily on coal for power generation, and Latin America, where reliance on hydroelectric power, which already accounts for almost two-thirds of electricity supply, will increase.

In the OECD area, power needs are expected to grow by 28 per cent, with much of the additional need to be met through additions to fossil fuel based generating capacity. Hydroelectric sites are increasingly difficult to locate and, for hydrological reasons, yield lower load factors than the average capacity now in place. Furthermore, competition with alternative land and water uses is becoming more acute, and there is public resistance to projects due to the perceived impact on the environment. The situation is similar in Eastern Europe and the European section of the former Soviet Union. In the case of nuclear power, a continued slowdown in development is foreseen due to costs, regulations, lengthy design and construction lead times, and safety concerns.

There is uncertainty over the outlook, however, particularly in light of increasing concern about the effect of greenhouse gases on the environment. The growth forecast in energy demand by IEA would raise world carbon dioxide emissions by 48 per cent over their 1990 levels by the year 2010. This would be somewhat at odds with the international convention that was negotiated in 1992 on climate change. The principal objective of the Convention, which has been signed and ratified by more than 100 countries, is to protect the atmosphere through the stabilisation of greenhouse gases such as carbon dioxide. To this end, developed countries and most of the larger Eastern European countries (including the Russian Federation and Ukraine) have signaled their intention to work towards the rolling back of emissions to their 1990 levels. How this could be achieved is not clear. Technological change is likely to make a significant contribution, as might taxes on carbon.

Possible taxes on carbon have, in fact, received considerable attention in OECD countries. The IEA analysis indicates that a carbon tax on the order of about $300 per tonne (of carbon)

would be required in order to roll back OECD country emissions from their forecast level in 2010 to the level attained in 1990. This would imply a doubling of crude oil prices from their forecast level (to $62 per barrel) and a several-fold increase in coal prices. A more modest tax of $100 per tonne, on the other hand, would only reduce emissions by 8 per cent from their forecast level.

If taxes are introduced to help address environmental issues, they would of course increase electricity prices in many OECD countries. On the whole, over half of electricity supply is generated using combustible fuels in the OECD area. The most heavily affected would be Australia (89.1), the United States (71.9), Mexico (70.6) and eight EU Member states, where combustibles account for more than 70 per cent of electricity production. In contrast, the impact would be much less in countries that rely predominantly on hydroelectric and nuclear sources. This would include countries such as Norway (99.6 per cent hydroelectric), Iceland (94.5), Austria (72.2), New Zealand (68.1) and Canada (61.2), where hydroelectric sources account for more than 60 per cent of electric power generation, and France, where nuclear power accounts for 78.1 per cent of power needs.

In addition to electricity prices, there would also be the more direct effect of the tax on the carbon-bearing materials used as reductants in ferroalloy production itself.

It is for these reasons that further shifts are likely in ferroalloy production. Incentives to increase production in Latin America are likely to be great in view of an expansion in relatively low cost hydroelectric power in the region, while further contraction is likely in most, but not all, of the OECD area. Favorable conditions in non-OECD countries in Asia also hold potential for further expansion of the ferroalloy industry, but much depends on the ability of countries to finance and construct new generating capacity. Reference has already been made to the situation in China but India is also a country to be watched. It too has been affected by power shortages.

In contrast to China, however, electricity prices in India are relatively high, with further increases expected. Maintaining the competitiveness of the ferroalloy industry has required that special measures be made to help contain energy costs. Those producers that export all their production apparently are able to obtain energy inputs on favorable terms. The energy situation could well explain why the country, which is an important exporter of ferrochrome and ferromanganese, has had a much different experience with the more energy-intensive ferrosilicon. In China, on the other hand, electric rates currently appear to be relatively low (2.7 to 3.7 cents per kilowatt hour in some locations), a situation that would facilitate further growth in the production of all ferroalloys.

Trade

The terms and conditions under which trade is conducted between countries have an important influence on where manufactured goods such as ferroalloys are produced. Through the

General Agreement on Tariffs and Trade countries have been working together for decades to liberalise these terms and conditions, with a view towards expanding economic growth, enhancing living standards and improving efficiency through increased trade. This has been achieved principally by reducing tariffs, phasing out non-tariff barriers and by negotiating multilateral rules governing the actions countries can take in the trade and trade-related areas.

In April last year, the most recent and far-reaching set of negotiations -- the Uruguay Round -- was concluded. As a result of the negotiations, a new and more powerful institution has been created in the form of the World Trade Organisation, which is equipped with an effective means for settling disputes among contracting parties. Moreover, in areas of traditional GATT competence, rules have been tightened and loopholes eliminated. In general, one could say that the results of the Round are positive in the sense that they have the potential to strengthen market-based principles and increase economic efficiency world-wide.

In the area of tariffs, the overall reduction in rates for all merchandise will be almost 40 per cent in developed countries (once phased in), which will bring the average level down to less than 4 per cent. In the case of ferroalloys, tariffs in the OECD area will generally be less than 10 per cent, while those elsewhere will be considerably higher. A number of countries, for example, will have tariff ceilings as high as 35 to 40 per cent (Table 9). To the extent that tariffs have been lowered, trade will be facilitated, a development that could lead to further concentration of the ferroalloy industry in lower cost countries.

In the area of non-tariff measures, significant changes were made in the international rules governing the use of safeguard, subsidy and antidumping measures. In light of the number of antidumping actions that have been taken in recent years on ferroalloys, it may be of particular interest to focus attention on this measure and examine how things might change under the new regime.

Under the GATT, countries have been entitled to take antidumping measures in instances where imported merchandise was being sold at less than "normal" value and where this was injuring (or threatening to injure) a domestic industry. Put another way, a country could be charged with dumping if its export prices were less than the comparable prices being charged in the exporting country's home market, or, in certain instances, when the product was being sold at less than the cost of production.

Ferroalloy producers world-wide -- including those in Brazil, the European Union, Japan, the United States, and perhaps other areas -- have used these provisions in recent years to address trade problems, principally with those ferroalloys containing silicon (i.e., ferrosilicon and silico-manganese) (Table 10). All of the top five exporting countries -- including Brazil, China, Norway, South Africa and several states that were part of the former Soviet Union -- have been cited in the antidumping cases. In many instances, the dumping margins that were found were sizable. In the case of Ukraine, Russia and Kazakhstan, for example, the margins often exceeded 50 per cent, and sometimes were greater than 100 per cent.

TABLE 9. Final Uruguay Round tariffs on ferroalloys, by area

	Ferromanganese	Ferrosilicon	Ferrochromium
	---------- Percent *ad valorem* ----------		
OECD			
Australia	0	0	0
Canada	N.A.	N.A.	6.7
European Union	2.7	3.7 to 5.7	2.7 to 7.0
Japan	6.3	0 to 2.5	2.5 to 5.3
Mexico	35.0	35.0	35.0
United States	1.4 to 2.3	0 to 3.9	1.9 to 10.0
Eastern Europe			
Czech Republic	4.0	4.8	3.8 to 6.4
Poland	12.0	12.0	12.0
Romania	35.0	35.0	35.0
Slovak Republic	4.0	4.8	3.8 to 6.4
Other			
Certain Latin America[1]	35.0	35.0	35.0
Egypt	20.0	20.0	20.0
India	40.0	40.0	40.0
Indonesia	40.0	40.0	40.0
Republic of Korea	10.0	10.0	5.0
South Africa	5.0	5.0	5.0

N.A.: Not available on an *ad valorem* basis.

1. Argentina, Brazil and Venezuela.

Source: GATT Secretariat.

TABLE 10. Antidumping and countervailing duty investigations conducted on ferroalloys in recent years

Product/Area conducting investigation	Country investigated	Case type[1]	Status
Ferrosilicon:			
European Union	Brazil	AD	Final measure taken in 1991
European Union	China	AD	Final measure taken in 1994
European Union	Egypt	AD	Final measure taken in 1992
European Union	Former Yugoslavia	AD	Final measure taken in 1990
European Union	Iceland	AD	Final measure taken in 1990 and rescinded in 1993
European Union	Kazakhstan	AD	Measure taken
European Union	Norway	AD	Final measure taken in 1990 and rescinded in 1993
European Union	Poland	AD	Final measure taken in 1992
European Union	Russia	AD	Measure taken
European Union	South Africa	AD	Final measure taken in 1994
European Union	Sweden	AD	Final measure taken in 1990 and rescinded in 1993
European Union	Ukraine	AD	Measure taken
European Union	Venezuela	AD	Final measure taken in 1990
Japan	Norway	AD	Further details not available
Japan	South Africa	AD	Further details not available
United States	Brazil	AD	Final measure taken in 1994
United States	China	AD	Final measure taken in 1993
United States	Egypt	AD	No final measure taken (1993)
United States	Kazakhstan	AD	Final measure taken in 1993
United States	Russia	AD	Final measure taken in 1993
United States	Ukraine	AD	Final measure taken in 1993
United States	Venezuela	AD	Final measure taken in 1993
United States	Venezuela	CVD	Final measure taken in 1993
Silico-manganese:			
European Union	Brazil	AD	Provisional measure taken in 1994
European Union	Georgia	AD	Investigated in 1994; no measure taken
European Union	Russia	AD	Provisional measure taken in 1994
European Union	South Africa	AD	Provisional measure taken in 1994
European Union	Ukraine	AD	Provisional measure taken in 1994
Japan	China	AD	Final measure taken in 1993
Japan	Norway	AD	No final measure taken (1993)
Japan	South Africa	AD	No final measure taken (1993)
United States	Brazil	AD	Final measure taken in 1994
United States	China	AD	Final measure taken in 1994
United States	Ukraine	AD	Final measure taken in 1994
United States	Venezuela	AD	No final measure taken (1994)

TABLE 10. Antidumping and countervailing duty investigations conducted on ferroalloys in recent years (continued)

Product/Area conducting investigation	Country investigated	Case type[1]	Status
Ferrochromium:			
Brazil	CIS	AD	Final measure taken in 1994
Brazil	South Africa	AD	Final measure taken in 1994
European Union	Kazakhstan	AD	Final measure taken in 1993
European Union	Russia	AD	Final measure taken in 1993
European Union	South Africa	AD	No final measure taken (1989)
European Union	Turkey	AD	No final measure taken (1989)
European Union	Ukraine	AD	Final measure taken in 1993
European Union	Zimbabwe	AD	No final measure taken (1989)
Silicon metal:			
European Union	Brazil	AD	Final measure taken in 1992
European Union	China	AD	Final measure taken in 1990
United States	Argentina	AD	Final measure taken in 1991
United States	Brazil	AD	Final measure taken in 1991
United States	China	AD	Final measure taken in 1991
Ferroboron:			
European Union	Japan	AD	Final measure taken in 1990
Ferro-silico-calcium:			
European Union	Brazil	AD	Measure expired in 1992
Ferrovanadium:			
United States	Russia	AD	Provisional measure taken in 1994

1. AD: Antidumping investigation; CVD: Countervailing duty investigation.

Sources: Commission of the European Communities: *General Reports on the Activities of the European Communities* and monthly *Bulletins of the European Union*; US International trade Commission, reports on antidumping cases; various issues of *Metal Bulletin* and *American Metal Market*.

Unfortunately, we at the OECD were not able to examine the effects that the antidumping actions had on production and trade patterns, since most of the measures have been taken relatively recently. The measures have, however, undoubtedly worked to slow or reduce imports, or in at least one case, eliminate imports altogether from the countries charged with dumping.

What might the future bring in the trade area? Once economic reforms in China and the former Soviet Union are carried out, perhaps the situation in ferroalloys will stabilise, leading to a reduction in the number of antidumping actions taken. As indicated earlier, the situation will also be influenced by the changes in international rules agreed to in the Uruguay Round. The new rules specify in greater detail the methods to be employed to determine whether a product is dumped, the criteria to be taken into account in a determination that dumped imports were causing injury, the procedures to be followed in conducting investigations, and provisions related to the implementation and duration of antidumping measures.

Under the new rules, authorities will be required to allow exporters at least 60 days to adjust their export prices to reflect sustained movements in exchange rates. This would benefit exporters in countries where currency appreciation was occurring as they would be entitled to have time to react to the appreciation.

The new rules also define, for the first time, how large dumping margins have to be before antidumping duties can be applied. Henceforth, there will be no penalty if the dumping margin is less than 2 per cent. This would not have had any effect on the ferroalloy cases that have been considered recently since final margins have all appear to have been well in excess of the 2 per cent level. The situation could, of course change in the future.

Also for the first time, the length that an antidumping measure can remain in place has been limited. No measure can now be maintained for a period exceeding five years, unless, that is, authorities determine that termination would lead to a continuation or recurrence of dumping and injury. The 5-year limitation, while qualified, should make it easier to eliminate measures that are clearly no longer appropriate by requiring countries to address basic issues according to a fixed timetable.

Guidelines have also been established that will limit the countries that are subject to antidumping actions. Henceforth, a volume of imports that is less than 3 per cent of total imports from the country cited for dumping (or 7 per cent if imports from a number of countries are considered collectively) will normally be considered negligible. In such instances, investigations would have to be terminated. In the case of ferroalloys it does not appear that this would have affected many, if any, of the decisions reached in recent cases as they have generally involved the major players.

In summary it can be said that the rules governing the use of antidumping measures have been strengthened through the establishment of more definitive and stricter guidelines. As a result, fewer countries will be involved in dumping proceedings (due to the exclusion of small

exporters), and the margins that are established could well be lower. On the other hand, the basic character of the antidumping rules has not yet been changed significantly. Those industries that would have filed cases on the basis of the previous rules would probably do so on the basis of the new rules. It is not clear that the final outcomes would be substantially different in many countries.

Other

There are, of course, many other factors that will influence the future structure of the ferroalloy industry. Growing globalisation in the ferroalloy industry, for example, could be important. In recent years significant new international relationships involving marketing, raw materials and production facilities have been formed, or are being explored. These relationships are global, involving companies in Eastern and Western Europe, the Middle East, Africa, Asia, North and South America, Asia and Oceania. We are following the growth in globalisation of industrial activities with great interest at the OECD. Such activity can enhance economic efficiency, thereby increasing economic performance. In the case of ferroalloys, for example, it appears that the growing number of international linkages will result in investment flows being directed increasingly towards those areas which have economic advantages, and that the closure of marginal facilities may be accelerated.

Work done at the OECD suggests that national and international policies may have to be fine-tuned in certain areas to help assure that the economic gains of globalisation are maximised. This will require closer co-operation at the international level in, for example, foreign direct investment and competition law and policies. Efforts need to be made to assure that investment flows are free and undistorted, and to assure that the generally pro-competitive implications of globalisation are not undermined through the creation of anti-competitive monopolies or dominant firms at the international level. In addition, it is recognised that effective policies need to be developed to address the needs of workers who may be adversely affected through the structural changes that occur in industries as a result of the increased globalisation. This too will require increased international co-operation.

Finally, questions have been raised regarding the division of labour between industrialised and developing countries and the effect that this might have on the structure of the ferroalloy industry. At this point in time it does not appear that initiatives are being pursued at the international level that would have a bearing. The last UNCTAD conference that occurred on co-operation in an area related to ferroalloys, for example, was held in the mid-1980s, on manganese.

THE OUTLOOK FOR 2000

The analysis presented shows that the structure of the ferroalloy industry (in terms of consumption, production and trade) changed significantly over a relatively brief time span.

Although world production was virtually the same in 1980 and 1992, production in most OECD countries plummeted, while that in China, Brazil and India rose sharply. At the same time, the importance of international trade rose significantly. Based on the above discussion, it appears that change will continue through the year 2000. On the bright side, overall demand for ferroalloys is likely to rise. The question is, who will supply future demand? As with steel, one has to start by saying that many outcomes are possible.

Under one, measures would be taken in the OECD area to address concern over environmental issues, resulting in higher energy and environmental costs. As a result, the competitiveness of the ferroalloy industry would decline further, forcing additional reductions in production (Table 11). The decline would be slowed, however, by antidumping measures, most of which would remain in force until 1997-1999, at which time governments would review the situation. Within the OECD area, those countries with mineral resources and/or a favorable energy situation could well enhance their competitive positions. The net production lost in the OECD area would result in increased import dependence, which would rise to about 30 per cent in the case of Western Europe and to 70-75 per cent in the case of North America.

The situation in Eastern Europe would be relatively stable, though net imports might fall somewhat. In the case of the former Soviet Union, increasing energy and transport prices and industry restructuring would result in a reduction in ferroalloy production -- perhaps largely in ferrosilicon --but the area would remain an important net exporter of ferroalloys. Dumping measures, however, would continue to affect exports. If key foreign markets were effectively closed, the outcome could be quite different.

In Latin America, expansion of low-cost power plants would provide further incentives for expansion of ferroalloy production in the region, which would more than double its net exports of ferroalloys. In Asia, growth in ferroalloy production would not keep pace with increases in steel production, resulting in higher net imports. China would continue to experience growth in production on the basis of its relatively low energy costs. In India, much would depend on the course of the country's economic liberalisation programme. Current energy prices there seem to vary considerably among locations. In Africa and the Middle East, production would also continue to grow, which would permit net exports to grow as well.

This is one scenario. As indicated, many other scenarios are possible, depending on the assumptions one makes about the market and industry conditions. As stated at the outset, the structure of the industry will be determined by the decisions that each company makes in the areas of marketing and investment. Governments, of course, will also play a role to the extent that they take measures that affect these two areas. Then there are the decisions that your customers make. Whom they pick and choose to supply their ferroalloy needs will be based on their own particular needs and interests. This is an important area that, for reasons I mentioned earlier, have not been addressed, but would need to be in a more comprehensive analysis.

TABLE 11. The ferroalloy situation in 1992 and an outlook for the year 2000, by area

Area	Production		Net trade		Consumption	
	1992	2000	1992	2000	1992	2000
	Thousand tonnes					
Western Europe	3,062	2,500	(553)	(1,100)	3,615	3,600
Eastern Europe	492	600	(178)	(100)	670	700
Former Soviet Union	4,212	3,600	1,501	1,400	2,711	2,200
North America	850	600	(1,407)	(1,600)	2,258	2,200
Latin America	1,466	2,500	514	1,150	952	1,350
Asia and Oceania	4,973	6,500	(969)	(1,500)	5,942	8,000
Africa and Middle East	1,559	2,500	1,092	1,750	467	750
Total	16,615	18,800	0	0	16,615	18,800

Note: figures might not add to totals shown due to rounding.

Sources: US Department of the Interior, Bureau of Mines and estimates of the OECD Secretariat.