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TABLE OF CONTENTS

INTRODUCTION

1. "General Objectives Steel 1995" is being written in a radically different economic and political climate from the General Objectives for 1985 and 1990.

Together, the lasting macroeconomic boom coinciding with the ending of the measures to combat the crisis in the steel industry have restored normal conditions of competition for most steelmakers.

Henceforth the common steel policy will revert to the normal ways and means of the ECSC Treaty: the medium-term industrial strategies for the Community's steel industry will be laid down at a time free of the constraints imposed by the crisis measures.

2. These strategies must take into account the results, as they now appear, of the crisis period, and in particular the period during which steel undertakings, while eligible for several types of aid (under the Aid Code), were subject to very strict regulation of the market (Article 58), price controls (Article 60) and capacity-shedding obligations. The results can be quantified briefly as follows:

- production capacity (MPP) for hot-rolled products fell from 194.5 million tonnes in 1980 to 165 million tonnes at the end of 1988 (EUR 12);

- employment fell from 672 000 in 1980 to 409 000 in 1988. This trend is all the more remarkable by comparison with 1975, when the workforce of the steel industries of the twelve countries which are now Member States of the ECSC exceeded 870 000;

- the State aids authorized between 1980 and 1988 under the Aid Code (for EUR 10 and for Spain and Portugal) was in the order of ECU 40 000 million. This figure does not include the aid recently authorized for the publicly owned Italian steel industry;

- investment in the steel industry, including coking plants, between 1982 and 1988 amounted to ECU 21 200 million (EUR 10);

- between 1980 and 1988, MPP (EUR 10) for continuous casting rose from 70.9 million tonnes to 134.2 million tonnes (151.2 million tonnes in the Community of Twelve).

These figures call for some explanatory comments. At this stage, we will simply say that, while the trend in capacities and employment and the large sums of public money injected into the industry show the scale of the efforts

being made by the various operators involved, the last two figures - the overall investment trend during the restructuring period and especially the maximum possible production for continuous casting - show the major role played by the "modernization and adaptation of plant" in the restructuring policy.

3. Another significant achievement was the major improvement in the financial situation of the large majority of Community undertakings. This was helped by the abovementioned State aids and by the fact that, thanks to the organization and control of the Community market, Community steel prices did not fall too low. These definite improvements, however, do not mean that restructuring is now complete. The crisis has also brought home the fact that the steel undertakings' results (in terms of profit or loss) depend very largely on the efficient use of the factors of production. This is one aspect of restructuring which calls for further progress to reestablish a balance between the various stages in the overall production process. Hitherto, the inflexibility imposed by the quota system has, despite the easing of the rules since 1986, delayed certain strategic decisions on industrial and commercial cooperation between undertakings. Such decisions began to gather pace only in 1988, as the quota system was drawing to its end and the economic situation became exceptionally favourable.

Although the results for 1988 and 1989 are extremely good - in particular with regard to the financial situation of steel undertakings - it must not be forgotten that the steel industry, just like other basic sectors, faces fluctuating market conditions: relatively small changes in demand together with a commensurate weakening of prices, can once again place certain steel manufacturers in a difficult position.

4. This is why the Commission is proposing to lay down the broad lines for a common steel policy. But a policy must be based on principles: competitiveness, productivity and respect of the competition rules as well as the regular supply of the market and improvement in working conditions will be the basis for the arguments put forward throughout this document. This is precisely the policy line laid down in the ECSC Treaty, and it accords entirely with the current political and economic environment of the internal market.

In addition to stating its essential principles, any sectoral policy must be based on an analysis of the economic factors which characterize it.

It is not enough, especially for the steel industry, to note that the macroeconomic climate is good and is likely to remain so: the future of steel, as a raw material, must depend on trends in consumption, production costs, competition from alternative materials, supply (with

particular attention to scrap metal), new production techniques likely to be introduced in the short term and, finally, workforce skills.

Both the quantitative and qualitative aspects of these factors will be analysed.

5. In the spirit of Article 46 of the ECSC Treaty, the main purpose of "General Objectives Steel 1995" is to set out as accurately as possible the quantitative and qualitative medium-term scenario for the steel industry in terms not only of the products market but also of the market for the factors of production.

In the light of these analyses and forecasts, the Commission will propose the policy guidelines which it intends to apply in the years to come, using the instruments available to guide and back up steelmakers' strategies.

The document is divided into three analytical sections, summed up in a concluding chapter.

Part 1 seeks to define the qualitative scenario. In its four chapters an attempt is made to identify the factors which may be crucial to the development of the steel industry over the next few years.

Chapter I examines the relationship between trends in steel consumption and trends in GDP within the Community. In particular, an analysis is made of probable trends in steel consumption and its relative share of GDP and industrial production. Another important factor to be studied is the trend in specific consumption of steel and substitution.

Chapter II analyses the possible changes of scenario on the world market by studying the quantitative and qualitative trends in world supply and demand in order to identify specialization possibilities for the Community steel industry, which will be increasingly based on the quality of its products and the services offered to its customers.

Chapter III examines the main trends in technological progress which will affect the steel industry by 1995 in both production processes and products, to which an every larger research effort is being devoted.

Steelmakers can become more competitive only by exploiting one of these factors, i.e. either increasing their productivity (= cutting costs) or improving the quality of their products or marketing new or highly differentiated products that make a profit from innovation. Technological innovation is a very important means of safeguarding or improving the competitiveness of the Community steel industry as a whole.

Chapter IV analyses the impact on steelmaking of the new legal and economic framework which will be created by the completion of the internal market. The impact may be economic and financial: increased demand, higher or lower costs (of energy, environmental protection, transport, financing, customs formalities, etc.), and tougher competition will have an influence on commercial strategy. But there may also be an impact in terms of economic thinking: a trend towards less interventionist economic policies and the development of competition policy on mergers, and specialisation and rationalisation agreements.

Part 2 deals essentially with the analysis of, and quantitative forecasts for, the products market within the Community in 1992 and 1995.

Chapter V examines the outlook for internal demand using two kinds of approach. The first consists of an overall statistical model based on the relationship between GDP and the apparent consumption of raw steel: the second consists of a sectoral model based on trends in steel-using sectors and the quantities of steel they consume - i.e. specific consumption.

Chapter VI examines the outlook for the Community's external trade in steel. Forecasting the medium-term trends in Community imports and exports is particularly difficult since they will depend on several factors which can sometimes have opposite effects. For instance, some traditional tendencies towards international specialization may be curbed or even halted, at least temporarily, by the deliberate strategies of individual firms.

Chapter VII analyses Community supply, its present structure and future trends and prospects. From these considerations and from the results of Chapters V and VI (regarding internal demand and the external trade balance) certain conclusions can be drawn as to the necessary conditions for achieving an equilibrium between supply and demand.

Chapter VIII rounds off Part 2 with a brief look at past trends in steel prices and presents a few ideas which might provide a basis for a future prices policy.

Part 3 examines the market for the main factors of production. A detailed analysis is made of future trends on the raw materials markets (iron ore, scrap and ferro-alloys) and in energy inputs. The kinds of workforce skills and investment that will be required by the steel industry are also considered.

With regard to raw materials, Chapter IX looks at the main external factor, which is the supply of iron ore. The scrap metal market is also of great interest, in particular because of the fundamental role it plays in the development of electric steelmaking.

Chapter X examines employment trends and prospects, in terms of both numbers and skills. One of the important questions studied is the demand for skilled workers. The new technologies increasingly require a highly skilled workforce and this means a considerable increase in the costs of vocational training to be borne by steelmakers.

SUMMARY AND CONCLUSIONS

I. INTRODUCTION

1. The main purpose of the policy guidelines based on the 1985 and 1990 "General Objectives for Steel" was to ensure the success of the crisis measures taken under Articles 58, 61 and 95 of the ECSC Treaty; the goal was to restructure, in as orderly and coherent manner as possible, the Community's iron and steel sector, which had seen the crisis beginning in 1975 worsen after 1980. All concerned have made a major effort and accepted very great sacrifices:

   - The national and Community authorities have spared neither effort nor resources. Whether directly, by applying the Aids Code, or indirectly, by organizing and monitoring the internal market, by external trade measures or by bearing a great part of the social expenditure and the costs of regional readjustment, the Member States and the Commission have played their part.

   - The labour force did not go unscathed either. The consequences of the crisis hit employment in the regions concerned very hard, although the social and regional flanking measures went some way towards mitigating its effects.

   - Steel undertakings, for their part, have transformed their financial structures, their industrial and sales strategies, and their production methods to face the new situation both within and outside the Community. All this has been accompanied by major change in the business philosophy and management style of most managers in the Community steel industry.

2. At the time of writing, the economic and political environment of the Community steel industry is radically altered:

   - The continuing macroeconomic boom experienced since 1987 and, in particular, the combined expansion in investment in capital goods, in demand for certain consumer durables (e.g. motor vehicles) and in construction have been particularly beneficial for the steel sector.

- Faster progress towards the full internal market has set economic policy in an environment which is more open to free competition and less susceptible to public intervention, thereby encouraging steelmakers, like all industry, to exercise initiative.

3. "General Objectives for Steel 1995", drafted by the Commission in compliance with Article 46 of the ECSC Treaty, attempts, in a climate totally different from that conditioning previous ones, to analyse the key factors which could determine the sector's development until 1995. On the basis of these qualitative analyses and quantitative forecasts for 1992 and 1995, which have been prepared as objectively as possible and concern both the markets for steel products and the main factors of production, the Commission proposes the main lines of the policy which it intends to apply, using its powers and instruments under the ECSC Treaty, to guide and back up steelmakers' strategies in the years to come.

II. SUMMARY OF THE RESULTS OF ANALYSIS

4. Part 1 of "General Objectives for Steel 1995" (GOS-95) seeks to analyse the factors considered crucial for making realistic medium-term forecasts for the Community steel sector:

A. The relationship between the main macroeconomic variables and steel consumption in the industrialized countries and the Community in particular

Despite the acknowledged existence of a statistical relationship between the growth rates of GDP and apparent steel consumption, the statistical model should be used with great caution to allow for the effects of such variables as stock changes, which can distort and render meaningless forecasts of steel consumption based only on the trends in macroeconomic variables.

Nonetheless, having taken such precautions, the Commission, in its macroeconomic forecasts for 1988 to 1993 (GDP up by 3% p.a., investment up by 5% p.a.), which assume that macroeconomic policies in the developed countries remain stable and there are no major crises in the developing countries, expects gross steel consumption in 1993 of about 130 million tonnes, very slightly up on 1988.

B. Changes on the world market and the effect of macroeconomic and sectoral policies on the structures and international trade in steel products

The world steel market has been characterized for 10 years by rapid growth in production capacity in the NICs (mirrored by their domestic consumption) and by the restructuring which has followed stagnating demand in the OECD countries. These structural trends are the mainspring for the dynamic exports of certain NICs and the declining market share of traditional exporters (the Community and Japan).

The continuation of these trends and the expected buoyancy of world demand forecast for 1995 (on a par with 1988) should reduce imbalances between supply and demand at world level (which had until 1987 been forcing steel prices down) and lead to a growing regionalization (into large zones) of international trade in steel.

The political and economic development of the Eastern European countries need to be followed carefully, even more so in that, in most of these countries, the steel industry is a very important industrial sector and the changes which might occur in this sector will have an important impact in the world steel situation.

World trade in steel has also been influenced by government intervention aimed, in the OECD at facilitating restructuring, and in other countries, at encouraging expansion of the industry. Renewed growth in demand and the consequent reduction in global imbalances between supply and demand will see government's role gradually diminish, allowing trade to develop in a more orderly fashion.

Nevertheless, the enduring macroeconomic instability foreseeable in some countries or regions of the world could lead to fluctuations of greater or lesser abruptness, whether or not cyclical, in the steel trade, particularly because these countries do not always adhere to fair competition and pricing practices in either their domestic market or their exports.

C. The influence of continuous technological innovation on relations between producers and customers

Despite the considerable effort made during the recent quantitative phase of restructuring (cutting capacity, jobs and costs), steel undertakings in the industrialized world have for some years been engaged

in constant and accelerated technological innovation aimed at a more qualitative restructuring to meet the ever more exacting requirements of their customers.

As in most sectors of industry, customers are demanding higher quality throughout the range, from concrete reinforcing bars to coated sheet or special steels, and service which is faster, more comprehensive and, often, cheaper.
Community steelmakers must therefore increase investment in innovation and applied research.
This must encompass both processes at the different production stages (including, increasingly, processes to conform to environmental standards) and products; for the latter, close cooperation with users to improve quality and especially to find new applications or outlets for steel products has become even more essential.

D. The impact of the internal market

Although the Single Act makes no direct reference to the steel industry, completion of the internal market is bound to have an indirect impact on two areas in particular: production costs and, therefore, the conditions of competition.

Where costs are concerned, current and future policies on the internal energy market, on liberalizing the transport sector, and the capital market will probably lead to increasing uniformity of the unit costs of energy, transport and finance, where differences between certain Member States can at present be as great as 80% (e.g. in electricity).

The growing harmonization of economic, fiscal and monetary policies will mean a more competitive environment which will facilitate certain industrial cooperation projects between steel undertakings (even outside the national framework) already begun in 1988, which could make a positive contribution to the rationalization efforts still necessary in the sector.

5. Part 2 of "General Objectives", comprises quantitative forecasts for the market in steel products in 1992 and 1995 which take account of this qualitative analysis.

A. The internal-demand forecasts are based on the foreseeable development of user sectors, on the consumption by each of steel products and on trends in specific steel consumption.

Demand for steel from the construction, civil engineering and machine manufacturing sectors, and parts of the transport equipment industry will be sustained by investment; car production should also exceed the present high level in the medium term. In sectors such as packaging, where there is less potential for expansion, it would be realistic to expect quantitative demand to stabilize.
Furthermore, the downward trend in specific consumption should be less significant than in the past.

These changes will mean:

- real consumption of ECSC products at 110.7 million tonnes in 1992 and 114.7 million in 1995 (compared with apparent consumption of 111.7 million tonnes in 1988), representing annual growth of 1.4% on the reference period (1986-88), a rate of growth markedly lower than that of GDP;

- a shift in demand towards more elaborate products, e.g. coated and special steels.

These forecasts therefore indicate a structural trend towards stability over the period until 1995, (compared with 1988 levels), although this does not rule out normal cyclical fluctuations (such as that starting in late 1989), on a scale which will depend on variables that are difficult to pin down such as stockpiles, the trading behaviour of producers, dealers and users, and, finally, any pressure from imports.

B. The Community's exports and imports have generally been remarkably stable over the last ten years, and their structure too has remained relatively stable (with the exception of semi-finished products), but with considerable geographical concentration in certain parts of the world.

From here to 1995, the most reasonable scenario seems to be one of stability. In fact, even if certain long-term, albeit theoretical, trends point towards greater specialisation by product between industrialised countries and those new to production, which could lead to a slight deterioration in tonnage terms of the commercial balance, the companies' new-found dynamism and the overall good competitive position of the sector may nevertheless counterbalance these trends and maintain market share, both internally and in export markets.

This scenario of stability, compared with recent developments (the reference period being the average of the years 86-87-88) would therefore mean an overall commercial balance of around 13 million tonnes in 1995, resulting from an export level of 22.5 million tonnes, and an import level of 9.5 million tonnes.

The sensitivity of these assessments to factors such as fluctuating exchange rates and the knock-on effect on exports of developments in non-Community economies which have yet to stabilize nevertheless demands that these forecasts be regarded with considerable caution.

As far as the process of opening up to Eastern Bloc countries and the prospect of German unification are concerned, it seems premature to try to quantify their mid-term or long-term impact on the level of trade in steel products; this impact will most probably be influenced by the difference, notably from the aspect of quality, between the Community and the Eastern European countries in steel consumption as well as production. A certain pressure from exports of bottom-of-the-range products into the Community may be seen in the short term.

C. The above assessments give rise to estimates for output of hot-rolled products in 1995 of around 117 million tonnes, slightly above the figure of 115.4 million tonnes achieved in 1988 (Eurostat).

Comparing these production forecasts with the MPP (maximum possible production) of steelworks in 1992, recently confirmed by undertakings at the special request of the Commission, the following overall conclusions can be drawn (see table in Annex):

- The forecast average capacity utilization rates during the period 1992-95 for coil and strip mills (77%) and wire-rod mills (68%),[1] are just within the accepted norms for financing plant replacement: but from this overview emerges a certain concern about hot-rolled wide strip mills in particular, where disparities between undertakings' technical and financial structures are still great enough for new difficulties to be feared should there be even a short-term fall in production or prices for this product which is highly sensitive to market fluctuations.

1 Two thirds of these are in the electric branch of the industry and can therefore operate more flexibly.

- The forecast average utilization rates during the period 1992-95 for mills producing heavy sheet (65%), heavy sections (62%) and even for the most flexible mills producing light sections (63%) seem unsatisfactory and show that further significant cuts in capacity must be made to ensure the medium-term stability of undertakings making these products.

6. Part 3 of GOS-95 comprises a study of two highly sensitive factors of production (alongside those already mentioned, i.e. plant and energy) affecting steel undertakings' competitiveness: raw materials and labour.

A. Metallic raw materials (iron ore, ferro-alloys and scrap) are a major factor in the sector's economy because the Community depends heavily on imports.

Considerations of quality and low production costs dictate that most iron ore is imported from outside the Community, often under long-term contracts or through direct participation by our industries in mining ventures. Exhaustion of some deposits and, in some instances, political instability mean that Community steelmakers, to ensure continuity of supply at competitive prices, will have to increase their involvement by stepping up investment, in cooperation with those countries outside the Community most likely to welcome such projects.

Most of the constituents of ferro-alloys are also imported from outside the Community; certain countries (exporting chrome, for example) enjoy a virtually dominant position.

Finally, the collection in the Community of high-grade scrap may be insufficient in the short term to guarantee adequate supplies for the electric-steel industry and the development of new products and processes; new sources must be found, either by new recycling methods or importing.

In this respect, future standards for the protection of the environment should take account of the important economic factor which scrap recycling constitutes, and of the fact that these same regulations may encourage the collection, and therefore the final recycling of the product. Because it is the collection of a non-pollutant product, recycled steel may well be a valid competitor for other substitution products, whose collection and recycling may be less easy given the pollution problems which these operations may pose.

As can be seen, external trade plays a major part in supplying the steel industry and security of supply is a constant problem in an environment where the Community's industries are in direct competition with the other industrialized countries on the world market for raw materials.

B. Restructuring has transformed the employment situation; the steel industry is now much less labour-intensive: in 1975 it employed 870 000, in 1988 only 409 000 (Community of Twelve, including apprentices).

However, the labour force is now much more highly skilled and will become even more so as technological innovations are introduced on to production lines. The correlation between the increase in the sector's capital intensiveness, the sophistication of its products and the skills skills of its workforce will therefore continue to cause significant change in vocational training in the steel industry.

The job losses that could still be expected up to 1995, will be spread over the entire period, and will not have by any means the same scale as during the last decade.

III. CONCLUSIONS: FUTURE STRATEGIES AND POLICIES

7. The economic and political environment of the Community's steel industry in the future

A. The present macroeconomic situation and the forecasts on which GOS-95 is based are quite different from those underpinning GOS-90.

The 1985 forecasts for 1990, which in the optimistic scenario put hot-rolled sheet production at 109 million tonnes, were already being exceeded by a considerable margin in 1988 (114 million tonnes) because of a boom in all major steel-consuming sectors.

The sectoral policy, defined in the GOS-90 was mainly aimed at shedding the steel industry's surplus capacity, estimated at almost 30 million tonnes p.a. over the period 1986-90, and making the capacity retained technically and financially viable.

In contrast, the quantitive analyses in GOS-95 show, an economic climate and prospects which are generally stable when production forecasts for 1995 are

compared with those of 1988. When these forecasts are compared with the MPPs for 1992 announced by steelmakers, the theoretical overcapacities revealed are much smaller than those forecast in GOS-90, but they are static, since they ignore the fact that steelmakers' continuing investment in modernization and improving productivity will lead to some increase in the capacity of the plants concerned.
Although the climate is generally favourable, several points of uncertainty emerge from a dynamic analysis; steelmakers and the Commission should keep these points in mind when formulating strategies and policies for the years ahead. The main areas of uncertainty or instability requiring close monitoring are:

- the impact of cyclical fluctuations in demand for Community steel and the effect of imports on the volume and prices of Community steelmakers' deliveries;

- the effect, already mentioned, of the investment needed to modernize, and improve productivity on steelworks' actual capacity, where there remains an overall surplus for certain products (for heavy sheet and long products in particular, and to a degree for hot-rolled wide strip).

B. The political and legal framework for the Community steel industry will by 1995 be characterized by:

- continuing liberalization of economic policies; a clearly less interventionist stance on the part of the Community and a fully competitive environment will give steelmakers the initiative but also the responsability for all decisions affecting their industrial structures and commercial practices;

- a greater commitment by the Commission to secure compliance with the rules of free competition both within the Community, by firms (agreements or concerted practices) and by Member States (state aids), and in international trade; this has already started with the signature of a bilateral consensus with the USA;

- genuine determination by the Commission to support, if necessary, corporate initiatives using the instruments of the ECSC Treaty, which will bring steel closer to the other industrial sectors covered by the EEC Treaty.

8. Community steel undertakings and their strategic responsibilities

The aim of any industrial undertaking (and therefore of every steel company) which wants to maintain a stable position on the market in the long term is certainly to preserve or if possible to improve its competitiveness so that it can:

- meet the demand of its present and future customers in terms of volume, quality and price;

- generate sufficient cash flow to ensure through its own resources the reinvestments needed to guarantee an adequate return on capital invested and to mitigate the effects of cyclical fluctuations.

To achieve this objective, the Community's steel companies will be faced with important strategic choices on their own responsibility, of which the main elements to be considered are the following:

- generally strong prices from 1988 to the end of 1989 certainly masked the surviving overall excess capacity in most steel products and different levels of corporate economic performance, especially as regards depreciation and financial costs: the ability to resist a greater or lesser fall of longer or shorter duration in prices will therefore vary significantly from one undertaking to another;

- given this sensitivity to cyclical change, traditional risk limitation strategies are not applicable to all firms: diversification into different subsectors of steel, the possibility of joint ventures for new investments or agreements making for synergies in the use of existing plant will depend heavily not only on each company's management traditions and style (joint stock companies, family firms) but also on their industrial structure (integrated; electric, coastal and concentrated; inland and dispersed) and their commercial structure (diversified distribution system; high level of integration with dealers; close ties with major users);

- the introduction of new technological developments in the short term (such as the continuous casting of thin slabs) will also force certain integrated and electric steel firms to decide whether or not to incorporate them into their industrial structure, depending on their position on the flat products market, their supply resources for high-grade scrap, etc.

The immediate implication of these comments is that it will be up to each company to determine, depending on its industrial and commercial structure and its economic and financial situation, the structural adaptations it must still make in order to be prepared for less favourable conditions (in volume terms, but especially in prices) than those obtaining since 1987-88.

In any event the undertakings must be aware that the persistence of certain overall excess capacities in some steel products could disturb the market to an even greater extent if investment strategies are not adapted to market realities.

Accordingly, undertakings must understand that the Commission will pursue a very strict policy regarding state aids and monitoring compliance with Articles 65 and 66 of the ECSC Treaty. Similarly, they will no longer be able to count on an interventionist policy for the organization of the Community market (based on Article 58), which is not applicable in the event of normal cyclical fluctuations in a period of economic stability, as is expected for the steel market over the next few years.

9. The Commission's main policy lines

Taking account of the future economic and legal framework described in this document, the Commission will pursue its efforts to guide and support undertakings' initiatives in the following fields.

A. Continuous review of the internal market

The Community's steel market will increasingly be the fundamental element for most Community steel undertakings. The Commission will therefore continue to devote special attention to the continuous study of market trends in the short and medium term. It will use the instruments available to it under Article 46 of the ECSC Treaty.

These General Objectives for 1995 will be reviewed in 1992 in order to adjust the forecasts in the light of the data available for supply and demand. The Commission will supplement these analyses with monographs on major questions affecting the future of the steel sector, such as the supply of scrap (already started), the first-stage processing sectors, etc.

B. Monitoring of international steel trade practices

* When renewing the arrangement on the exports of steel products to the United States, the Community undertook with the American Government to abolish all similar voluntary export restraint arrangements (including the Community external steel trade policy system) by 31 March 1992 at the latest.

  In 1990 the Commission proposed to the Council a progressive liberalization of this external trade system (already started in 1989), to facilitate a smooth transition to the post-1992 environment.

* But the Commission will also immediately seek to obtain, if possible in the current Uruguay Round and in any case before 1992, a multilateral agreement imposing strict and effective discipline in international steel trade as regards state intervention and tariff and non-tariff barriers to access to steel markets, as already agreed in the bilateral consensus signed with the USA.

* In the context of the growing liberalization of trade in steel products, the Commission will try to prevent unfair practices having a negative impact on prices on the Community market. It will exhaust all the possibilities under GATT to improve the effectiveness of anti-dumping procedures.

C. Analysis of structural change

* In cooperation with the steelmakers, the Commission will continue its periodic reviews of changing production structures, mainly through steel plant census and through the analysis of the production capacities (MPP) and the investment projects notified by the firms.

* As regards the MPP, the Commission will ensure that the criteria for defining them are correctly applied and that their evaluation takes account of every possible productivity improvement obtained, where appropriate, from investment, new management techniques or verifiable changes in the product mix or in the normal operation of the plant.

* The Commission will deliver opinions under Article 54 ECSC on investment projects and on multiannual investment programmes at the request of companies, mainly with a view to obtaining a loan later on. The analysis of these projects and programmes must show these investments fixed in the overall strategy of the company and of the centres of decision.

* Through its opinions the Commission will consider as a positive element the introduction of more efficient new technologies. It will also inform investors of the updated forecasts for the markets in the steel products in question and if necessary will remind them of their responsibility for any market imbalance which their investment could cause.

  At the company's request, a loan may be granted to finance the investment if, on examination of the preceding conditions, the impact on the balance of the market is insignificant, or if the impact results from innovative technological elements in the investment.

  The Commission leaves the initiative and responsibility for investment decisions to the firms, while considering that the possibilities for industrial and technological cooperation between Community firms which can mitigate the negative impact on the market of an investment causing a significant increase in production capacities, and also help to rationalize Community steel supply.

* As regards industrial structures, the Commission will in any case ensure that the present developing trends towards industrial concentration does not impede effective competition on the markets.

  Nevertheless there is still a number of steel firms (or rather groups) in the Community where certain possibilities of complementary operation can be studied. The imminent prospect of a single market from 1993, and especially of a single capital market open to all Community economic operators, should facilitate the still necessary industrial readjustments and the sector dynamics.

* In this spirit the Commission will be in favour of complementary operations between Community steel firms, where such operations pursue the objective of facilitating the rationalization decisions and improving the industrial, commercial and financial structures of the firms concerned in the face of market conditions that could be less favourable than they are at present.

D. <u>General policy lines with financial consequences</u>

* The ECSC has a financing capacity which it uses to meet the needs of the steel and coal industries as defined by the imperatives of the sectoral strategies defined at Community level and as budgetary possibilities and constraints allow. For steel,

since 1980 the emphasis has been on the necessities dictated by restructuring and in particular the flanking social measures.

In the context of a dynamic steel policy, the financial operations of the ECSC should be steadily shifted towards objectives more directly linked with production structures and improving productivity, especially towards research and certain types of investment, and therefore social measures should be completed, following the guidelines described hereafter, and in the limits of the available resources.

The criteria for these operations should therefore be reviewed; the Commission considers that projects which could be submitted by undertakings, whether for research or for investment, should be individually larger than in the past and of greater significance for the whole structure of the undertaking concerned.

This reasoning will of course apply to all fields covered by the ECSC Treaty, the iron and steel industry proper as well as supply (iron ore, scrap, certain ferro-alloys), as policy for the sector must be planned on the basis of an overall strategy covering the entire industrial cycle.

* ECSC research: the Community policy which has been pursued since 1955 will be continued; a larger contribution will be made to the technological development of the sector on the basis of the following considerations:

  - the unremitting need for further cost price reductions and productivity improvements,

  - continued promotion of steel in its competition with substitute materials,

  - the growing pressure of environmental protection measures to reduce harmful emissions and to recycle waste and industrial effluent,

  - the 1993 single market, which necessitates research and adaptation studies for establishing rules and standards for manufacturing and construction;

  To maxamize the contribution of ECSC research to the development of the steel industry, action is needed on the following fronts:

- Developing cross-border and interdisciplinary cooperation in order to reinforce the advantages of joint research and to forge genuine European links.

  To this end the Commission intends to promote projects, quality being equal, which involve the greatest possible degree of cooperation.

- Promoting long-term high-risk Community projects in areas of strategic interest for the Community steel industry, such as new steel production technologies like reduction casting and continuous casting of thin products, or their advanced applications - coated steel, stainless steel, etc.

- Encouraging complementarity with other national and/or Community programmes: launching large-scale programmes, of the sort already run by our direct competitors, the USA and Japan, will demand considerably larger budgetary resources than are available for ECSC steel research at present.

- Bringing the research effort in all European producer countries up to the level of intensity of the most efficient, and encouraging each country to play its part in the common effort. The aim would be to reduce the disparities between countries and companies, facilitating better distribution of the efforts in this field. The result would also be a substantial increase in resources devoted to research. A target of ECU 5 per tonne of steel would be realistic, and would still represent only about 40% of Japan's expenditure.

  The Commission could encourage this trend by promoting projects involving the participation of producers, firms, universities and users with smaller capacities and resources.

* With regard to Article 54 ECSC loans, the Commission is planning, in order to expand its financial intervention, to bring back a system of interest rebates with a view to channelling investments towards priority fields in line with Community objectives and corresponding criteria. At the outset it could concentrate on loans for environmental protection measures.

  For alongside their efforts to improve competitiveness, firms are required by Community and national environmental protection measures to incur non-productive investment expenditure whose relative importance, which is still low at present, will

continue to rise: the estimate for 1989 is 4% of total investment expenditure. The Commission has launched a preliminary study to determine the scale, in financial and cost terms, of the environment protection obligations. This study will give the Commission the specific background for the steel sector which must be taken into account in any change in the criteria for granting aid for pollution control purposes (after the present Aids Code expires). In this context, particular attention will be paid to the polluter-pays principle, without, however, losing sight of the financial significance of the problem which is characteristic of this basic industry, and of the fact that steel is one of the most recyclable of industrial products.

In this respect, a particular effort will be made as far as regulations are concerned, so that there will be as few obstacles as possible to scrap collection, which in itself already constitutes a measure of respect for the environment. It is therefore appropriate that means be found within the framework of Community law for this type of operation to be encouraged.

* Finally, with regard to the investments to promote the consumption of Community steel, the Commission will continue to facilitate the financing of these investments pursuant to two sections in the communication of 31 October 1987:

  - industrial projects leading to an increase in consumption of Community steel or at least preventing its decline;

  - major infrastructure projects of European interest; this aspect has already aroused considerable interest in the national industries and a number of projects have already been approved by the Commission and the Council. This suggests that increased use will be made of the financial assistance available under this instrument in the very short term.

* Social measures: in framing its policy the Commission is faced with two fundamental problems. First, given the restructuring operations still to be completed and the effects of incorporating new techniques to improve competitiveness, more redundancies must be expected by 1995, though at a lower rate than in the 1980s; secondly, both the innovations in production technology and the development of computerized systems have transformed the jobs of steel workers and created major requirements in vocational training and work organization.

Faced with these two issues, the ECSC has several ways of supporting the strategies launched by the undertakings and underpinned in many ways by the Member States as regards the management of human resources.

The ECSC can facilitate the analysis and study of adequate solutions by means of research on industrial health and safety and through the work of the Joint Committee for the Improvement of working conditions. One example is the very detailed survey of vocational training requirements in the sector carried out among several firms in the Community and presented to steel experts at a briefing in Luxembourg last October.

This survey will be supplemented by an initiative to incorporate the views of employees and their representative organizations into the conclusions to be drawn.

Secondly, under Article 56 of the Treaty the ECSC runs a compensation scheme for making up the income lost by workers redeployed within the firm or elsewhere, including those taking early retirement, and to cover the cost of their retraining. As much as two thirds of the ECSC annual budget has been used for these measures over the last 10 years. However, this compensation scheme is restricted by the application criteria of Article 56: in line with the restructuring policies defined in the General Objectives for 1990, it applies only to workers affected by capacity closures or permanent cuts in activity; a second limitation stems from the high cost of this type of operation compared with the budget resources available.

In the light of the new economic and social context outlined in the present document, the Commission will study, as in fact it has already done at successive stages throughout the existence of the ECSC, the possibility to adjust the scope of Article 56 by emphasizing more the actions in favour of the objective of improving skills adjustments made necessary by the adaptations and changes in activity involved in the current restructuring phase in the steel industry. Given the foreseeable slowdown in the rate of job losses and the consequent reduction in funding needed for the accompanying social measures, the time is right for a change in priorities.

* Regional policy measures: the RESIDER assistance programme runs until 31 December 1992. Under the 1989 reform of the structural Funds, Member States may continue and step up regional aids in steel-producing areas that are eligible for objectives 1 and 2.

  The operational rules for granting conversion loans under Article 56(2)(a) of the ECSC Treaty have been amended so that they can be incorporated into the Community support frameworks in the steel-producing areas covered by objective 2.

* The Commission must fix the budgetary priorities annually, at the time when it takes its decisions on the draft budgets for the following financial year. It will therefore determine how far the new political orientations sketched out above, will be put into operation on financial and budgetary levels.

10. Conclusion: encouraging prospects and responsibilities for undertakings

The general economic background to the Commission's decisions for the General Objectives for steel 1995 is encouraging, both in the macroeconomic growth rate and in the resulting stability for steel, and the fluctuations will probably be no more than are normal in a cyclical market like steel.

These economic prospects offer a good opportunity to firms to finalize their structures and secure their position on the market. The clear trend away from intervention by Member States and the Commission, fostered by the momentum created by the Single Market, gives them a greater capacity for initiative, and also a greater responsibility, given the influence that their investment strategies and commercial practices could have on the stability expected for the medium term.

The Commission will continue to monitor market trends and steel industry structures, and will give particular attention to compliance with the competition rules, both on the internal market and in international trade. Similiarly, using whatever financial instruments it can under the ECSC Treaty, it will support corporate initiatives that are compatible with the aims of improving competitiveness and adapting structures to the quantitive and qualitative changes on the market.

PRODUCTION CAPACITY AND PRODUCTION OF STEEL 1992-95

(Million tonnes)

	MPP 1992-95	Production 1992	Utiliza-tion rate %	Production 1995	Utiliza-tion rate %
I. CRUDE STEEL	186.0	138.6	74.5	143.0	76.9
II. HOT-ROLLED STEEL					
Wide and narrow strip	79.0	60.2	76.2	62.9	79.6
Reversing-mill plate	13.9	9.0	64.7	9.1	65.5
Total: hot-rolled flat products	92.9	69.2	74.5	72.0	77.5
Heavy sections	14.5	9.0	62.1	9.1	62.8
Light sections	35.2	22.0	62.5	22.3	63.4
Wire rod	19.8	13.2	66.7	13.8	69.7
Total: long products	69.5	44.2	63.6	45.2	65.0
Total: hot-rolled proudcts	162.4	113.4	69.8	117.2	72.2
III. OTHER FINISHED PRODUCTS					
Cold-rolled sheet	47.3	32.6	68.9	34.3	72.5
Coated sheet	21.5	16.4	76.3	17.6	81.9

P A R T 1

THE KEY FACTORS FOR IDENTIFYING FUTURE TRENDS

CHAPTER I

THE MAIN FACTORS DETERMINING STEEL CONSUMPTION IN THE COMMUNITY

1. THE RELATIONSHIP BETWEEN GDP AND APPARENT STEEL CONSUMPTION[1]

The first oil shock in 1973 brought about far-reaching changes in industry in general and the steel industry in particular. These began to manifest themselves in 1975 (see Graph I.1) when there was a sharp break in the trend in crude steel consumption, which until then had grown steadily since the early 1950s.

Graph I.2 shows that crude steel consumption in the Community of Twelve followed the same pattern as in the other western industrialized countries (OECD). It can be seen that:

(a) there was a dramatic slump in 1975 and a less marked decline in 1982/83, in each case some time after the preceding oil shock;

(b) there has been a general downward trend since 1974 which flattened out in the early 1980s; afterwards, consumption remained virtually constant until 1987.

Consumption fell by over 20 million tonnes (15.8%) between the first five years of the reporting period and the five years around 1981. However, between 1981 and 1987 consumption in the Community of Twelve fluctuated within a 5% band either side of 104 million tonnes per year (see Table I.1).

In the United States demand followed a similar pattern to that in Europe until 1976, since when it has fluctuated widely but always in a very sharp downward direction, with a 35% drop from the average in 1977-81 to that in 1982-86.

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1 Apparent consumption covers production plus imports less exports, and is expressed here in terms of crude steel. Real consumption, i.e. consumption which takes account of variations in stocks, or even real final consumption, which takes into account not only variations in stocks but also the balance of what is known as "indirect steel trade", would be more relevant here than apparent consumption. We shall, however, be using apparent consumption in our analyses for purely statistical reasons.

In Japan, however, there was no sign of any structural downward trend in apparent consumption. Demand in Japan has followed a fairly cyclical pattern since 1970 with regular peaks in 1973, 1979/80, 1984 and 1988.

This trend is attributable to:

(a) a general slowing down in growth in the industrialized countries since the end of the 1960s which became particularly marked when oil prices rose. One phenomenon which is not often mentioned but is very relevant to an explanation of the behaviour of steel demand from 1974 to 1984, is the cutback in investment in capacity expansion; this is a regular feature of periods of recession and particularly of the recent slump;

(b) a general trend towards conservation of energy and raw materials which has been reflected in the steel sector by more efficient use of steel. Where the level of use remains constant, the savings achieved permit a sharp cut in crude steel consumption. This phenomenon has been accompanied by the impact of technological innovation: steel has been replaced by other materials such as aluminium or plastic in numerous industrial applications. To the extent that these alternative materials have a cost advantage (costs including not only the cost of intermediate products but also that of adapting production plants and processes), the possibilities opened up by technological innovation will be exploited and steel will continue to be replaced.

The computer revolution has brought about dramatic changes in the product mixes of sectors using steel. New electrical household and electromechanical products are making greater use of software and by-products of R&D, and less use of hardware and materials.

As a result of the efficiency gains achieved in steel plants by technical improvements in the liquid (continuous casting) and rolling phases, it is now possible to produce the same tonnage of final products using less liquid steel. This explains why the apparent consumption of rolled finished products has followed a healthier trend than crude steel.

It is also thanks to innovation in steel technology that lighter and better quality products can be made, with smaller average volumes of steel needed to meet a particular demand;

(c) the accelerating growth of the tertiary sector of the economy, resulting in a faster decline in the relative importance of steel-user sectors in GDP. Steel products are used for the most part as inputs in a small number of industrial sectors, ladle steelmaking, mechanical

engineering, transport equipment, electrical engineering and the building sector. The relative size of these sectors in a country's productive structure will partly determine the ratio of steel consumption to GDP. Since the 1960s there has been a steady relative decline in steel-user sectors and a concomitant expansion of the tertiary sector in highly developed economies.

This trend towards a more sparing use of steel was seen:

(a) in the steel companies themselves where wastage has been reduced in the conversion of crude steel into rolled products;[1]

(b) in companies which process steel products into components. Savings have been achieved in this sector as a result of the introduction of new technologies to reduce the number of rejects and improve cutting processes, thus reducing waste;

(c) among users, who use less steel for the same purpose by reducing the thickness of components. This has been made possible by the use of products with improved properties in terms of average and spread[2].

This trend towards a more sparing use of steel was more marked during the reporting period by an order of magnitude than the trend towards the substitution of steel by other materials (car industry) or that of other materials by steel (building). The overall impact of such substitution is very difficult to quantify.

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1 The following Table showing scrap production in the Community steel industry (as a percentage of crude steel produced) will illustrate this trend.

	1972	1981	1983	1989
Community (10)	21	16	15	13
Spain	21	17	16	14

Source: Europe

2 The following Table shows the trend in the thickness of tin cans and the number of cans which can be made from one tonne of cut hot-dipped tin.

Example of a milk tin - diameter: 63 mm height: 62 mm

	Thickness body (mm)	Thickness lid bottom (mm)	No of cans per tonne tin
1973	0.15	0.17	32 800
1990	0.12	0.15	39 000

The effect of these trends has been a steady reduction in the steel intensity of GDP which, as we have seen, depends on the sectoral structure of the economy as well as on technological factors. Structural factors have reduced production by steel-user sectors in overall production, whereas technological factors (with an obvious microeconomic component) have reduced the average tonnage of crude steel needed to meet user sectors' demand, i.e. they have reduced specific consumption.

The steel intensity of GDP has declined in the three major areas of the industrialized world, although the decline has been slower since the beginning of the last cycle (1984). In the case of the Community, Table II.2 would even suggest a reversal of this trend. It is probably a sign of recovery rather than reversal, which is normal in phases of cyclical upturn and in this case is even more significant in view of the deep recession which followed the oil shocks. In other words, the downward trend in the steel intensity of GDP, especially if expressed in terms of crude steel, will continue but will be slower than in the period from 1974 to 1984.

2. EXPLANATION FOR 1988 AND MACROECONOMIC PROJECTIONS FOR 1993

No full and detailed explanation can be given for the high rate of increase in apparent consumption in 1988 until much more sectoral data are obtained. An initial interpretation can, however, be advanced on the basis of the factors described in the previous section.

Observers have been struck not only by the large increase in apparent steel consumption (14.1% over 1987) but also - and especially - by the fact that the increase is much higher than GDP growth. Does this observation cast doubt on the stability of the statistical relationship between GDP and apparent steel consumption? Does it reflect a far-reaching and unexpected (but very positive) change in the structure of this relationship? If so, can we expect a period of growth in the steel sector in the years ahead? Can GDP trends continue to be used as an indicator of steel consumption trends?

Various studies have sought to identify a structural relationship between growth in steel consumption and growth in GDP and/or some of its components.

The 1982/83 OECD study[1] came to the conclusion that steel demand in the OECD tended to fall when the GDP growth rate was less than 3%, and tended to rise - but more slowly than GDP - when GDP increased by between 3% and 4.5% and rose faster than GDP when the growth rate exceeded 4.5%.

The 1988 OECD study[2] found a remarkable stability in the relationship between the growth rates of GDP and apparent consumption throughout the OECD over a thirty year period.

These General Objectives examine this statistical relationship for the Community of Twelve over the period 1973-88. As will be seen in the following Chapter, the results suggest that GDP growth rates of 2.4% and 3.1% are required to ensure the same or higher rates of increase in steel consumption.

Although the relationship has proved to be stable, statistical adjustment is not sufficiently reliable to provide accurate forecasts: 20% of the trend in apparent steel consumption remains unexplained (R^2=0.80).

These findings confirm a certain positive relation between steel consumption and GDP and the existence of a significant negative trend over time which reflects the gradual decline of steel intensity in GDP. They must, however, be treated with extreme caution and cannot be used automatically to explain a particular phenomenon or, even less, to make a specific forecast. In addition to these statistical constraints there are a number of factors, already outlined, which call for caution in interpretation:

(1) these thresholds reflect long-term trends;

(2) their value declines over time, mirroring structural economic changes;

(3) variations in stock levels cannot be identified if apparent consumption is used as an independent variable;

(4) in periods of economic upturn, the downward trend in the steel intensity of GDP may slow down, and even be temporarily reversed as investment and consumption of durables picks up.

In the light of these remarks, 1988 should be seen in the context of the general economic upswing already described above. Any general comment on 1988 will hence cover a number of cyclical aspects, of which the "abnormal" stockpiling observed is not the least. It can be concluded that there was not a significant change in the structural

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1 "Long-term demand for steel: determining factors and forecasting methodologies", OECD, 1983.

2 "Analysis of longer term developments in the demand for steel", OECD Steel Committee, SC/WP(88)28.

relationship between GDP and steel consumption. The GDP trend will always be an interesting indicator of what will happen to steel demand. It can be concluded, therefore, that the medium-term sectoral outlook is reassuring.

The Commission's medium-term macroeconomic forecasts (1989/93) (see Table IV.1 in Chapter IV) point to a period of relatively high growth (+3% on average for GDP) in the Community which will be fuelled essentially by investment (+5% a year).

This good macroeconomic outlook will be a key positive factor in the medium-term prospects for the steel sector and should keep the demand for steel at a high level. Significant increases in demand cannot, however, be expected in view of the factors discussed above.

TABLE I.1

Apparent consumption of ECSC and non-ECSC steel
In terms of crude steel equivalent

'000 t

Year	EUR 12	USA	JAPAN
1970	130.745	126.186	70.864
1971	122.504	126.885	59.095
1972	130.151	137.581	70.621
1973	139.905	149.205	88.467
1974	134.998	143.433	77.295
1975	113.100	115.978	66.783
1976	126.059	128.987	65.220
1977	118.305	133.043	63.205
1978	113.632	145.013	66.652
1979	122.936	140.061	78.163
1980	118.566	114.015	79.007
1981	109.285	128.523	71.136
1982	104.299	83.934	69.504
1983	99.236	94.011	65.614
1984	102.282	111.152	74.367
1985	101.592	105.095	73.377
1986	104.514	94.810	69.941
1987	103.637	101.642	75.757
1988(*)	118.138	112.200	86.600

(*) Provisional

Source : Eurostat (EUR-12)
ISI (USA, Japan)

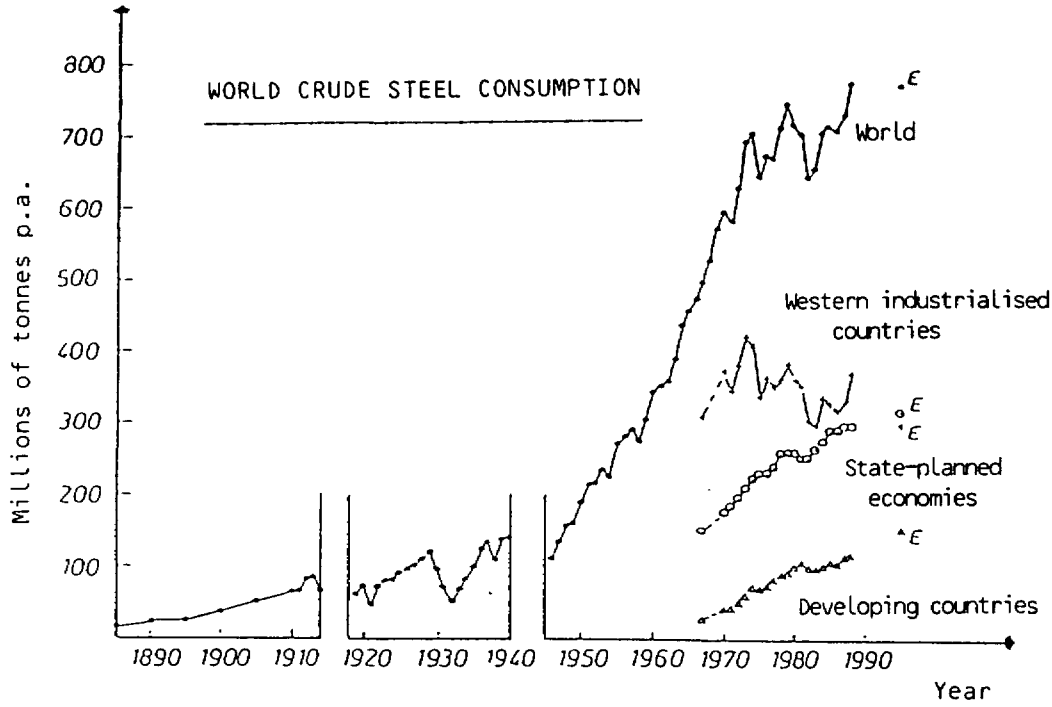
TABLE I.2

Average annual growth rates

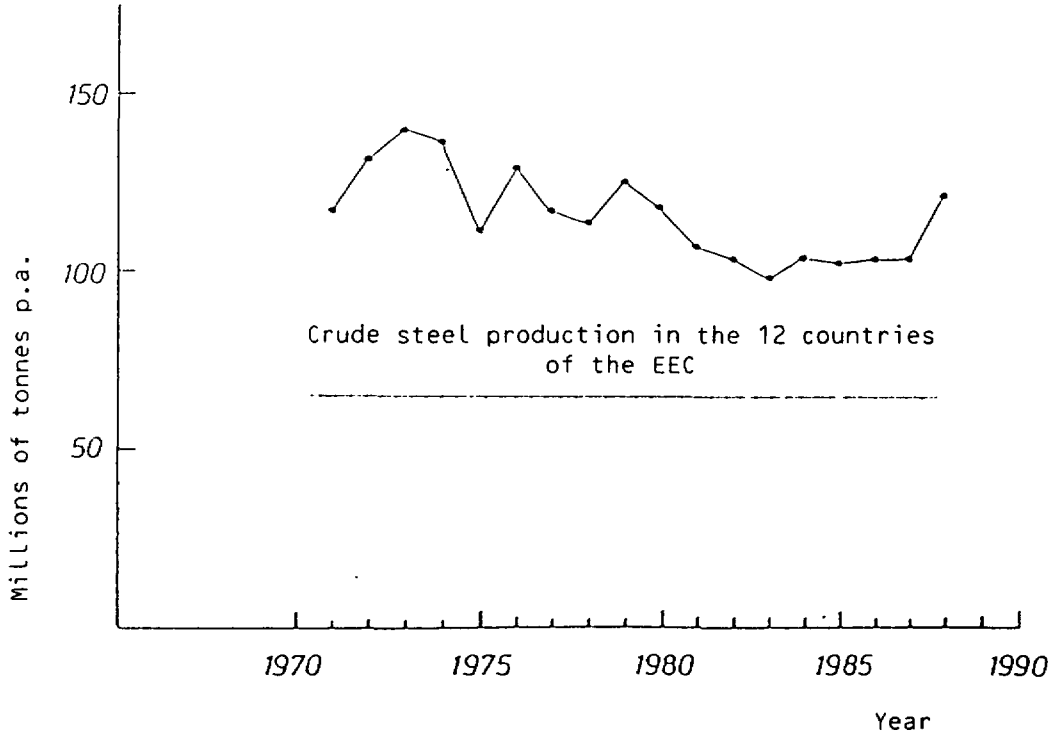
	Per capita consumption				Per capita product				Steel intensity			
	1	2	3	4	1	2	3	4	1	2	3	4
EUR 12	+0.2	-2.2	-3.9	+3.0	+3.3	+2.0	+1.0	+2.6	-3.1	-4.2	-4.9	+0.4
USA	+2.2	-1.5	-5.5	-2.2	+2.0	+2.0	+1.1	+2.5	+0.2	-3.5	-6.6	-4.7
JAPAN	+0.6	-0.8	-1.7	+3.0	+3.2	+3.6	+3.2	+3.7	-2.6	-4.4	-4.9	-0.7

1 : 1970/74 2 : 1974/79 3 : 1979/84 4 : 1984/88

Source : Eurostat (EUR-12)
ISI (USA, Japan)



Graph I.1 : World development of crude steel production
(Source : IISI)



Graph I.2 : Development of crude steel production in the EEC
(Source : IISI)

CHAPTER II

NEW TRENDS IN THE WORLD STEEL MARKET

1. TRENDS IN WORLD STEEL CONSUMPTION - NEW GEOGRAPHICAL DISTRIBUTION OF STEEL DEMAND

Over the last two decades, world steel consumption has been characterized by a slowing down of long-term growth and considerable changes in regional distribution. Most OECD markets have seen a stagnation or decline in steel demand, while consumption in the developing regions of the world has increased substantially.

World steel production (and demand) increased at a rate of about 6% per annum between 1950 and 1970 (6.1% in the 1950s and 5.6% in the 1960s). This slowed during the 1970s to 1.9% per annum following the first oil crisis, and declined further in the 1980s when consumption increased by only 1% (and, in fact, decreased in the industrialized world, not regaining its 1980 level until 1988).

There has been a major change over the last 30 years in the geographical distribution of steel consumption.

In 1960, consumption in the OECD countries accounted for 63% of the world total, that in the USSR and Eastern Europe 25%, and the remaining 12% was consumed by the developing countries.

In 1988, the OECD countries accounted for only 48% of world steel consumption, the share of the USSR and Eastern Europe was practically unchanged at 26%, and the rest of the world accounted for 25% of the total (see Table II.2).

Thus, during this period, the developing countries' share of world steel consumption had more than doubled, reducing that of the OECD by the same amount, and almost matching that of the Soviet Union and Eastern Europe.

Within the OECD, the period 1960-88 was characterized by the emergence of Japan as a major steel country, and by the relative decline of the USA and the European Community. Japan's share of world steel consumption is now almost 12%, as against only 5% in 1960. The share of the USA dropped from 26% to 14% during the same period.

The Community's share of consumption was over 23% of the world total in 1960 (countries of EC 9), whereas today, after the last enlargement (EC 12), it is just over 16%.

As to the rest of the world, the share of the Soviet Union and Eastern Europe has remained relatively stable (moving from 25 to 26%), while the greatest increase during the period 1960-88 occurred in the developing regions.

This is particularly true of Asia (including China), where steel consumption in 1960 amounted to 7.6% of the world total as compared with 17.1% today (more than the European Community or the USA). There has also been growth in Latin America (from 2.5% to 4.4%) and the Middle East (from 0.6% to 1.9%), and to a lesser extent in Africa (from 1.3% to 1.6%).

Table II.1 gives the consumption figures by region for the last decade.

The same trends can be observed in the long-term perspective: steel consumption declined rapidly in the USA (in particular) and in Europe until 1986, while the decline in Japan was less marked. In the OECD countries as a whole, the level of demand of the previous decade was regained only in 1988. By contrast, steel consumption expanded very rapidly in Asia (including China), but demand has stagnated in Latin America, Africa and the Middle East over the last 10 years.

Steel consumption in the Far East, including China, the rest of Asia and Japan, increased from 170 million tonnes of ingots in 1979 to 246 million tonnes in 1988; this represents a growth of total steel consumption of 76 million tonnes (up by 45%) in ten years, whereas consumption in the rest of the world merely regained its level of ten years previously in 1988.

Various political and economic uncertainties make long-term forecasting of world steel consumption a hazardous exercise. Nevertheless, the normal practice is to extrapolate the long-term trends already analysed. The development of steel demand in the past was determined by certain basic economic factors, the reconstruction process after the Second World War and the stagnation that followed the oil crisis. The key factors in the structural development of steel consumption in future will probably be the industrial development of the Third World and the growth of demand for certain capital goods and consumer durables (replacement) in the industrialized countries.

The experts unanimously take the view that these forces justify forecasts of steel demand in the direction of stagnation in the OECD and steady growth in the developing countries, particularly of the Far East. In these countries, with their high population density and infrastructure development needs, steel consumption will continue to expand.

In the industrialized countries, there is a steady trend towards consumption of more sophisticated products. This makes any comparison on a volume basis misleading, since the better quality steels are both tougher and lighter. The qualitative change is also apparent in the analysis in value terms, particularly when comparing production and trade flows in the OECD countries and the rest of the world.

The latest IISI forecasts put world steel consumption in 1995 at a level slightly above that of 1988, representing an annual increase of 1.1% for the period 1985-95. The IISI expects steel consumption to increase slowly in the industrialized countries (0.4% per annum between 1985 and 1995) and in the state-trading countries (0.5% per annum), and to continue to grow rapidly in the developing regions (4.3% per annum) (see Table II.3). Growth is expected to be most rapid in Asia (6.7% per annum) while consumption in the USA is expected to decline.

In the industrialized countries, the trend in steel demand forecast for 1995 is lower, at 344 million tonnes, than the 1988 level of 370 million tonnes, although this could be achieved if 1995 were to be a peak in the economic cycle.

2. TREND IN PRODUCTION CAPACITIES: RESTRUCTURING IN THE OECD COUNTRIES AND EXPANSION IN THE NEWLY INDUSTRIALIZING COUNTRIES

Crude steel production capacity in the OECD reached a record level of 577 million tonnes in 1980; this had fallen to 496 million tonnes by 1988, and it is expected to decline to 450 million tonnes by 1995.

Production capacity in the market economies outside the OECD rose from 75 million tonnes in 1978 to 124 million tonnes in 1988, and the forecast for 1995 is 151 million tonnes. Crude steel production in the state-trading countries was 321 million tonnes in 1988, and is likely to be just over 333 million tonnes in 1995 (see Table II.4).

While capacity in the OECD was declining, it was increasing at an equivalent rate in the newly industrializing countries not part of the OECD. The twelve Community countries and the USA together cut their production capacity by a total of 73 million tonnes in the period 1978-88. During the same period, the developing countries (including China) increased their production capacity by 76 million tonnes (mainly in Latin America and Asia). This trend is likely to continue until 1995, with production capacity in the OECD as a whole diminishing by a further 45 million tonnes and capacity in the developing countries increasing by 39 million tonnes. As a result, the cuts in production capacity by the OECD

will probably be offset almost tonne for tonne by capacity increases in the newly industrializing economies, repeating the pattern of the last 10 years.

It is perhaps worth stressing that the above global figures mask some interesting points. While most of the OECD countries made major capacity reductions in the 1980s, not all did so; Turkey increased its crude steel production capacity from 4.4 million tonnes in 1980 to 9.7 million tonnes today. Furthermore, while the production capacity of the state-trading countries is likely to expand only slightly between 1988 and 1995, China and North Korea will probably continue to build up their capacity.

Both economic and political factors are involved in the changing world picture of steel production. As to the economic factors, both demand and supply elements are in play.

On the demand side, there is clearly a close correlation between rapid growth in domestic steel consumption and the decision to invest in an expansion of production capacity. As already discussed in the previous section, the industrial dynamism of the NICs was at the root of the growth in their demand for steel and, consequently, of the development of their steel production capacities.

It is clear that, in some cases, the home market is too small to justify a given plant or that it fails to absorb the output of a new plant owing to a slump in domestic demand. In such cases, and in order to maintain reasonable utilization rates, it is vital to export. Latin America is the best example of how an economic crisis can provoke a surge of steel exports owing to a lack of domestic outlets (both to absorb the fixed costs of investment and to obtain foreign currency to pay off the external debt). In the countries of the Far East, by contrast, the growth of capacity is always matched by vigorous growth in consumption.

During the period 1978-88, production capacity increased by 21 and 48 million tonnes respectively in Latin America and Asia (including China). However, while consumption in Asia increased by 58 million tonnes, it was stagnating or in decline in Latin America, which explains the boom on the Asian markets and the rise in exports from Latin America. In general, steel investments in the past were based on a forecast of expanding domestic consumption (misguided in the case of Latin America), but there is an increase in projects aimed chiefly at the export market, above all for semi-finished products (Tubarao being one of the first examples).

As far as the supply side is concerned, the competitiveness of the steel industries of the newly industrializing countries has been a factor in their growth.

Competitiveness is always difficult to measure, given the confidential nature of much of the data and the fact that countries have different accounting systems.

The information available on production costs, e.g. from Paine Webber/World Steel Dynamics, appears to confirm that certain NICs such as Brazil, South Korea and Taiwan have the world's lowest production costs (approximately US$ 420 per tonne), while Japan and the USA alternate at the top of the production cost league depending on fluctuations in the exchange rates. At present, the total cost in Japan exceeds US$ 550 per tonne and US producers are managing to turn out steel at US$ 484 per tonne. On average, Community producers have an intermediate position (around US$ 450 per tonne), with overall production costs well below those of their OECD competitors, and the most efficient European producers achieve costs on a par with those of the NICs.

Although the productivity of labour in Brazil is low, its extremely low cost gives the Brazilians an advantage over their competitors. Raw material costs throughout the world are very similar, except in Brazil which has cheap national resources (iron ore).

All these cost comparisons have to be used with the utmost caution, as they are based on broad averages which obscure considerable disparities with regard to the product ranges and other key elements of the structure of every business.

To conclude, the expansion of internal demand and the competitiveness of certain new plants are two important elements in the growth of capacity in the NICs. However, it is perhaps government policy which has played the most important role.

All the developing countries which wanted to establish a steel industry resorted to protectionist measures. The steel industry, with its substantial economies of scale, is an ideal candidate for a policy of protecting nascent industries. The means employed by the newly industrializing countries to protect their steel industries ranged from high customs tariffs barriers to import licences issued only with the consent of the national steel industry. But the role of central government was not, of course, limited to protection against imports. Many governments in market economy countries outside the OECD gave financial support to their steel industries. As much of the steel industry in e.g. Brazil, Venezuela, South Korea, Mexico, Taiwan, Iran and India is state-owned, the governments of these countries were able to bring greater influence to bear in supporting the expansion of production capacities.

In the industrialized countries, governments also played a large part in restructuring the industry. In the Community, many steel undertakings recording major financial losses became state enterprises. Production capacity cuts in the

USA were chiefly the result of commercial decisions by steel undertakings reacting to massive financial losses due to overcapacity. The US industry, and to a lesser extent that of the Community, also received protection against imports. The Japanese steel industry embarked on its relatively modest restructuring under the direction of the MITI, and the steel industries of both the USA and Japan enjoyed tax concessions.

To sum up, both economic and industrial factors played a part in the massive expansion of production capacities in the newly industrializing countries and in restructuring in the OECD countries, but in both cases State interventionist policies were a key element. It is to be hoped that such intervention will not in future result in obstacles to true international competition.

3. THE BALANCE OF SUPPLY AND DEMAND AT WORLD LEVEL

Recent analyses of world steel supply and demand have attempted to evaluate the magnitude and movement over time of the international imbalances, which have been an important and persistent feature of the world steel market since the mid-1970s.

It is generally agreed that there has been a considerable excess supply for about 10 years; this is still a problem in the OECD and could continue to undermine future prospects for the sector.

However, despite this overall assessment, it is impossible to put a precise figure on the magnitude (or to forecast the future pattern), for several reasons:

- nominal technical capacity is a concept which varies widely from one country to another, so that comparisons (and additions) on a world scale have little meaning;

- the maximum utilization rates of nominal capacity also vary from one country to another, with the result that actual capacity is even more difficult to evaluate with any accuracy. This is due to factors such as infrastructure bottlenecks, production efficiency (including management), availability of raw materials, labour law, maintenance and production shutdowns, etc.;

- the structural balance or imbalance between supply and demand is the important issue here; consequently, it must be analysed in relation to steel consumption over the long term;

- global steel consumption figures throw little light on the markets for specific products.

However, despite all these qualifiers, the comparison of overall production capacity and steel consumption does give a general picture of the problem and its evolution.

3.1 Past trends

Between 1978 and 1987, the overall imbalance between world supply and demand (defined in simplistic terms as the difference between production capacities and steel consumption) remained remarkably stable at around 200 million tonnes, owing to the stability of world steel production capacity (between 900 and 950 million tonnes) and world steel consumption (between 700 and 750 million tonnes), except for certain years in which consumption collapsed (1982).

During this period, and despite this overall stability, different trends emerged as regards both production and consumption in the developing countries (in particular the newly industrializing countries of America and Asia) and in the OECD countries. These divergent trends were analysed in sections 1 and 2.

Within the OECD, major restructuring efforts by producers led to the elimination of 71 million tonnes of production capacity during this period. At the same time, consumption declined by 50 million tonnes. The reverse occurred in the developing countries (particularly in Latin America and the Asian NICs), with steel production capacity and consumption increasing by 76 and 57 million tonnes respectively. In Eastern Europe, the increases in capacity and consumption were more modest.

3.2 The concept of imbalance and the outlook

As already said, there are two main problems to be resolved if these rough comparisons of production capacities and steel consumption are to be used to evaluate the world imbalance between supply and demand.

With regard to supply, actual capacity (i.e. nominal capacity multiplied by the utilization rate) will provide a better basis for calculating potential production. In the case of demand, cyclical fluctuations over the long term need not be taken into account when evaluating structural imbalance.

In a recent OECD study, the "standard" utilization rates were put at 80% for the developing countries and 90% for the industrialized countries. If we apply this criterion, we find that in 1987, for example, when nominal steel production capacity was 940 million tonnes per annum, actual capacity would be no more than 833 million tonnes per annum.

Of course, these global utilization rates do not give an accurate picture of the situation of each steel plant, and other steel experts come to different conclusions (though generally speaking there is agreement that a standard utilization rate should be about 85% on average).

With regard to steel consumption, the study of imbalances between supply and demand must be based on long-term estimates of the demand trend in order to avoid being influenced by purely cyclical fluctuations.

Steel consumption reached a record level of 782 million tonnes in 1988. This figure should be seen against the last peak in steel demand in 1979, when apparent consumption reached almost 750 million tonnes.

The IISI forecasts that world steel demand will reach a new record in 1995, bringing consumption to about 800 million tonnes. These forecasts take 1985 (average 1984-86) as the base year, and assume a global growth rate of 1.1% per annum until 1995. In other words, 1988 is regarded as a peak year in this cycle which would not be representative of the long-term trend.

A simple extrapolation of world steel consumption since 1973 appears to indicate slow long-term growth leading to some 730 million tonnes in 1988. This level is not very far removed from the 1984-86 average used by the IISI as a basis for forecasting growth in demand in the period 1985-95. (An assumed annual growth rate of approximately 1% from 1985 would indeed result in approximately 736 million tonnes in 1988.)

The current structural imbalance between supply and demand at world level can be calculated as follows (rounded figures) on the basis of the estimates of effective capacity referred to above and the trend in structural demand.

- nominal steel production capacity=940 million tonnes
- actual steel production capacity =830 million tonnes
- real demand =780 million tonnes
- structural demand =730/740 million tonnes.

This gives a figure of around 90/100 million tonnes per annum for the difference between actual capacity and the trend in consumption.

Its future development can also be forecast using this method. Of course, all the usual qualifiers apply to any long-term estimate of supply and demand (in addition to those mentioned above).

The hypothesis developed above, i.e. the stability until 1995 of the estimated world steel production capacity and the IISI forecast of a growth of about 1% in steel demand during the same period, could lead to a progressive reduction in the global imbalance between steel supply and demand.

Further reductions in steel production capacities in the OECD countries could offset the new capacities being built in the rest of the world (see section 2 above); in addition, world steel consumption is likely to increase. The combination of growing consumption and growing potential production in non-OECD countries and continued restructuring within the OECD should partly resolve the problem of global imbalance in the coming years.

3.3 Supply and demand imbalance by product and region

In spite of all the difficulties and imprecisions already mentioned, the problem of imbalance must be analysed more precisely by product and world region.

It is extremely difficult to obtain precise information either on production capacity or on consumption per product for the various regions of the world. A recent study[1] arrived at the following conclusions:

- world hot-rolling capacity amounted to 836.2 million tonnes per annum in 1988, of which 339.1 million tonnes was for long products (40%) and 497.1 million tonnes for flat products (60%);

- world utilization rates in 1988 were 77% for long products and 71% for flat products, or 74% for all finished products (73% in 1987);

- forecasts for global utilization rates are of the order of 71-76% in 1995, with 75-80% for long products and 68-74% for flat products. In other words, there is and will continue to be a greater surplus for flat products than for long products in the world as a whole.

With regard to the regional distribution of the gaps between capacity and internal consumption, this problem, as already indicated, primarily concerns the OECD and to a much lesser extent Eastern Europe. The developing countries as a whole are virtually not affected. However, structures within these broad regions are highly diverse.

In the OECD area, the European Community and the USA had to carry out painful restructuring to reduce production capacity by 32 and 41 million tonnes of crude steel

1 Paine Webber - WSD "World steel planner" 1989.

respectively during the period 1978-88. By contrast, Japan cut its capacity by only 2 million tonnes per annum, while countries such as Turkey greatly expanded their capacity during the same period.

Given the increase in capacity in all the developing regions, it is interesting to examine whether this additional production will correspond to the growth in national steel demand, take the place of imports or flow into world markets in the form of higher exports.

Table II.6 shows that in 1978 each of the developing regions had a shortfall in steel production capacity to the extent that it did not cover home demand. Ten years later, the shortfalls had increased in Asia and decreased in Africa and the Middle East. The biggest change occurred in Latin America, where massive capacity increases led to a huge surplus over domestic consumption (which had been affected by the depressed home economy since the external debt crisis) and, consequently, massive exports.

The forecasts for 1995 paint a similar picture; Latin America would still have a gap of over 20 million tonnes per annum between capacity and consumption, while capacity shortfalls would continue to grow in Asia (but decline in China) and to diminish in Africa and the Middle East. If these estimates prove correct, the Asian markets will continue to be very buoyant in 1995 and absorb not only steel exports from their own region (Japan, South Korea and Taiwan), but also from the rest of the world (particularly Latin America).

4. WORLD STEEL TRADE

The world steel markets in the 1960s and 1970s were dominated by the emergence of Japan as a major exporter. In the 1980s, the dynamism of the traditional leading exporters (EEC and Japan) subsided and new steel exporters emerged, principally in Latin America, Eastern Asia and the Mediterranean region.

At the same time, the import markets of the USA, China, South East Asia and the Middle East registered sporadic peaks (Middle East) or sustained upward trends (Asia, USA) (see Table II.9 for the world steel trade by region in 1988).

With regard to products, flats (HR and CR strip and coil) accounted for the largest share of total world exports, but there was steady growth in semi-finished products (particularly slabs).

There are both economic and environmental factors underlying this trend which will probably continue to influence trade in semi-finished products.

Until 1985, net exports from OECD countries and net imports by developing countries increased at a steady pace.

They moved from 14/13 million tonnes in 1960 to 20/23 million tonnes in 1970, 50/48 million tonnes in 1980 and 52/49 million tonnes in 1985. After 1985, however, the OECD's net steel surplus dropped sharply to only 24 million tonnes in 1988. The two major OECD exporters, the Community and Japan, saw their net balance diminish from 67 million tonnes in 1985 to 42 million tonnes in 1988 following a slump in exports by both parties and an increase in imports (more particularly in Japan) (Table II.7).

Only the Asian countries now import more steel than in 1980. Net imports in Africa and the Middle East dropped from over 21 million tonnes in 1980-85 to just over 11 million tonnes in 1988. The trend reversal was even more spectacular in the Latin America countries: from having been major net importers in 1980 (8 million tonnes), they are now the only developing region whose steel exports exceed imports (almost 10 million tonnes of net exports in 1988).

Given that new production capacity is being created in the developing regions (the only regions in which consumption will probably continue to increase), and that restructuring is continuing in the OECD area, this long-term trend towards import substitution in the new steel-producing countries appears to be a likely scenario in the coming years.

Net steel exports in the Community increased from 13 million tonnes in 1970 to 38 million tonnes in 1985 (including both ECSC and non-ECSC products), before dropping back to under 21 million tonnes in 1988. As we have seen, the same pattern was followed in Japan.

The political and economic upheaval in Eastern Europe will not fail to have an impact on the industrial structure of the countries concerned, and consequently on their steel industries. Nevertheless, it seems premature to attempt an evaluation however approximative, of the trends.

Moreover, a preliminary sketch of certain changes which could be envisaged in the long term show certain contradictory trends, which prevent conclusions being drawn even as to the probable direction of steel production, consumption, and trade in the area. Thus, as far as supply is concerned, a certain restructuring of the steel industries might be expected in most of these countries. This could combine plant rationalisation with modernisation of production facilities, with a very uncertain result in terms of output (lower nominal capacity, higher productivity). In the same way, on the demand side, the desirable improvement in economic activity may not necessarily be in sectors with a high steel consumption.

Unfortunately, all these structural trends give no precise indications of short and medium term effects of the change in the economic structure of the region. The investment strategy of the Community's industry (notably in steel-consuming sectors) will probably have a considerable role to play in this new structure, and consequently in the structure of the steel industry.

Among traditional steel producers, there is a general trend to concentrate on internal markets and/or "natural" outlets, and to avoid low-price exports to "exotic" markets. After the first oil crisis, European and Japanese steel exports expanded rapidly to make good the fall in internal consumption. However, after the second oil crisis, it became clear that restructuring, and not exports, was the only way out of a structural crisis.

During the last few years, three quarters of steel exports from the European Community were concentrated on Europe (both East and West), North America, Africa and the Middle East; an equivalent proportion of Japanese exports was directed towards the Asian markets (including China), Australia and the USA. Thus, traditional steel producers and exporters tend to target markets close to home and to shy away from undue dependence on far-off markets.

In the share-out of the world market (see Table II.8), the developing countries have succeeded not only in increasing their share of steel consumption in their own region (from 46% in 1960 to 70% in 1987, and from 67% to almost 76% if China is included), but also in capturing over 4% of OECD consumption and more than 1% of consumption in Eastern Europe. The reverse has been the case for the OECD countries, which not only lost part of their internal market to the developing countries and the countries of Eastern Europe (the OECD share falling from 99.6% to 93.8% between 1960 and 1987), but also half of their share of the market in the developing world.

For the European Community, which supplied 40% of the steel consumed in the OECD area in 1960 and 33% in 1987, the slump in its market share has been particularly marked in the developing countries: it fell from 34% in 1960 to 10% in 1987 (see Table II.8).

If China is included among the developing countries, the Community's market share fell from 20% in 1960 to only 7% in 1987, while the overall volume of consumption in the developing countries rose from 41 million tonnes to 203 million tonnes over the same period, throwing into sharp relief the extent of such a drop on extremely dynamic markets.

Table II.10 gives a more detailed analysis of the Community's market shares. They have remained stable overall in its traditional markets: approximately 30% in

Western Europe (with certain fluctuations due to the accession of Spain) and about 3% in Eastern Europe; there was a substantial increase in North America during the 1980s.

The course of development was different in the markets of Latin America (the share of Community exports plummeted from 27% of consumption in 1960 to under 4% in 1988), Asia (from 24% to 7% during the same period), Africa (from 44% to 19%), the Middle East (from 74% to 19%) and Oceania (from 13% to 4%).

In all these regions, the combination of expanding internal production (and import substitution) and increased competition in export markets (first from Japan and then from the newly industrializing countries) explains the fall in Community market share.

Another important trend is the increase in exports from non-EC countries to the Community market, whose share of its own internal consumption fell from 96% in the 1960s to 90% in the 1970s and, following a sharp rise in imports in 1976-77, to only 87-88% in the 1980s.

TABLE II.1 APPARENT STEEL CONSUMPTION (million tonnes ingot equivalent)

	1979	1984	1986	1987	1988
USA	144.1	118.8	103.9	111.5	122.6
Canada	15.8	14.2	13.5	14.6	17.5
EEC (9)(1)	120.4	104.7	(103.6)		
EEC (12)			116.8	118.0	136.6
Other West European(2) countries	34.2	35.3	25.8	26.3	25.6
Japan	83.9	85.8	81.2	88.3	101.1
Australia and New Zealand	7.6	7.3	6.9	6.9	7.2
OECD	406.1	366.1	348.2	365.5	410.6
Latin America	34.6	30.5	35.5	37.4	37.1
South Africa	6.9	6.7	5.9	6.5	7.1
Other African countries	8.4	7.5	6.9	6.5	6.6
Middle East	17.9	20.3	15.6	13.7	16.2
India	11.9	12.6	15.4	16.5	17.6
Other Asian countries	24.5	31.3	36.6	43.3	48.8
Western World	510.3	474.9	464.0	489.3	544.0
Eastern Europe (including USSR)	214.0	218.4	223.4	225.5	224.4
China and North Korea	49.8	67.0	81.5	79.4	78.7
World	774.1	760.3	768.9	794.2	847.1

(1) EEC (8) in 1979

(2) Including: Greece in 1979, Spain and Portugal in 1979 and 1984

SOURCE: OECD

TABLE II.2 DISTRIBUTION OF WORLD STEEL CONSUMPTION

(%)

	1960	1988
OECD	62.6	48.5
of which:		
USA	26.1	14.5
Japan	5.6	11.9
EEC	23.6	16.1
Eastern Europe (including USSR)	25.4	26.5
Developing countries	12.0	25.0
- Africa	1.3	1.6
- Middle East	0.6	1.9
- Latin America	2.5	4.4
- China and North Korea	5.3	9.3
- Other Asian countries	2.3	7.8
WORLD TOTAL	100	100

Source: OECD data and own calculations

TABLE II.3 WORLD APPARENT STEEL CONSUMPTION
(million tonnes of crude steel)

	1985 (average 1984-85-86)	1988	1995 (trend)	1985-95 (% per annum)
Industrialized countries	332	370	344	+ 0.4
Developing countries	99	115	151	+ 4.3
State-trading countries	289	297	305	+ 0.5
WORLD TOTAL	720	782	800	+ 1.1

Source: IISI

TABLE II.4 CRUDE STEEL PRODUCTION CAPACITIES
(million tonnes)

	1978	1988	1995
OECD	566	496	450
of which:			
EEC (12)	221	189	-
USA	143	102	-
Japan	151	149	-
non-OECD market economies	75	124	151
of which:			
Latin America	31	52	57
Africa	12	16	17
Middle East	4	7	14
Other Asian countries	28	49	63
USSR, Eastern Europe	240	254	254-262
China, others	40	67	79
TOTAL:	921	941	934-942

Source: OECD data and own estimates

TABLE II.5 CRUDE STEEL PRODUCTION
(million tonnes)

	1975	1980	1988
OECD	377	390	382
of which:			
USA	105	101	91
EEC (12)	137	142	137
Japan	102	111	105
non-OECD market economies	50	80	106
of which:			
Brazil	8	15	25
South Korea	3	9	19
State-trading countries	218	246	291
WORLD TOTAL:	645	716	779

Source: IISI/OECD

TABLE II.6 STEEL CAPACITY AND CONSUMPTION BY REGION, 1978-1988-1995

(million tonnes crude steel)

	1978			1988			1995		
	CAPACITY	CONSUMPT.	DIFF.	CAPACITY	CONSUMPT.	DIFF.	CAPACITY	CONSUMPT.	DIFF.
Latin America	31.6	32.2	-0.6	52.3	30.5	+21.8	56.9	35	+22
Africa and Middle East	15.5	30.7	-15.2	23.1	26.5	-3.4	31.1	32	- 1
China and North Korea	40	48.3	-8.3	67.4	78.8	-11.4	79.1	85	- 6
Rest of Asia	28.2	35.8	-7.6	48.7	63.6	-14.9	62.7	90	-27

Source: OECD, IISI, WSD - own estimates.

TABLE II.7 EXTERNAL TRADE BALANCE IN VARIOUS REGIONS

(million tonnes ingot equivalent)

	1960	1970	1980	1985	1986	1987	1988
EEC (1)	16,6	13,0	23,9	38,0	25,5	26,2	20,9
JAPAN	2,7	22,7	37,1	37,2	33,0	26,3	21,8
EEC + JAPAN	19,3	35,7	61,0	67,4	58,5	52,5	42,7
USA	-0,1	-7,1	-12,9	-27,0	-22,7	-22,1	-22,2
TOTAL OECD	**14,6**	**19,6**	**50,8**	**52,3**	**39,3**	**32,9**	**24,5**
EASTERN EUROPE (including USSR)	**-1,2**	**4,3**	**-0,2**	**-1,3**	**2,4**	**2,3**	**7,5**
CHINA, NORTH KOREA	-1,0	-2,9	-6,1	-25,7	-23,4	-16,1	-10,9
OTHER ASIAN COUNTRIES	-4,2	-7,0	-12,6	-10,3	-12,0	-14,2	-14,9
LATIN AMERICA	-3,9	-5,3	-8,0	7,6	6,5	7,2	9,9
AFRICA, MIDDLE EAST	-4,2	-7,9	-21,6	-21,1	-11,8	-10,2	-11,6
TOTAL DEVELOPING COUNTRIES	**-13,4**	**-23,2**	**-48,3**	**-49,4**	**-40,7**	**-33,3**	**-27,5**

Source: OECD data and own calculations.

(1) EEC (9) -->/80 1985 --> EEC (12).

TABLE II.8 WORLD MARKET SHARES

(%)

CONSUMER REGION / DELIVERIES FROM	OECD				STATE TRADING COUNTRIES				DEVELOPING COUNTRIES			
	1960	1970	1980	1987	1960	1970	1980	1987	1960	1970	1980	1987
EEC	40,3	34,4	30,7	33,3	2,8	1,6	3,1	3,0	34,2	13,5	12,5	10,0
USA	41,0	31,1	27,1	24,3	0	0	0	0	6,2	5,8	3,2	0,5
JAPAN	9,4	21,9	25,2	24,3	0	1,5	2,5	3,3	7,7	18,4	20,5	12,3
OECD	99,6	98,3	97,0	93,8	3,5	3,6	6,5	7,0	50,5	39,9	41,5	26,9
USSR + EASTERN EUROPE + CHINA + NORTH KOREA	0,4	1,5	1,6	2,0	96,5	96,2	93,3	91,8	2,7	5,2	1,9	2,7
DEVELOPING COUNTRIES	0	0,2	1,4	4,2	0	0	0	1,2	46,8	54,9	56,4	70,4
WORLD	100	100	100	100	100	100	100	100	100	100	100	100
TOTAL CONSUMPTION (million tonnes)	216,1	376,5	374,1	365,5	106,0	175,7	262,3	304,8	23,3	47,5	111,6	123,9

Source: OECD data and own calculations

TABLE II.9 IMPORT/EXPORT MATRIX

DESTINATION / ORIGIN	EEC (12)	OTHER WEST EUROPEAN COUNTRIES	USA	CANADA	JAPAN	AUSTRALIA AND NEW ZEALAND	OECD	EASTERN EUROPE	CHINA AND NORTH KOREA	OTHER ASIAN COUNTRIES	LATIN AMERICA	MIDDLE EAST	AFRICA	OTHERS	TOTAL
1988															
EEC (12)		8,4	7,3	1,9	0,4	0,3	18,3	6,3	0,8	4,7	1,4	3,1	2,6	-0,8	36,4
Other West European countries	8,4	2,2	1,7	0,2	0,6	0,1	13,2	1,4	0,5	0,7	0,2	3,7	0,3	-0,2	19,8
USA	0,3			0,7	0,2		1,2		0,1	0,4	0,6	0,1	0,1	-0,1	2,4
Canada	0,1		3,7				3,8	0,1		0,2	0,1			0,3	4,5
Japan	0,4	0,2	5,1	0,3		0,7	6,7	2,4	6,4	11,8	0,8	1,6	0,5	0,5	30,7
Australia and N. Zealand			0,4		0,2	0,2	0,8			0,5		0,2		0,3	1,8
OECD	9,2	10,8	18,2	3,1	1,4	1,3	44,0	10,2	7,8	18,3	3,1	8,7	3,5		95,6
Eastern Europe	4,0	2,9	0,4	0,3	0,6		8,2	14,4	2,0	1,4	1,0	0,9	0,1	4,5	32,5
Latin America	1,3	0,7	3,1	1,3	1,5	0,2	8,1	0,2	0,9	4,3	2,3	0,4	0,3		16,5
Other Asian countries	0,3		2,7	0,3	4,9	0,1	8,3		0,4	4,0	0,1	0,8			13,6
Rest of the world	0,7	0,5	0,2		0,5		1,9	0,2	0,8	0,5	0,1	0,8	0,8	0,2	5,3
Others, non specified		0,3				-0,1	0,2							-0,2	
TOTAL	15,5	15,2	24,6	5,0	8,9	1,5	70,7	25,0	11,9	28,5	6,6	11,6	4,7	4,5	163,5

Source: OECD.

TABLE II.10

Share of Community steel deliveries in world consumption by region

(%)

	1960	1965	1970	1975	1980	1985	1986 (EEC 12)	1988 (estimate)
EEC (1)	96,0	96,6	90,8	90,9	87,9	87,4	87,3	88,6
Other West European countries	34,5	36,0	25,3	24,5	29,4	34,6	32,2	32,8
USA	2,8	4,5	4,9	4,1	3,9	7,1	7,5	6,0
Canada	8,2	13,2	3,6	4,5	2,6	7,0	8,8	10,3
Australia, New Zealand	13,2	6,3	2,7	2,1	0,7	1,6	1,3	4,0
Japan	0,7	0	0	0	0	0	0,2	0,4
OECD	40,3	36,3	34,4	31,0	30,7	31,2	34,5	34,0
Africa	44,7	37,1	25,4	25,4	23,7	21,2	21,9	19,0
Middle East	74,7	53,0	31,4	31,0	27,5	18,7	21,7	19,1
Asia	24,0	12,0	7,3	3,9	5,6	6,5	6,3	7,0
Latin America	27,5	14,8	8,1	12,5	7,1	4,7	6,9	3,8
USSR + Eastern Europe	2,8	0,9	1,5	4,2	3,4	3,6	3,3	2,8
China + North Korea	3,3	2,4	2,6	3,1	1,8	4,3	4,1	1,0

(1) until 1985, EEC9

Source: OECD figures.

CHAPTER III

TECHNOLOGICAL INNOVATION

1. INTRODUCTION

The competitiveness of the Community steel industry depends to a very large extent on its application of advanced technology. While, on the one hand, the restructuring activities of the last few years led to some streamlining of the means of production (elimination of obsolete plant and duplication of jobs, more suitable locations, etc.), the introduction of more modern, efficient production techniques is, on the other, a recent phenomenon, linked to the final, qualitative phase of restructuring.

Thus the ground made good in respect of the more advanced steel industries (Korea, Japan) does not represent the final step, for the gap has not yet been closed and, above all, investment by the Community steel industry in innovation and applied research is still running below that of the most serious competitors.

The Community steel industry must therefore exploit the current favourable profit situation due to the business upswing and launch a concentrated technical and financial effort.

2. CHANGES IN THE EUROPEAN STEEL INDUSTRY

The technological innovation that has taken place in the European steel industry in the last few years, in part as a result of the R&D effort, concerns both processes and products.

These two aspects are often intimately linked. In the first place, new production techniques are generally accompanied by improved or even completely new products (continuous casting of sheet); secondly, the creation of new products developed in the laboratory and tested in the pilot plant frequently involves the construction of new production lines (coated products).

2.1 Process changes

Steel is no longer produced in the same way as in 1974 and in many cases it is no longer the same product.

The main changes in the production lines that have now become standard are ore beneficiation and improvements in blast furnace operation, pre-treatment of pig iron and oxygen steelmaking process, direct feeding of scrap to

electric-arc furnaces, ladle metallurgy, casting and solidification, hot rolling, cold finishing or rolling, heat treatment, product coating, etc. These will be considered in the light of the following benefits:

- lower production costs;
- improved productivity and working conditions (6.9 h/t in 1983, 3.9 h/t in 1988);
- lower energy consumption (10-15% of cost of production);
- enhanced product quality and industrial environment.

Manufacture of pig iron

Extensive research has provided improved knowledge of various phenomena; the use of new measurement sensors and software in sintering plant and blast furnaces has given operators a more complete and precise picture of conditions, enabling them to react more quickly and on better information and to apply new strategies in the choice of materials, e.g. use of pellets and agglomerates with a high iron content and improvement of their reduction properties and behaviour in the blast furnace.

This has led to improvements in metal yields and increased productivity, in particular by concentrating operations on large-diameter blast furnaces and closing small plants, as well as on improving pig iron quality, particularly in respect of sulphur content.

A number of energy-saving measures have been implemented, such as recovery of sensible heat from the off-gases of the sintering plant and hot-blast stove, blast furnace gas-recovery turbines, dry quenching of coke, etc., while coke is increasingly being replaced by coal injected directly to the tuyeres.

Steel manufacture

In oxygen steelmaking plants, the use of pig iron with lower silicon and phosphorus contents has made for a considerable saving in flux (lime) consumption. This, together with combination-blown processes, has resulted in considerable gains in metal yield (5-10%) and refractory life (approximately tripled).

R&D has also been geared to developing new converter gas recovery techniques, in particular by dry filtration. Thirteen European steelworks currently recover this gas, which leads to a considerable enhancement of the steel environment and yields savings of over 0.5 GJ/tonne of steel.

Considerable advances have been made in electric steelmaking with the aid of power transformers, scrap preheating and some injection of oxygen, including from the bottom. This led to an average 20% saving in electricity. An industrial DC furnace has been developed, reducing electrode consumption by half with, in addition, an appreciable effect on the level of noise and scale of load fluctuations in the electricity supply networks.

Furthermore, the virtually general application of ladle metallurgy has made it possible to cope not only with extremely tight analytical ranges, but also to steadily reduce impurity content.

In the particular case of electric steelworks, separation of the melting operations in the furnace proper and refining in the ladle has made it possible to achieve productivity levels of one cast per hour or below.

Finally, in the manufacture of stainless steels, AOD ladle metallurgy has made it possible to increase recycling of stainless steel scrap and to use high-carbon ferrochromium in place of costly refined ferrochromium. This saving is particularly welcome in view of Europe's dependence on third countries for supplies of these materials.

Continuous casting and hot rolling

This process is now very widespread owing to the considerable savings in costs and energy obtained in continuous casting of slabs, blooms or billets. However, it should be stressed that its growing importance is related to on-going improvement of all aspects of the process, e.g. design, instrumentation, metallurgy, which have made possible the current achievements in the field of productivity, reliability and quality of the manufacturing programme. An example of this final point is the recent development of horizontal continuous casters, which are particularly well suited to the manufacture of small lots of special steels.

Wide-strip mills have undergone profound changes in the last few years in order to adapt to feed exclusively from continuous casters; larger dimensions of semis, discontinuation of pretreatment, hot charging and, if possible, direct rolling have required engineers to study large width reductions and more flexible scheduling of the widths rolled.

The downstream requirements, mainly of the cold-rolling mill, concerning dimension tolerances, flatness and section of the strip have led scientists to develop new measurement and control techniques: trimmers, AWC, AGC, axial displacement and bending of the rolls, tensiometers, etc.

In the case of long products and heavy sheet, harnessing of the rolling heat for in-line heat treatment, such as the Tempcore or QST processes developed entirely in Europe, greatly improves the weldability and formability of steel while reducing the need for costly alloying elements.

As far as energy savings are concerned, there has been a steady improvement of the order of 3% per annum for the whole hot chain - manufacture of pig iron and steel and hot-strip mills - the best results of 18.65 GJ/tonne of hot coil being comparable to the efficient Japanese results.

Cold rolling and coatings

The cold-rolling mills for sheet have also made productivity gains, particularly by grouping tandem cold-rolling mills in continuous/semi-continuous arrangements, and savings as regards dimensions by the same means as those described for the hot-rolling mill, except that the absolute precision required is much greater and requires further development.

Other improvements in productivity and product quality have been obtained in annealing processes, in particular continuous annealing, skin passing (temper rolling) and/or high-convection hydrogen furnaces. Considerable research is required to develop such processes, not only on the technological level, but also on metallurgical aspects, with repercussions reaching to the steelmaking stage, particularly regarding the analysis of pig iron and scrap.

There has been an increase in demand in Europe for flat products with improved corrosion resistance, which has led to an increase in both quantity and quality terms in production capacities for coated sheet. Developments in the quality of the base metal (formability), the coating (hot dip process, electrogalvanizing) and the quality of its adhesion may serve as examples.

In the same connection, although more geared to the construction and capital goods markets, the production of organically coated flat products has developed to replace expensive painting or enamelling of finished products. In this field Europe already has combined galvanization and coil-coating plants.

2.2 Changes in products

There has been a considerable change over the same period in the products manufactured in the European Community.

- Cold-rolled sheet: the development of new sheet qualities for deep-drawing (interstitial free, etc.) has made it possible to satisfy the most stringent requirements of

processors. Enamelling steels have had to be adjusted to the continuously cast killed steels, while the new continuous annealing lines have permitted the development of new high-strength steels (HSLA), with good form and welding properties for the motor industry.

Fabrication techniques have been improved in collaboration with the manufacturers themselves, such as new pressing techniques (plastic forming) or surface monitoring (roughness) and joining to other materials by bonding.

- Coated sheet: galvanized coatings, electrogalvanized products, zinc-aluminium coated or aluminized and pre-painted products which can withstand severe forming processes and welding after coating, have made it possible to meet the specific requirements of the motor and construction industry with regard to corrosion resistance and aesthetic appearance.

In the field of tinplate, improvements in gauge (double reduction) and formability have permitted the use of high-speed production processes which enable tinplate to compete with other packaging materials such as aluminium, plastics, glass, etc. It is worth mentioning here the project supported by the Commission on developing a drinks can made entirely of steel.

- Hot-rolled sheet: progress in the form of various treatments has led to an expansion in the use of such products with good forming and welding properties in the building of tanks for the petrochemicals and offshore industries.

- Wire rod: steel cord is continuing to make advances in the manufacture of radial tyres, conveyor belts and hoses.

Products heat-treated in rolling heat, such as concrete reinforcing bars, rails and beams, which are more resistant to wear and less vulnerable to brittle fracture while remaining weldable, represent a major advance in European technology although standardization work on these products is in some cases still in progress.

Increasing the competitiveness of steel in the construction industry requires a great many studies and developments, notably concerning the choice of the weight/strength ratio, the shape and dimensions of the sections, the modification of construction techniques, the use of simplified (nodal) joints and combinations with other materials (fire resistance).

- The particularly vigorous growth of stainless steels in Europe is due not only to the significant reduction in production costs, but also to work on opening up new markets in connection with the development of services to important

customers in various fields: decoration of buildings, lamp posts, beer casks, railway wagons, installation of flue gas desulphurization equipment, etc.

- The growth in wear-resistant steel has followed the development of better-performance and low-alloy grades, while heat-resistant steels - chromium-aluminium alloys capable of service up to 900°C - are set to experience major expansion in view of the Community decision on equipping vehicles with catalytic converters.

There has also been a considerable change in the composition of certain special steels, e.g. the replacement of heat-treatable chromium-nickel-molybdenum steels by boron steels or micro-alloy steels not requiring further treatment, the manufacture of unleaded free-cutting steels and the enrichment in alloying elements, chromium and molybdenum, of steels resistant to creep at increasingly elevated temperatures.

The result of these efforts is that:

1. The European steel industry has been able to meet the specific demands of its principal customers.

2. The substitution of alternative materials for steel has been slowed down.

3. The level of net exports from the Community has remained practically unchanged.

3. SHORT- AND MEDIUM-TERM INNOVATION

3.1 Key objectives in support of competitiveness

Maintaining and strengthening the competitiveness of the European steel industry in the world industrial and commercial context depend on continuing the efforts already undertaken in the two directions described above:

- reducing production costs and improving quality;

- maintaining the traditional markets for steel and opening up new markets.

In the first case, the lenght of time taken to produce 1 tonne is an issue. If in Europe, it currently takes between three and five hours of labour to produce one tonne of standard rolled products, some competitors are already aiming to reduce this time to two hours per tonne. With regard to energy consumption, Europe must reduce its current average from 22 GJ/tonne to 18 GJ/tonne, the level of the most efficient producers.

As far as the second point is concerned, the previous chapter has shown that the substitution of alternative materials for steel has yet to make an impact. This may well change in future, in view of the R&D activity scheduled in the field of competing materials and the changes in consumer habits which will occur when the 1993 single market has become a reality, particularly as a result of the application of new standards relating to products and their utilization.

Substitution must also be understood in the sense of internal substitution of one type of steel for another: alloy/micro-alloy steels, coated/non-coated products, etc.

The third domain in which technological innovation will be a determining factor is that of the environment. To keep up in a more and more demanding industrial context, the steel industry will have to keep up its efforts to create operating conditions, which on the one hand are not harmful to the surroundings - water, air, noise - notably by resorting to clean technologies, and on the other hand, give good performance in terms of the economy of its resources, notably by the recycling of its waste products and developing its by-products.

3.2 Expected results of technological innovation in processes in the period 1991-95

During the period 1991-95, research efforts will tend to optimize existing processes with a view to producing faster, better and more cheaply.

- "Faster" means that there must be further improvement in lead times, in the technical and qualitative reliability of equipment and process stages and in the flexibility of the production chain, particularly with regard to its "diversification" link.

To attain these objectives, it will be necessary to apply the new information monitoring techniques and engage in the integrated quality schemes already being implemented in some quarters.

- "Better" calls for improved knowledge of the phenomena operating in multi-phase systems at high temperatures.

The basic studies to be carried out in this field must involve a broader range of scientific disciplines: flow properties of fluids, shaping of solids, physico-chemistry of interfaces, or they must exploit new scientific discoveries such as the theory of fractals to study the kinetics of the reactions of porous materials.

New measuring sensors and software to process and interpret the data, i.e. automatic control, expert systems, etc. must be installed to provide operators with continuous information on phenomena such as dimensions, shapes, microstructures, mechanical properties, etc.

This is true of the traditional processes, but even more so of the processes being developed such as smelting reduction and continuous casting of thin products.

Finally, the construction of off-line models based both on theory and experience should make it easier to define operating strategies and optimize operations as a whole.

- "More cheaply" means continuing efforts to economize on specific consumption of raw materials, labour and energy and in the choice of the most appropriate materials and energy sources.

The issues at stake in the various fields are:

- production at lower temperatures of agglomerates with a higher iron content and better reduction properties;

- reduction of coke consumption in the blast furnace by increased injection of pulverized coal to the tuyeres, and in particular the use of higher hot-blast temperatures and oxygen enrichment of the blast;

- with regard to steel manufacture, the problem will be to increase recycling and decontamination of scrap by removing residual materials harmful to the steel;

- increase in the efficiency of electric-arc furnaces and ladle metallurgy processes, particularly in the manufacture of stainless steels, the expected growth in which of over 1 million tonnes in the coming five years depends on a reduction in production costs. Efforts will have to be made to conserve energy - electricity remains a costly energy form - and to save on raw materials, in this case chromium, by stepping up recycling, developing silicon- and aluminium-based substitute grades and/or reducing the use of chromium steels in product finishes;

- continuation of the efforts to improve continuous casting plant and to make technological and metallurgical improvements to the new casters for thin products and the downstream hot-rolling mills for thin slabs, sheet and bars that are beginning to be installed in various parts of Europe and the world. These developments should aim for an improvement of quality - surface condition and geometry - and of material and energy yield;

- the emphasis with regard to the cold-rolling mills and the finishing lines will be placed on raising production speeds, linking operations, diversifying production on existing equipment and developing more efficient techniques - in particular of pickling and electrolysis - and new products, such as painted tinned sheet, plastic films, composite soundproofing products, steel foils, etc., in respect of which Japan has already built up a certain lead;

- at each manufacturing stage, considerable efforts will be necessary to improve refractory life and use, to utilize by-products from an ecological point of view, and to design less expensive and more reliable equipment with a view to reducing maintenance costs.

The objective of developing these new techniques is to reduce cost prices.

3.3 Expected results of technological innovation in products for the period 1991-95

As in the case of processes, activities during the period in question will be geared to optimizing existing products and finalizing products under development to meet customers' requirements: faster, better and more cheaply.

- "Faster" means cutting lead times for the products required by the customer, and consequently:

- improved customer information, in particular by providing reliable, detailed descriptions of the various products available - through the approval and standardization bodies whose cover will extend to the whole of the Community in the light of 1993 - and by efficiently promoting new products;

- acquiring a better understanding of the behaviour of steels in order to respond more rapidly to planned new applications.

- "Better" means supplying fewer products to customers which are defective or in need of repair when put into service. This depends on:

- stricter quality control in manufacture and on leaving the works. This is taking the form of quality assurance measures and there will be an increasing need for non-destructive testing techniques;

- a better understanding of fabrication processes - forging, drawing, forming, milling, welding, etc. - in order to assist or advise the customer. In this connection, pilot plants or simulators equipped with adequate measuring facilities must be developed.

- "More cheaply" should not be interpreted in the sense of cuts in selling price, but of maintaining the market share of steel vis-à-vis competing products, i.e. its competitiveness in terms of application costs and utilization properties.

It is clear that these competitiveness goals will, on the one hand, have to be achieved by developing new products, but also by developing new, more efficient fabrication or design processes.

Let us consider some of the new developments expected in the various product categories:

- with regard to cold-rolled sheet for drawing, there are expected to be developments in surface condition, in particular the development of new roughness categories, while it is essential in the case of high-strength steels to reduce the spread of current grades and to create a new bake-hardening grade. Soundproofing products for the motor industry will probably be developed by combining steel with other materials (sandwich panels);

- research is in progress in the field of coated products, both with regard to the base metals and the coatings, and measures similar to those undertaken in the case of lids for drinks cans will have to be initiated for tinplate, in order to design and implement competitive packagings for tomorrow's markets;

- with regard to electrical sheet, Europe must keep up its diversification efforts undertaken in non-orientated sheet, but it cannot leave unchallenged Japan's monopoly in grain-oriented sheet in view of the advances these products have also made in the field of amorphous materials; although they are asserting themselves in the long-term, it is necessary to pursue actively the development of continuously cast steel foils by the melt spinning process;

- efforts will be continued to increase further the elastic limits and high-temperature weldability of hot-rolled sheet, particularly in response to demand from the welded tube market, but also in order to access new markets, including the new hydrogen industry.

- progress in the field of long products by heat treatment in rolling heat must be consolidated and generalized;

- efforts in the field of special steels will concern a deeper knowledge of the behaviour of these steels in respect of their resistance to corrosion, oxidation at elevated temperatures, wear, milling and welding, in order to identify the possibilities for adapting

analyses or compositions. The search for new applications will also be actively pursued, for example high-resistance stainless steels for the construction industry.

The development of new and more efficient production and design processes depends on R&D activities in fields more and more remote from the traditional skills of steelmakers and which will be of benefit to a wider public.

Steelmakers must be aware that these problems do not discourage the producers of certain other materials, but that solutions can be found in joint research with some users.

3.4 Results expected from technological innovation in the area of the environment

Certain companies have already made considerable efforts in this area, but attention must be paid to the fact that not all the solutions exist yet, and putting new procedures and new products into operation can pose new problems which have to be tackled.

These are certain fields in which technological innovation is already being seen, and which need to be developed by recourse either to clean technologies, or to the recycling of recoverable materials or developing by-products.

In the first category fall :

- carbon injection in blast furnaces,
- pre-treatment of pig-iron, minimising the production on non-usable slag,
- secondary metallurgy and, in particular, vacuum-degassing,
- direct charging of continuously cast slabs in reheating furnaces,
- neutral pickling, regeneration of pickling baths, and, for stainless steels, the replacement of nitric acid, by oxygenated water.

In the second are :

- the treatment of residual coking-plant water,
- the separation and retreatment of sediments rich in volatile metals, alkalis, and oils from blast furnaces, steel plants, and rolling mills,
- the extraction of noble metals - Cr, Ni, Mo, V - from the dust coming from electric arc furnaces used for the production of stainless steels,
- the destruction of dioxine produced by organic materials contained in electric furnace scrap.

So, so far as individual products are concerned, the attention of recycling steel must be emphasised, along with its degradable nature which, particularly in the area of packaging, gives this material a decided advantage over its less degradable competitors.

4. LONG-TERM PROSPECTS FOR TECHNOLOGICAL INNOVATION IN THE STEEL INDUSTRY

A substantial contraction of research budgets during the long crisis led to the postponement in the industry of long-term projects, which explains:

- the proliferation of current projects;

- the diversity of fields investigated.

What will a steelworks be like in 20 years?
It is by definition impossible to know in advance what will be the results of research and where they will be achieved: in Europe, Japan or the USA. For the moment, we shall have to be content with listing the channels currently being explored.

Manufacture of pig iron

The objective is to use coal directly, without having to pass through the coking stage, and possibly to use raw ore without the need for agglomeration or pelletization.

These processes, known in French as "fusion réductrice" and in English as "smelting reduction", are the subject of major strategic research in Japan, Australia and the USA. A process originating in Europe has begun to be used industrially, at the pilot stage, in South Africa. It has emerged that dust filtration and recycling operations are critical, and it is not certain that this problem, fundamental to the economics of the process, can be overcome.

The European Community must be attentive to developments, throughout the world, in techniques using coal alone for the production of pig iron.

Such experiments are very costly, principally because of the adaptation of these new technologies at the industrial level. Extensive exploration in the field of the concept of equipment is necessary, preliminarily at any attempted development to an operational stage which may compete with the blast furnace, which offers experience more than a hundred years old. As the challenge is important, particular attention must be paid to the cautious management of funds available for R&D in this sector.

In expectation of these developments, the European steel industry has already taken steps to increase the life of blast furnaces undergoing reconstruction and to promote high rates of coal injection to the tuyeres in order to postpone the need to construct new coke oven batteries.

Steel production

The equipment of the steelworks, e.g. converters, electric-arc furnaces, ladle metallurgy facilities, etc. appear well adapted to face any possible change in steel production strategy: continuous scrap feed, smelting reduction, etc. It is for this reason that work on new steelmaking processes, such as continuous refining, has been shelved.

Direct continuous casting of products close to the finished product

The objective here, too, is to cut out a manufacturing stage - in this instance, hot rolling - while maintaining a very high standard of product quality.

The technique of continuous casting of thin slabs, developed entirely by European designers and already at the marketing stage, does not meet the final objective of the total suppression of a manufacturing step; it provides substantial savings only in the event that a finishing train has to be renewed.

Various projects based on different principles are being developed for direct continuous casting of coil or wire rod, e.g.:

- continuous casting to paired rolls;
- continuous casting in a mould table followed by paired rolls: casting-pressing-rolling;
- casting of steel strip or film on a single roll or on a moving belt;
- casting of a jet of liquid steel atomized in an inert gas and projected on a substrate of appropriate form: flat, tube, forging blank, etc.

Europe is very active in this field, but so are its main competitors, Japan and the USA.

Treatment of cast products

The treatments to be applied to the products cast using the techniques referred to above, probably reduced to cold

rolling and finishing lines, will have to be adapted to the new dimensions and new structures - in particular microstructures - obtained by these processes and adjust them to meet customers' requirements.

Many laboratories are already engaged in basic studies of the new microstructures in order to define the working and use properties of these new products.

Surface treatment

The development of non-ferrous metal alloys of new synthetic films in conjunction with improved fundamental knowledge of steel properties should lead to the development of new composites with improved properties. Existing lines will have to be modified or new production lines constructed to produce these new materials.

It is also likely that new coating processes, such as vacuum coating by evaporation or deposition in inert or reactive plasma, will make advances and lead to considerable improvements in the cost, quality or flexibility of production compared with the current, even improved techniques of hardening, electrolysis, coating or gluing.

Steel applications

The steel industry must remain vigilant vis-à-vis the long-term developments which will take place both with regard to technological changes and to requirements for materials for general or specific uses on the part of its traditional customers and new industries.

It will also, in order to gain its customers' confidence, have to find suitable solutions to the problem of the interruption in some of its sources of supply, in particular of ferro-alloys.

With this in mind, European R&D must undertake:

- fundamental studies of steel properties: weldability, formability, fracture mechanisms, fatigue behaviour, resistance to corrosion and creep at high temperatures with the modern means at its disposal;

- more specific studies relating to specific applications, particularly in respect of the major customers such as the motor and construction industry;

- promotion schemes to raise the awareness of users.

CHAPTER IV

THE STEEL INDUSTRY AND THE INTERNAL MARKET

1. THE CURRENT SITUATION AND THE OUTLOOK FOR 1993

The framework provided by the Treaty of Paris has enabled the Commission/High Authority to develop a Community steel policy which has contributed towards aligning an industrial economic reality to the European scale, which, in certain respects, may be considered as a single steel market.

For this reason, the Commission White Paper of June 1985 on the completion of the internal market makes no explicit reference to the steel industry.

This does not mean, however, that this "sectoral reality of European dimensions" actually constitutes a truly competitive market as described by the White Paper and as it is possible to achieve through the legal instrument provided by the Single European Act.

The Treaty of Paris is still in force, but the deregulatory thrust of the Single Act will probably inject a liberalizing influence into the Treaty, which was conceived in a much more interventionist spirit. This general change in philosophy will probably generate the main, and therefore indirect, consequences of the completion of the internal market on the steel industry.

On economic grounds, there are many reasons to justify the Commission's developing a generally interventionist steel policy. (From the legal point of view, it simply applied the provisions of the ECSC Treaty.) The main reasons are probably the enormous economic and social importance of this basic industry and its great sensitivity to cyclic trends. But in the past the financial effects have been multiplied by serious structural problems, such as an often obsolete organization of the industry and especially the existence of surplus capacities which are absolutely intolerable during periods of recession.

The Commission and steel firms did not wait for the spur of the 1993 deadline to look at these problems and react accordingly. There is no need to list again all the efforts made by both sides in recent years to reduce excess capacity. And firms are beginning to be very active with regard to industrial organization and more and more major operations are taking place.

What is added by the 1993 objective is the clear conviction of the irreversible need to adapt the industry to the requirements of the market economy.

At the same time, the 1993 open market will provide the ideal framework for ensuring a competitive European steel industry: a genuine large internal market which, provided that firms adopt suitable strategies, should make it possible to achieve efficient structures in the industry (size of companies, mergers, etc.) for meeting the external competition effectively and on equal terms.

A brief analysis follows of the most significant effects of the completion of the internal market on the steel industry. First, we analyse the effects on production and marketing costs and on conditions of competition; secondly, we examine certain strategies which undertakings could follow; finally, we put forward the guidelines of competition policy.

2. WILL THE SINGLE ACT CHANGE STEEL MARKET STRUCTURES?

Even if the completion of the internal market has little direct impact on the steel industry, inasmuch as none of the 300 or so Directives set out in the White Paper concern this sector, the indirect effects may be very significant.

The indirect effects may be felt at two levels: in costs, and thereby in conditions of competition.

2.1 Costs

The new environment is certain to have an impact on firms' manufacturing and marketing costs. Even if it is virtually impossible to quantify, the effect will certainly be to harmonize and approximate the conditions of production and distribution for firms in different Community countries. Since one of the major discriminatory factors on the Community steel market at present is of course the differences which still exist between costs, it is clear that the impact could be significant.

(a) The outlook for the energy market

Energy, particularly electricity, is an important element in the costs of steel firms, especially those operating electric furnaces. As is well-known, the electricity market is far from open to competition. The national markets are almost entirely walled off from each other within the Community's internal frontiers, with monopolies or oligopolies in every Member State and a resulting considerable lack of transparency in pricing systems.

Clearly such a situation is a source of a good deal of economic inefficiency and substantial discrimination between European consumers. The steel industry, as a major consumer, is immediately concerned by this situation.

In the gas industry the situation is very similar as regards conditions of competition, even if the causes and circumstances involved are very different.

Building the internal energy market is thus a major task within the single European market. Given the conditions at the outset, it is a difficult task, but the Commission is intent on completing it step by step.

As far as price transparency is concerned, the Commission has adopted (COM(89)332) a draft directive setting up transparency of gas and electricity prices to final industrial consumers. This proposal received a large degree of consensus within the Council of 30th October 1989, and the opinions of the European Parliament and the Economic and Social Committee are being formulated now.

A similar and parallel approach between the gas and electricity sectors has also been adopted for the fixing of a first stage towards an internal market for energy.

The communications adopted by the Commission on the internal market for gas and electricity (COM(89)334 and 336) focus on the concern for competition in these sectors to be extended, so that all consumers, large and small, can benefit from it.

The objective pursued by the Commission is therefore to create an adequate legal framework guaranteing free circulation of natural gas and electricity, and favouring a reduction in the cost of supply. It is emphasised that in no case must the quality of service to the consumer and the security of its supply be reduced from their current high level.

The Commission's proposals contain, notably :

- a draft directive (on the basis of Article 100A of the EEC treaty) setting out the terms of application of the right of transit between two integrated gas or electricity networks, with a view to exchanges being increased and liberalised;

- the setting up by the Commission of consultative committees (composed respectively of representatives from Member States and those interested parties concerned) to examine whether access by third parties to gas and electricity transport networks must be organised, and if so, on what conditions, in order to guarantee that quality of service to the consumer and security of supply be maintained.

Community authorities have begun the examination of the Commission's proposals : the Economic and Social Committee should express its opinion in January 1990, and the Parliament (on first reading) in February 1990. In both cases, the welcome given to the proposals has been broadly

positive. In the Council, the first discussion on electricity transit has also been positive. The directive on gas transit has met with reserves from several delegations, notably because of the fact that current transboundary transit already accounts for 22% of consumption.

Nobody ever imagined that the internal Market in Energy would be easy to bring about. The advances already outlined today in the Community show, however, that this movement is underway, and it appears broadly irreversible : producing as well as consuming industry is concerned with it, and is preparing for it.

The effects on the European steel industry will no doubt be very considerable. There are still big differences in energy prices between Member States. In the electricity industry, for example, there are pre-tax differences of over 80% in prices charged to major consumers, as most steel firms are. This applies not only to standard prices but also for those enjoying special conditions under contracts containing specific interruption and modulation clauses, etc.

In the gas industry, the differences appear to be smaller but may still exceed 60% before tax.

The effect of the single energy market will probably be to reduce price levels, at least for gas and electricity, but above all it should narrow the wide differences in prices which still exist from one Member State to another.

(b) <u>The impact of liberalization of the capital market on financial costs</u>

The financial services supplied to steel firms (interest rates for long-term debts, commercial effects, insurance policies paid, etc.) generally represent a not insignificant part of steel firms' overall operating costs. In the recent years of crisis the heavy financial burden, and especially the interest on long-term debts, has been one of the major obstacles facing the industry. It became one of the key factors at the heart of plans for restructuring, which established, among other things, maximum limits beyond which viability was not guaranteed.

As pointed out above, this general indebtedness has been one of the features of the steel crisis common to all Member States. A feature not common to them all and responsible for differing debt burdens on firms is the big differences in interest rates from one country to another, resulting in major discriminatory effects on firms.

One of the prime objectives of the internal market is the integration of the European financial markets. Its importance lies not only in the greatly improved competitiveness of the industry itself but also in the macroeconomic effects and the resulting stimulus for firms using these services.

There are still great divergences between Member States. According to the Cecchini report, these are often more than 50%, and this highlights the disparities in conditions of competition in the Member States.

The integration of the financial markets will have the twofold effect of eliminating differences, or at least considerably reducing them, and bringing down prices. A study by DG II puts the potential reduction of financial costs at 10% at the least.

Even if it is true to say that steel firms, faced with this discriminatory situation, have enjoyed the major corrective of Community loans under Article 54 of the ECSC Treaty, the fact remains that the harmonizing effects and lower financial costs should constitute a major stimulus for them.

(c) Impact of environment policy on production costs

The European steel industry is changing. Production and demand are now becoming increasingly geared towards alloys and products coated with zinc and/or other heavy metals. Although these are niches and products with a high added value, and therefore the logical specialization path to follow, this type of production and consumption undoubtedly poses problems of recycling, as regards both the emission of heavy metals and the generation of non-recoverable waste.

It is therefore important to focus attention on the threat of increased pollution, stemming from this sort of change.

What is also true and deserves immediate mention is that steel firms are making ever greater efforts to solve this problem through major investments, either directly to improve the environmental performance of a given production process or in research projects which also aim to reduce or eliminate pollution in steel manufacturing.

It is perhaps worth adding that, as was pointed out at the last IISI conference,[1] the steel industry is a pioneer in the development of systems for monitoring industrial emissions. It is also one of the largest users of recycled energy. Steel itself is probably one of the most recyclable materials in the world: around 40% of annual steel production derives from recycled steel products. At present that represents annual savings of about 160 million tonnes

1 IISI, 23rd annual conference, Berlin, 1-4 October 1989.

of coal and 200 million tonnes of iron ore. The fact that steel can be recycled should be emphasized in any assessment of the importance of the use of steel in everyday life.

There are no environmental standards specifically aimed at the steel industry at Community level. Steel firms are, however, directly covered by Community Directives on the emissions of pollutants from industrial plants. Their activity can also be affected by the Directives concerning quality levels of different media, i.e. air (emissions or immissions) or water, or problems of waste or noise.

Perhaps the only Community standard which directly affects the steel industry is Directive 85/337/EEC, which entered into force on 3 July 1988; it provides, inter alia, that all projects concerning integrated factories for the initial smelting of iron and steel should be the subject of an environmental impact assessment, carried out in compliance with the procedure laid down in the Directive.

The Single European Act, in force since 1987, has given a legal basis to Community environment policy. It states: "Environmental protection requirements shall be a component of the Community's other policies." The Single Act also requires that the Commission, in its environmental proposals, shall take a high level of protection as a base.

The steel industry can indeed generate large quantities of pollutants, given the nature of its manufacturing processes; but progress in pollution-control technologies has been such that the elimination of pollution can now be claimed to be an economic rather than a technical problem.

The Community applies a guiding principle which is now well established and widely accepted as regards the financing of investments to be made by firms in the context of environmental protection: the "polluter pays" principle.

This principle, which already appeared in the 1973 First Community Action Programme on the environment, was adopted in the Council recommendation of 3 March 1975, essentially in the name of defending competition. Many exceptions to this general rule are, however, provided for; in 1974 the Commission established, in the context of competition policy, a Community code of aids for environmental purposes, approved as an exception to the general principle of the incompatibility of State aids (Article 92(3)(b) of the EEC Treaty) and aimed at establishing a system of standard and coherent criteria for the growing number of environmental aids granted to firms by the Member States.

This code, initially introduced for the period 1974-80, has been extended twice and is currently in force until 1992. It is not applicable to steel firms, which are covered by the ECSC Treaty.

Article 4(c) of the ECSC Treaty prohibits the Member States from granting aids to coal and steel firms and does not allow any exceptions to this general ban. The Commission had to turn to Article 95, first paragraph, to establish the first aid codes for 1981-85 (Decisions Nos 257/80/ECSC and 2320/81/ECSC).

It was not until the third steel code for 1986-88 (Decision No 3484/85/ECSC) that provision was made explicitly for the first time for the possibility of State aids to enable steel firms to adapt their plant to new standards of environmental protection.

Decision No 322/89/ECSC of 1 February 1989 renewed the Steel Code up to 31st December 1991, with the same criteria and conditions for granting aids for environmental purposes, in particular for adapting plant which entered into service at least two years before the introduction of the standards and with a ceiling of 15% net grant equivalent of the costs directly related to the environmental measures concerned.

The context of Community environment policy has changed significantly in recent years. Firstly, the Single European Act has provided this policy with a legal basis. In specific terms, for the financing of environmental protection measures to be taken by firms, the Single Act explicitly establishes that Community action must be based, inter alia, on the application of the "polluter pays" principle. Hence, over and above the relevance of this principle to competition policy, the Single Act recognizes it as the guiding principle of environment policy.

The Fourth Programme for Action on the Environment makes revision of the "polluter pays" principle a priority for the Commission. The Commission is currently working on this in the light of the new environmental context. If it concludes that there is a need to amend the 1975 recommendation, the Commission will put forward a draft recommendation on the new interpretation and application of the "polluter pays" principle to the Council for approval as soon as possible.

(d) Liberalization of transport

The transport sector, whether road, rail, air or waterway, is highly regulated and the conditions for healthy competition at European level are far from being fulfilled.

The White Paper on the completion of the internal market provides for the gradual liberalization of transport, a

process already set in motion by specific measures, especially in road haulage (relaxation of quotas, etc.) and air transport.[1]

The combined effects of economies of scale and competition will help achieve the twin objectives pursued through the actual completion of the internal market, i.e. a lowering of transport costs and an end to discrimination between users on the basis of country or sector. For instance, the Commission's Directorate-General for Economic and Financial Affairs estimates that road haulage prices could drop by some 5%.

It is extremely difficult to quantify what proportion of the total cost of a steel product is accounted for by transport since it depends on many factors, such as the value added content of the product in question (there would naturally be a big difference between concrete reinforcing bars and galvanized sheet), the means of transport actually used, the average size of deliveries, etc. However, it is generally accepted that transport accounts for a not inconsiderable proportion of the total cost of a product.

Liberalization of the transport sector should therefore have a beneficial effect on the steel sector and lead, inter alia, to increased intra-Community trade, for lower transport costs would have the same effect as lower customs duties.

2.2 Conditions of competition

The 1993 single market will therefore have the effect of harmonizing and lowering the costs borne by steel undertakings. This will enable them to lower their prices (within strict limits) without thereby reducing their profit margins and consequently become more competitive internationally. Naturally, this is subject to "other things being equal" or, in other words, our ensuring that any back-up policies do not hinder the dynamic flow of the economy towards 1993.

But all this will affect more than the industry's ability to compete abroad. It will also speed up the growing importance of factors other than prices in internal competition. Prices will of course continue to play a very important role, particularly in markets for volume products which are difficult to differentiate, but the abolition of all barriers and growing awareness of the oneness of the

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1 The White Paper does not include any proposals to liberalize rail transport because the specific nature of this mode largely rules out competition or free access to the market.

market (already reflected in anticipatory moves by the undertakings) will highlight the growing importance in competition of such aspects of customer service as flexibility and speed of delivery.

Proximity to the customer, for instance via a good distribution network, will thus become an increasingly important aspect of marketing. This shows how strategically important new commercial investment is, particularly where it is made with the aim of ensuring a stronger presence in the Community's many submarkets.

In addition, where products with a high value added content are concerned, product quality and the kind of service offered will be the best means of differentiating the product and, therefore, a major strand in competitiveness.

3. THE SINGLE MARKET AND INDUSTRIAL ORGANIZATION

(a) Corporate strategy

For various reasons - some described in the preceding pages - the 1992 deadline has triggered a dynamism now chiefly driven by the anticipatory activities of undertakings. In steel, this dynamism is combined with the industry's restructuring efforts, with appropriate aid and accompanying measures by the Member States and the Commission (see introduction).

This combination is leading to a fundamental reappraisal which should generate the right strategies for the future.

- The measures accompanying restructuring were strictly temporary, their sole aim being to make the industry competitive.

- The prospects opened up by the 1992 deadline simply reinforce the concept of a fully competitive environment.

- The financial and social structural adjustments in the steel sector should allow it, as in other industrial sectors, to face up to the real pattern of good and bad market conditions.

- Competition from outside the Community will be stronger, but the competitiveness of a business should be its only weapon, as long as the competition is not unfair. If it is unfair, commercial policy measures must be taken vis-à-vis third countries.

- The internal market provides the right framework for achieving a competitive position in foreign trade, for instance through economies of scale combined with product specialization or differentiation strategies.

Such considerations are fundamental to the strategies that undertakings should adopt in the coming years. Customer service and commercial investment were mentioned earlier, but these are to some extent governed by others that are even more fundamental for any undertaking:

- When it comes to fluctuations in business cycles, various strategies are possible. Production can be diversified to sectors other than steel, but it would also be worth considering a strategy of takeovers, mergers, etc. From past experience we know that no hierarchy can be laid down in advance.

- There are many strategies for meeting competition from outside the Community. However, one certain direction must be towards specialization in high-quality products and highly integrated production processes which result in products with a high value added. Here, too, various approaches are possible - vertical integration by means of merger or acquisition and cooperation agreements between undertakings giving similar results but with greater flexibility and without the disadvantages of large-scale operations.

In any event, the main advantage enjoyed by European steel is that its domestic customers are extremely demanding where quality and service are concerned. The large internal market should enable the industry to put in place the kind of technology and organizational structure needed to satisfy these demands to the full.

The steel industry has begun moving in this direction and a great deal of strategical thinking along these lines is already taking place.

(b) The Community's competition policy

The current general objectives highlight the significant improvement in the industrial, financial, and social structure of the Community's steel industry, as well as a better match between production capacity and demand. From now on, these improvements must allow undertakings, whilst still preserving the specific nature of the dispositions to this effect in the ECSC treaty, to adapt to new requirements similar to those in other sectors, with similar characteristics, in the field of EEC competition rules.

In this context, the Commission's policy in this area, as far as the application of ECSC Articles 65 and 66 is concerned, will continue to be prompted by twin objectives : on the one hand, to preserve effective competition, equally valid in the interests of the dynamism of producers and distributors as far that of consumers; on the other hand, to facilitate the structural development still necessary which,

without being an impediment to the first objective, will allow the steel sector to pursue its restructuring and to modernise, so that it can better face up to sharper industrial competition.

Within the framework of the application of ECSC Article 66 concerning concentrations, certain fusions, particularly transnational, will no doubt prove necessary in this respect. In its appreciation of them, the Commission will nevertheless have to take into account the existence of narrower and narrower oligopolies, at least in certain sub-sectors. As far as agreements under Article 65 are concerned, the Commission will not, of course, be able to give its approval to these being associated, even for the sake of rationalisation or specialisation, to measures leading to market sharing, or to concerted attitudes on pricing matters. In the same way, the Commission will continue to watch that no financial and personal links facilitating concertations be established among the large steel-making groups.

In the distribution sector, and particularly as regards concentrations which have the effect of tighting the producers' control of distributors, the Commission continues to consider that certain transnational operations play a useful role, from the point of view even of competition, by allowing certain producers to have an even greater presence in the territory of other Member States. The Commission must nevertheless examine with greater attention, from the point of view of the consumers' interests, national operations which have the effect of strengthening the already very strong positions of certain producers at the distribution level.

P A R T 2

STUDY OF THE MARKET FOR STEEL PRODUCTS IN THE COMMUNITY AND FORECASTS FOR 1992 AND 1995

CHAPTER V

INTERNAL DEMAND FORECASTS

1. METHODOLOGY

Before discussing the actual forecasts, a description of the methodology used to prepare them would perhaps help the reader put the results into context.

There are basically two ways of forecasting steel consumption. One is based on the relationship between steel consumption and GDP trends and the other on the relationship between steel consumption and the sectors which use steel.

Both are structural (and not functional) methods based on input and output, and both therefore suffer from the same disadvantage, namely that they cannot easily reflect the structural changes in the economy which affect these relationships.

There is one further problem with the global approach, i.e. that which considers the relationship between steel consumption and GDP trends, in that it does not take explicit account of developments in the steel-using sectors. Against this disadvantage, however, the global approach presents at least two major advantages:

(i) forecasts are based on only one variable, GDP, which is itself a well-known variable and the subject of extensive forecasting;

(ii) to the extent that it is possible to determine a statistical relationship between the two variables, the statistical machinery required is very simple.

The difficulty of taking structural changes into account can be partially resolved by adding into the equation a second independent variable, such as the trend over time. However, it should be made clear that by doing this the problem is only very partially resolved because structural changes are dynamic and the models generally used are static. For this reason, the coefficients estimated on the basis of these models may provide a statistically satisfactory synthesis of historic trends but are incapable of projecting the dynamic trends of structural change into the future. Forecasts based on these models will therefore generally tend to overestimate actual levels of steel consumption in the future.

Another important drawback of the global approach is that it uses apparent consumption as a forecasting variable.

The selection of this variable derives exclusively from the lack of statistical information on actual consumption. While it is true that changes in stock levels even out over a long period and are not therefore important when estimating long-term trends, it is also true that specific forecasts about consumption cannot be made without taking stock movements into account.

It is well known that the stock situation has the effect of amplifying, often very considerably, the upward and downward movements of the trade cycle.

One final disadvantage of the GDP approach is that it cannot be applied to the individual steel products: the concept of crude steel must be used as the only level at which steel consumption can be treated homogeneously.

To conclude, using trends in GDP to explain trends in steel consumption and more particularly to prepare forecasts is a valid approach, but must be used with caution in view of all the restrictions and constraints which limit the significance of the results obtained.

The sectoral approach, on the other hand, also has the shortcoming of not allowing for structural change, but at this level of disaggregation the problem is less complex since the changes are reflected in the specific consumption of steel, whose pattern is governed by two things, the substitution for steel by other products and the use of lighter materials, both of which are easier to evaluate at sectoral level.

Nevertheless, even at sectoral level it is extremely difficult to project past specific consumption trends into the future. There is the added difficulty of forecasting changes in the steel-using sectors, which usually has to be done by less orthodox methods than the GDP method.

In any case, this is the only method which can be used to make forecasts for individual products, and it will consequently be the essential reference point for quantitative objectives. Nevertheless, the first method will be included for information, and to serve as a comparison with the results obtained from the sectoral approach.

2. APPARENT CONSUMPTION OF CRUDE STEEL FOR 1993

The relationship between GDP and crude steel consumption was discussed in the previous chapter. Without dwelling further on this, it must be remembered that, while the relationship certainly exists, certain important reservations should be made when using it for forecasting purposes. It usually tends to overstate future values.

Various econometric models were tested using conventional methods, i.e. alternating the independent variable(s) (GDP, investment, etc.) and the proposed functional form (linear, log-linear, etc.). The need to optimize statistical adjustment eliminated all the models but one and showed that GDP and a linear trend were the variables to be used, and that the relationship must be expressed in terms of growth rates. The model thus arrived at has the additional advantages of being clear and easy to use and offers the additional guarantee of being the model most frequently used by other international institutions, e.g. the OECD.[1] The estimated equation is therefore:

$$\frac{\Delta \text{ Apparent consumption}}{\text{Apparent consumption}} = a + b \frac{\Delta GDP}{GDP}$$

The corresponding analytic regression results are:

$a = -10.38$; $b = 4.32$; $R^2 = 0.80$; $DW = 2.01$
$(t=6.78)$ $(t=7.12)$

It will be seen that the coefficients are very significant, but the quality of the adjustment is only fair ($R^2 = 0.80$), which is a further reason for exercising caution when making forecasts since 20% of apparent consumption is due to factors which cannot be explained by the model.

It should also be mentioned that the data used apply to apparent consumption of crude steel for "ECSC and non-ECSC" products.[3] This is in order to include Spain and Portugal, for which we have no statistics on apparent consumption of ECSC products before 1986. The same applies to comparisons with non-Community countries (USA and Japan), for which only data comparable to "ECSC and non-ECSC" products are available. When preparing these forecasts, it was assumed that the growth rates generated by the model also applied to ECSC products only.

On the basis of these results and the Commission's medium-term macroeconomic projections, it was possible to establish medium-term trends in the apparent consumption of steel within the Community.

Table V.1 shows some of the Community's macroeconomic projections and the forecasts of GDP growth in the USA and Japan in real terms compatible with these internal growth trends. The forecasts show that the European economy will continue to grow relatively fast over the next few years and

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1 "Analysis of longer-term developments in the demand for steel", OECD Steel Committee, SC/WP (88) 28.

2 Data used covers EUR-12, and the period 1973-1988.

3 For a definition of this aggregate, see the footnote to Table V.3 below.

that growth will continue to be fuelled mainly by steady increases in investment, although on a smaller scale than in 1988 and 1989. According to the table, there will be a slight and very brief economic downturn after which the single market should stimulate further economic growth in 1992 and 1993.

Given these macroeconomic prospects, it would be unreasonable to expect steel consumption forecasts to be pessimistic or negative. But, it would also be unreasonable to jump to over-optimistic conclusions too quickly.

The discussion on methodology which preceded this section and the first chapter on the factors determining steel consumption contained a number of caveats on the interpretation of the results of an econometric model, particularly if it is used for forecasting. Moreover, the above macroeconomic forecasts are derived from a basic scenario which rests on certain assumptions, such as constant real exchange rates and oil prices over the period, unchanging economic policies in the developed countries and no serious crises in the developing countries.

Other scenarios would of course change the macroeconomic forecasts and therefore the forecasts of steel consumption. As an example, graph V.2 shows the forecasts which would result from a "dollar shock" scenario (a 10% fall in the dollar in 1990 and again in 1991) and an "oil shock" scenario (an increase in the price of a barrel of oil from $16 to $20 in 1990 followed by 10% increases each year).

It is important to stress here that in order to forecast trends in global steel consumption it is essential to define the point of departure very carefully.

Since the year 1988 is considered to be an observation point that is heavily influenced by many purely cyclical factors, it is necessary first of all to neutralize their effects in order to identify underlying trends and extrapolate them by means of regression analysis up to 1993.

In practical terms, allowing chiefly for assumed stock trends, the level of apparent steel consumption considered to correspond to the underlying trend in 1988 is 116.7 million tonnes. This figure is arrived at by applying to 1987 apparent consumption a growth rate equal to half that actually recorded. The projection to 1993 obtained from the level of consumption which this gives for 1988 is considered to be the most probable consumption level for 1993 (as the underlying trend). The figure is 130.6 million tonnes.

As we have already said, any global forecast tends to overestimate the true trends, in particular because the forecast takes no account of the gradual decline in the proportion of GDP represented by steel. This means that these forecasts must be revised downwards.

Thus the most likely level of crude steel consumption in 1993 can be estimated at 130 million tonnes, and deviations from this central value will be chiefly due to cyclical factors.

This forecast is borne out by the results obtained using the sectoral method, as will be seen in Section V.3 below.

3. DETAILED ANALYSIS OF TRENDS IN STEEL CONSUMPTION SECTOR BY SECTOR

3.1 General

3.1.1. Steel consumption sectors

Table V.3 shows in order of size the main sectors which used ECSC and non-ECSC steel products in the Community of Twelve in 1987. The average of the figures for 1986, 1987 and 1988 was taken as the reference point as recent detailed statistical surveys are available for these years as a basis for determining actual steel consumption (after allowing for stock movements).

In order of size therefore, the main sectors of final consumption (as a percentage of total consumption of ECSC and non-ECSC products) rank as follows:

Building, civil engineering and construction	28%
Transport, including shipyards	20%
Metalwork	14%
Mechanical engineering	13%
Electrical engineering)	
Boiler-making)	4-5% each
Canning)	
Other (railways, steelworks, mining, etc.)	11.5%

3.1.2 Qualitative aspects

Before discussing past and future trends in the steel consumption sectors, it is perhaps worth repeating some of the comments on specific consumption trends already made in the previous chapter. The unremitting drive to improve competitiveness and the quality of manufactured products entails both the rationalization of steel-based manufacturing processes, leading to a reduction in the "specific" unit consumption of steel, and also ever more stringent requirements with regard to steel quality and terms of trade (e.g. delivery dates).

The downward trend in specific consumption, i.e. the structural reduction in the quantity of steel required for each manufactured product, is the statistical result of a combination of several factors:

(i) making the product lighter by changing its design or by using lighter materials (either substitute products or lighter steels);

(ii) using steel more economically and thus reducing processing waste;

(iii) in mixed manufacturing sectors, producing products with a lower steel content, i.e. changing the product mix.

The sharp rise in steel consumption in 1988 and 1989 seems to indicate that none of these factors is fundamentally irreversible.

It is even tempting to conclude that the effect of substitution is often less important than changes in the product mix.

A look at general trends in specific consumption over the last few years, particularly in the building, motor and mechanical engineering industries, shows that for several years now the trend has been slowing down or has perhaps even been reversed (Table V.4). This may in part be due to factors relating to product mix.

Moreover, considering trends in steel consumption from the product angle, there are only a very few trends which could be described as universal, e.g. the fact that steel is no longer used for forged or cast products (now sometimes made out of pig-iron) and the trend towards coated products.

One indication of the need for quality products is the constant increase in the proportion of steel consumption accounted for by special steels. The same probably applies to quality steels and, more recently, coated steels. Although overall the move towards special steels may seem slow because the different sectors of consumption move differently over time, change has been much swifter in the main customer sectors. For example, the proportion of special steels increased overall by only 1.3% between 1980 and 1987, but in the transport equipment sector the increase was 1.9% and in mechanical engineering 4.6%. First-stage processing is particularly interesting in this respect because in 1987 that sector accounted for two thirds of the markets in special steels (tubes alone accounting for nearly 30%), with most of this steel going to a limited number of final consumption sectors like mechanical engineering, transport equipment and metalworking. Further comments will be made in the sections on these sectors of consumption.

3.2 Review of the main steel-using sectors and their prospects

Preliminary remarks

The opinions expressed in this section are based on a wide range of meetings which Commission staff have had with steel users or their associations, and are backed up by a number of specific sectoral studies.

It is worth emphasizing from the outset that, in general, neither the macroeconomic growth which is expected in the first half of the 1990s (Table V.1) nor the single market will necessarily boost steel-using sectors more than others. In fact, a study[1] to identify the impact of opening up markets on the various industrial and service sectors does not classify any steel-using sector in the group which will enjoy extra rapid-growth, like the information technologies sector.

3.2.1 Building, civil engineering and construction

After years of decline or stagnation, the construction sector started to grow again in 1986, although the recovery of the non-housing sector actually began in 1984.

Activity was vigorous in 1988 (6% up on 1987)[2] with even above-average growth rates for civil engineering (8%) and for non-housing construction (7%) but lower for housing construction (4.3%).

Even though these rates may fall slightly, they will still be high compared with the first half of the decade. It should be pointed out, however, that the strong recovery of this sector in 1988 and its good performance in 1989 have partly been helped by the good weather.

In the longer term, the prospects in this sector depend essentially on demographic trends, and the evolution of interest rates and purchasing power (and therefore of inflation), as well as public expenditure on construction.

Housing construction, which had initially benefited from a catching up after the decline seen up to 1985, could maintain its dynamism. A certain degree of optimism, suggesting a rate of growth in the order of 2% per year, could be justified not only in the light of existing

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1 European sectoral forecasts, November 1988 - Bipe, IFO, Prometeia.

2 Source: International European Construction Federation (IECF).

requirements, particularly in southern European countries in general economic expansion, but also from demand stemming from the massive immigration which the Federal Republic of Germany has been seeing since 1989.

In some countries, however, particularly countries like Spain and Portugal whose economies are generally expanding, the housing market could continue to grow just as vigorously.

At the same time, civil engineering and non-housing construction, a large and ever increasing proportion of which involves metalworking, are of major importance as steel consumers, particularly as they use steel more intensively than the housing sector. Prospects in these two subsectors are good.

For one thing, non-housing construction should continue to develop virtually in parallel with gross fixed-capital formation. Investment is likely to have a greater effect than in the past in strengthening capacity and will form part of the commercial and industrial restructuring in the run-up to 1992.

In civil engineering, it is virtually impossible to offer quantitative forecasts for more than two years ahead since most of its activities depend on public procurement. However, it is also worth mentioning the growing interest in investment in environmental protection and waste treatment.

In any case, the current recovery is good reason for optimism for the next few years, and there are a number of major infrastructure projects which will certainly provide the sector with work and may have spin-off effects. These include preparations for major events like Italia '90, the 1992 Olympic Games and the 1992 Expo in Seville, and projects like the high-speed rail network, the Channel Tunnel, the Great Belt project in Denmark and improvements to Spain's rail and road networks.

To sum up: in view of the uncertainties referred to above, the average annual growth rate in the whole of the construction industry can be expected to decline: 4% up to 1990, 3% from 1990 to 1992 and 2% from 1992 to 1995.

As far as steel products are concerned, apart from the general buoyancy of metallic construction, account should be taken of the increasing use of wire mesh instead of concrete reinforcing bars, cold-rolled sections and tubes instead of merchant steels and coated sheet instead of uncoated sheet. Altogether, coated sheet and stainless steels should capture new markets, but on the other hand some markets for steel tubing are being lost to tubes made from copper and synthetic materials. All in all, however, steel consumption should closely follow the level of activity in the industry.

3.2.2 Transport equipment

This sector essentially comprises the motor industry (including vehicles) and shipbuilding and to a lesser extent the railway equipment industry.

Since the motor industry builds some 12 million private cars but only slightly over 1 million commercial vehicles, trends in steel consumption will obviously depend largely on private car sales.

Demand for and production of private cars in the EEC has risen continuously since 1985 as a result of various factors, which include tax incentives in some countries and lower fuel prices. After rising for five years, these figures are expected to stabilize or even decline in 1990, with a moderate recovery by 1992. According to the DRI forecast at the end of 1989, production could increase by 1994/95 by some 1.1 million units over 1988 and by 750 000 units over 1989, that is, an average annual increase of a little more than 1.5% between the reference period 1986-88 and 1995.

The main uncertainty surrounding this forecast is the market share of imports, which could increase following the opening up to the outside world implied by the completion of the internal market.

Output of commercial vehicles increased even more dramatically with growth of 10% a year between 1985 and 1988. Industrial investment will probably benefit this sector too, although the gradual saturation of the road network could hold down expansion in this area and work to the advantage of the railways.

Although the railways are by no means a major user of steel, the rolling stock sector should show a significant increase in activity and in investment (high-speed rail network, integration of the Iberian and British networks).

Shipbuilding is now showing signs of recovery from a very low level. According to a detailed study,[1] world activity should increase from 10 million compensated gross register tons in 1987 to 11.5 million cgrt in 1995. Since this is in specialized sectors, Community shipyards should be able to restore their share of the market to 20%. Production would then be able to increase from 1.715 million cgrt in 1987 to 2.3 million cgrt in 1995, which is an average annual increase of some 3.5%.

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1 Moore and Stephens, study conducted for the Commission in 1988; the study arrived at more cautious conclusions than those reached by the world's main shipbuilders.

Steel requirements for the transport equipment industry should match activities in the industry much more closely than was the case in the past.

Specific consumption of steel (i.e. the steel required per unit manufactured) dropped by 10% in each of the periods 1975-80 and 1980-83 and then virtually stagnated. Because of its importance it is worth considering first of all the trends in the motor industry. This is a complex phenomenon which can be explained to some extent by the following factors:

(i) the production shift towards medium-sized or larger cars, a trend which intensified as fuel prices declined;

(ii) less pressure on producers to cut weight, also as a result of falling fuel prices, thus halting the trend towards substitution of lighter materials (aluminium and synthetic materials) and the use of thinner steel sheet;

(iii) further slowdown in substitution to prevent corrosion because of the success of coated sheet (steel parts have already been reintroduced to replace some synthetic materials, e.g. in fuel tanks);

(iv) the use of robots and automatic welding have tended to reduce the importance of conserving raw materials (sheet).

Nevertheless, for reasons of cost, quality and computer-aided design and manufacture (CAD/CAM), there has been substitution between steel products: certain forged products, long products (merchant steels and tubes) and ordinary steels are being replaced by castings of special pig iron, coated sheets, cold sections and particularly special steels.

From now on, virtual stagnation in the specific consumption of steel must be expected, except for a few changes in the consumption structure by product:

(i) the percentage of coated sheet will continue to increase until it reaches some 55% of all sheet used by 1992 and more than 60% by 1995 (with electro-galvanized plate possibly accounting for two thirds of all coated plate);

(ii) increasing use of special steels with the wider use of CAD/CAM and catalytic convertors (in which stainless steel has to be used).

Better car design and the use of special steels could result in some weight trimming, which should not exceed the rate of expansion of production (an average of 1% a year).

To conclude, steel consumption should be much the same in 1992-95 as it was from 1986 to 1988.

In the other transport equipment sectors, there are unlikely to be substantial changes in the use of materials, except that aluminium is being used more widely for railway equipment.

3.2.3 Mechanical engineering

Since 1984, after years of decline in this capital goods sector, production activities have slowly recovered, firstly because of the revival of the US economy and later because of the renewed growth of the European economy. In 1988 it achieved an extraordinary growth rate of 5%.

Some subsectors are worth particular mention as regards steel consumption. In 1985 the four subsectors with the highest consumption were as follows (the shares of total consumption by the sector are only approximate):

(i) civil engineering, hoisting and handling equipment: between 25 and 30% of consumption of ECSC and non-ECSC products;

(ii) agricultural equipment: nearly 15%;

(iii) machinery for the textile and food industries: nearly 15%;

(iv) machine tools: up to 10%.

The importance of the civil engineering equipment subsector and its development serves to explain, in part at least, the fact that towards the middle of the decade steel requirements in the mechanical engineering sector increased sharply compared with the level of activity in the sector. In fact, apart from increasing construction activity, the sector shifted towards major infrastructure projects, which tended in turn to create demand for powerful heavy machinery.

In general, the outlook for the sector remains favourable.

1. The climate improved for civil engineering equipment in 1986, with the resumption of construction, civil engineering and industrial investment in general. In the year 1988-89, growth rates in the region of 10% were recorded. Growth can be expected to continue at moderate to high rates of 2 to 3% p.a. by volume in all sectors except mining equipment. The

prospects for industrial lifting and handling gear also remain good, thanks to investment in the industry and in distribution.

2. Textile machinery has picked up since 1984 and Europe has consolidated its position as world leader with Japan. This sector will benefit from the conversion of the textile industry in the years ahead, suggesting moderate growth of 1 to 2% p.a.

3. The food-processing machinery industry has seen appreciable growth, averaging between 2 and 4% p.a. since 1986. Overall growth (except in such areas as canning and milk processing) will continue as concentration in this sector continues in the run-up to the full internal market. Similar conclusions can be drawn for equipment for the chemicals industry.

4. In the machine-tool sector, the European industry's rate of investment heralds future growth, although sharper international competition in this sector is not without risk.

5. The agricultural-machinery sector has been stagnant since 1984's halt in agricultural investment following reform of the common agricultural policy. This is primarily a market of replacement, where moderate growth in the area of accessories (e.g. harvesters) might be sustained until 1992 at a rate of no more than 1% p.a.

The mechanical engineering sector as a whole is expected to grow by about 3% p.a. An average growth of this order is feasible if the higher increases seen in 1988 and 1989 are taken into account, along with the demand for consumer goods which will flow from the economic reforms underway or envisaged in eastern European countries.

Steel consumption should grow at a slightly lower rate than activity, reflecting the generalized trend towards higher products. By contrast with the motor-vehicle sector, this trend is not a necessity in itself but stems (apart from materials cost considerations) from factors specific to the machines themselves, operating conditions, or the pursuit of improved performance. For example:

- In agricultural tractors and some civil engineering plant, by contrast with such agricultural equipment as harvesters, weight is not a criterion. Therefore substitute materials such as plastics and fibre-glass are introduced only for specific purposes, such as sound-proofing a tractor's cab or reducing the weight of a crane's jib;

- In machinery for processing food or chemicals, the product determines the material used. Stainless steels are increasingly preferred to aluminium because they better satisfy health, physical-resistance and heat-resistance requirements;

- In some machine tools, steel has been partly replaced by other materials, including concrete, for reasons including thermal insulation and better vibration absorption;

- more generally, machinery is being made more flexible by incorporating numerical controls and electronics, which primarily impinge on the use of forged or cast-steel parts, such as transmissions.

Overall steel consumption by the mechanical engineering sector could grow at about 2% p.a., and for the reasons given, the use of special steels (primarily stainless and structural steels) will show marked growth.

Outlets stagnating or in danger of declining

3.2.4. Metalworking

This sector covers a wide range of articles, most of which are intermediate products for the mechanical engineering, transport equipment or building industries:

- intermediate products: bolts, ironmongery, most drawn-wire articles (cables, springs, wire mesh, tyre cords), heavy packagings, joinery metalwork;

- consumer goods: household goods (cutlery, heaters, etc.);

- multi-purpose products: metal furniture, tools.

The recovery in this sector has been slower than in others, arising, in part, to substitution and the pressure of imports, which are hitting this sector harder than others (e.g. bolts and large containers).

At the risk of generalizing, prospects for intermediate products for the motor vehicle, mechanical engineering and building sectors seem relatively encouraging, while those for consumer goods seem mediocre. The outlook is favourable, with the knock-on effect, for the following sectors:

- metal furniture: the demand created by new commercial and office buildings can be expected to continue, together with, for fire-prevention reasons, an increase in its market share over wooden furniture;

- wire products (mesh) for the building industry, and bar or wire products for the motor vehicle or mechanical engineering industries (e.g. screw-cut parts): it should be noted that the substitution of welded mesh for concrete reinforcing bars has yet to be completed in certain countries;

- industrial packagings: after considerable growth in this sector in recent years, the expansion of trade offers great opportunities for this type of product, even though non-member countries dominate the supply of large containers (for shipping etc.).

No great growth is expected in the household goods sector apart from heating appliances, demand for which is determined by construction and renovation.

Despite the prospects for growth (about 2% p.a. maximum) in most sectors, some manufactures may show much substitution for steel. This is particularly true of industrial packaging (with the introduction of plastic) and heating appliances, and even in the furniture sector, for reasons of cost.

However, stainless and coated steels can offer (in the case for example of industrial packagings) an alternative to substitution in many instances. Therefore substitution will not be such as to reduce this sector's overall demand. In such conditions, steel consumption should be able to maintain its current level.

3.2.5 Light packagings

This is a mature sector with only a few areas of potential expansion, such as pet-food tins, drink cans and aerosols.

Steel (tinplate and, to a lesser degree, black plate) is in fierce competition with aluminium in this area. By playing up the cost and environmental aspects, it should gain a lead on aluminium in, for example, the area of two-piece drink cans. However, any small growth in demand could be cancelled out by the continuing reduction in thicknesses, and volume growth is therefore not expected to exceed 1% p.a. If the sector falls increasingly under the financial domination of aluminium producers, not even the stabilization of tinplate demand can be taken for granted.

3.2.6. Electrical goods

Domestic appliances (white goods) make up the largest part of this sector. Production of these consumer durables could grow by between 2 and 3% by 1995. Although in many countries this market is now one of replacement, some products such as dishwashers and microwave ovens are

developing a dynamic of their own. In these product areas, substitution has already had a dramatic effect and is expected to continue at a moderate rate, affecting even stainless steels. The expected consequence is stagnating demand for steel, or at the most a small rise of 1% p.a. Only coated steels are expected to increase their market share.

The manufacture of heavy electrical equipment should experience no marked growth (by contrast with machine making), the European electricity network having been largely completed.
Electronics, telecommunications and computers are not major outlets for steel.

3.2.7. Boilermaking and related sectors

Boilermaking, which covers the construction of boilers and large industrial receptacles, declined continuously from 1980 to 1986. Since 1987, the sector has been recovering gradually, in the Federal Republic of Germany and Italy particularly, owing to investment in the chemicals, pharmaceutical and foodstuffs industries, which have offset the fall in demand from the energy sector. This sector is expected to stabilize, or perhaps grow at a rate approaching 1% p.a., and the growth in demand should also include an increase in the use of stainless steels. However, in such areas as reservoirs and boiler piping, this sector is vulnerable to substitution by plastics.

In other sectors, where consumption is in structural decline because of problems in agriculture, mining and the railways, consumption, beyond the restructuring of the rail network, cannot be expected to recover.

3.2.8. Tubes and the rest of first-stage processing

The requirements of these sectors depend on the consumption of steel in the areas analysed above. In short, although the outlook is encouraging for the tubes and cold-processing sectors, the wire-drawing and smelting sectors will probably stagnate or decline slightly, while forging is expected to decline more noticeably.

The tubes sector is the most heavily dependent on exports. It is impossible to be optimistic: in the absence of any firm evidence of a recovery in the oil sector, demand for non-welded piping will remain depressed, while for large-gauge welded piping, the few large pipeline construction projects known (Norway, Zeebrugge, Iraq, Russia etc.) will barely ensure stagnation at 1987 levels until 1992. Without a sharp rise in the profitability of the oil industry, no lasting improvement can be envisaged in these areas.

3.3 Forecasts based on the sectoral approach

3.3.1 Methodology

Table V.3 shows the sectoral breakdown of consumption of ECSC steel products and of first-stage processing products (non-ECSC steel products), and, separately consumption of certain qualities of special steels. Average actual consumption for the years 1986 to 1988 was used as the reference for forecasts for the reasons explained in point 3.1.1.

In order to arrive at forecasts, the breakdown given in Table V.3 was extrapolated to 1992 and 1995 by applying the activity indices given in Table V.5 but correcting the result, in some cases downwards, to take account of expected specific consumption trends. These are summarized in Table V.6, while Table V.4 lists annual figures for certain selected sectors by way of illustration.

3.3.2. Forecast results

Table V.7 summarizes the results in the different consumer sectors. In the final consumption sectors, consumption is expected to show an increase of 88.5 million tonnes (see Table V.3) over the 1986/88 period rising to 99.5 million tonnes by 1995, a rise of 12.5%. The proportion of special steels is expected to rise by between 13.5 and 15% largely to meet the needs of the mechanical engineering and transport equipment sectors. The sectors mainly underpinning this increase are building and public works, mechanical engineering and transport equipment, which ties in with the sectoral developments referred to above. (N.B. The figures in Tables V.3 and V.7 are percentages of a total.)

Table V.8 shows the recent trends in apparent consumption by product, and forecasts for 1992 and 1995. In order to evaluate these results properly, it is important to remember that this forecast is based on actual consumption figures for 1986/87/88 and that these form a reliable basis for comparison. Because of stockpiling of certain products, apparent consumption reaches a peak in 1988. When forecasting for the years ahead, it was necessary to assume that the effect of stocks would be neutral (so that actual consumption corresponds to apparent consumption).

Demand for ECSC products should increase by 8% between 1986/88 and 1992, and by 12% by 1995. This increase is basically the result of activity in the building and transport equipment sectors and should benefit flat products and long products equally. For reasons explained elsewhere, demand for coated sheet is showing the fastest increase followed by demand for special steels.

TABLE V-1

MEDIUM-TERM MACROECONOMIC FORECASTS - EUR 12
(percentage change in volume over previous year)

	1989	1990	1991	1992	1993
GDP	3.2	2.9	2.9	3.0	3.2
GDP deflator	4.9	4.7	4.1	3.7	3.3
Investment:	6.8	5.0	4.8	5.1	5.5
- of which private investment	7.4	5.3	5.1	5.4	5.9
Internal demand	3.5	3.1	3.0	3.1	3.3
Exports	5.8	5.8	5.8	5.9	6.0
Imports	6.0	5.9	5.8	5.9	6.0
Long-term real interest rate	4.9	4.8	4.7	4.7	4.7
USA-GDP	2.6	1.7	2.0	2.2	2.4
Japon-GDP	4.3	3.6	3.5	3.6	3.8

Source: Commission of the European Communities.

TABLE V-2

Projection of growth rates in consumption of crude steel (ECSC products) and consumption forecast for 1992 and 1993

EUR 12 - (%) and million tonnes

1989	1990	1991	1992	1993	Consumption forecast 1992	Consumption forecast 1993
3.06	1.76	1.76	2.19	2.62	127.3	130.6

TABLE V-3

Actual consumption of ECSC and non-ECSC products in EEC 12 by sector in 1986-1987-1988 (provisional) (annual average)

% of total

Sector	ECSC products	of which special steels	Non-ECCS products*	of which special steels	ECSC and non-ECSC products	of which special steels
Steel foundries, deep-drawing and cutting	2.5	0.6				
Forging and stamping	4.6	2.6				
Drawing	9.0	1.8				
Cold rolling and shaping	5.5	0.5				
Tubes	17.7	4.4				
First-stage processing - Total	39.2	10.0				
Construction of non-electrical machinery	6.2	1.6	18.5	5.6	12.7	3.6
Construction of electrical machinery	2.8	0.2	5.7	1.1	4.9	0.6
Shipbuilding	1.1	0.1	0.9	0.3	1.6	0.2
Transport equipment	10.9	1.4	19.8	5.8	18.5	3.4
Metallic construction	6.0	0.2	6.2	1.2	8.8	0.5
Building and civil engineering	13.1	-	14.3	2.1	19.4	0.7
Metalwork	8.3	1.3	15.7	2.9	14.3	2.4
Canning	3.5	-	0.3	-	4.1	-
Boilermaking	3.0	0.2	2.6	1.1	4.3	0.6
Miscellaneous (including final consumption)	5.8	0.4	15.9	3.2	11.4	1.4
End-user sectors - Total	60.8	5.6				
Total (x million t)	100% 102 621	15.6%	100% 26 199	23.2%	100% 88 543	13.4%

Source: Commission surveys

* Non-ECSC products: tubes, drawn wire, drawn products, cold-rolled products or cold sections, deep-drawn or cut products, steel castings.

Explanatory note to Table V.3

The first-stage processing sectors make "non-ECSC" products (i.e. products not covered by the Treaty of Paris) and are intermediate sectors.

The difference between the consumption of ECSC steel products for first-stage processing (40.3 million tonnes, or 39.2% of 102.6 million tonnes) and the 26.2 million tonnes used after processing by the other "end-user" sectors is the result of processing losses plus net exports of non-ECSC products (some 6 million tonnes).

The "miscellaneous" sector includes the railways, mining and steelmaking itself, but also absolutely final consumption like the use of tubes by the oil industry or agriculture.

TABLE V-4

Trends in the specific consumption of steel(1) in all steel-using sectors and some selected sectors

(ECSC and non-ECSC steel products - EUR-10)

(1980 = 100)

Year	All sectors ("final") (2)	Transport equipment	Mechanical engineering	Building, public works and metallic engineering
1980	100	100	100	100
1981	99.3	102.4	97.8	98.4
1982	98.1	96.7	99.2	99.7
1983	95.0	90.0	95.7	95.5
1984	97.8	95.4	94.3	97.5
1985	97.1	92.7	94.0	100.3
1986	97.8	93.3	95.4	101.5
1987	99.0	89.8	95.7	107.1

Source: Commission studies

(1) Steel consumption compared with the activity index of the sector (in the case of transport equipment this is the number of vehicles produced, excluding shipyards).

(2) Weighted by the total consumption of ECSC and non-ECSC steel products in 1980.

TABLE V-5

Level of activity of steel-using sectors

EUR 12 indices 1985=100

Sector	1984	1985	1986	1987	1988 provisional	Reference for forecsts (86-87-88p)	Forecasts(5) 1992	Forecasts(5) 1995
Steel foundries, deep-drawing and cutting	93.7	100	98.5	123.7	:	:	:	:
Forging and stamping	95.5	100	98.8	98.5	:	:	:	:
Drawing	99.9	100	99.4	101.0	:	:	:	:
Cold rolling and shaping	100.7	100	101.4	106.1	:	:	:	:
Tubes (1)	99.3	100	90.8	89.0	92.2	90.7	94(2)	96(2)
First-stage processing - Total (3)	98.9	100	95.9	97.8	:	:	:	:
Construction of non-electrical machinery	94.8	100	99.0	96.5	102	99.2	115	126
Construction of electrical machinery (4)	94.0	100	103.9	106.3	111.6	107.3	121	130
Shipbuilding (4)	113.5	100	77.4	70.0	66.7	71.4	83	92
Transport equipment (4)	94.3	100	106.1	112.2	119.6	112.6	121	129
Metallic construction	94.2	100	99.5	106.5	114	106.7	127	135
Building and civil engineering (4)	101.5	100	102.9	106.1	112.4	107.1	128	136
Metalwork	100.6	100	101.4	102.9	109	104.4	115	122
Canning	101.7	100	98.3	97.2	100	98.5	103	106
Boilermaking	100.7	100	99.1	97.9	103	100.0	105	108
Miscellaneous (including final consumption)	:	100	:	:	:	:	:	:
End-user sectors - Total(3)	97.6	100	101.7	104.0	110.0	105.2	118	126

(1) Source: "Orange report" by the liaison committee for the steel tube industry in the EEC.
(2) Forecast derived from final activities.
(3) Weighted averages.
(4) All the activity series are based on production by weight ('000 tonnes) except electrical construction (NACE index 34), shipyards ('000 cgrt; completions), transport equipment (number of private cars and commercial vehicles + three times the number of goods vehicles), building and public works (FIEC index).
(5) Source: European Commission data

TABLE V-6

Overall trends in the specific consumption of steel(*) by sectors of final consumption

SECTORS	Average annual growth rate (%)		
	1980-87	1986/87 /88-92	1986/87 /88-95
Non-electrical machinery	-0.72	-1	-1
Electrical machinery	-3.64	-1.5	-1.5
Shipbuilding	-	-	-
Transport equipment	-1.53	-	-
Metallic construction	+2.71	-	-
Building and public works	-	-	-
Metalwork	-0.76	-2	-2
Canning	-	-	-
Boilermaking, etc.	+2.87	-	-
Other consumers	-	-	-
TOTAL	-0.23	-0.72	-0.63

(*) ECSC and non-ECSC products.

TABLE V-7

Forecasts of actual consumption of ECSC and non-ECSC products in EEC-12 by sector for 1992/1995

(Reference: average for 1986, 1987 and 1988 provisional) % of total

Sector	ECSC products		of which special steels		Non-ECSC products*		of which special steels		ECSC and non-ECSC products		of which special steels	
	1992	1995	1992	1995	1992	1995	1992	1995	1992	1995	1992	1995
Steel foundries, deep-drawing and cutting	2.7	2.6	0.7	0.6								
Forging and stamping	4.3	3.9	2.6	2.4								
Drawing	9.2	9.3	1.7	1.8								
Cold rolling and shaping	5.6	5.7	0.7	0.8								
Tubes	17.0	16.8	4.2	4.0								
First-stage processing - Total	38.8	38.4	9.8	9.7								
Construction of non-electrical machinery	6.5	6.7	2.0	2.3	18.6	19.0	6.3	6.6	12.9	13.2	4.2	4.6
Construction of electrical machinery	2.7	2.6	0.3	0.3	5.9	6.1	1.0	1.0	4.8	4.8	0.6	0.7
Shipbuilding	1.3	1.3	0.1	0.2	1.0	1.1	0.3	0.3	1.8	1.9	0.2	0.3
Transport equipment	11.2	11.7	1.7	2.0	18.9	18.3	6.4	6.8	18.5	18.8	3.9	4.2
Metallic construction	6.7	6.9	0.2	0.3	6.3	6.2	1.3	1.2	9.6	9.8	0.6	0.6
Building and civil engineering	13.4	13.5	0.1	0.1	16.5	17.3	2.4	2.4	20.4	20.6	0.8	0.8
Metalwork	7.6	7.3	1.3	1.3	15.2	14.9	2.4	2.2	13.2	12.7	2.2	2.2
Canning	3.3	3.3	-	-	0.1	-	-	-	3.8	3.8	-	-
Boilermaking	3.1	3.1	0.2	0.2	2.6	2.5	1.2	1.2	4.4	4.3	0.6	0.6
Miscellaneous (including final consumption)	5.4	5.2	0.4	0.4	15.0	14.5	3.0	2.9	10.6	10.2	1.3	1.3
End-user sectors - Total	61.2	61.6	6.5	7.1								
Total (x million t)	100% 110.7	114.7	16.3%	16.8%	100% 27.8	28.8	24.3%	24.6%	100% 95.5	99.5	14.6%	15.3%

* Non-ECSC products - tubes, drawn wire, drawn products, cold-rolled products or cold sections, deep-drawn or cut products, steel castings.

TABLE V-8

Apparent consumption (1) of ECSC steel products by product

(EUR12-Million t)

Products	1986	1987	1988	Forecast reference period (average for 1986-87-88p)	Forecasts 1992	Forecasts 1995
Liquid steel, ingots, semis	11.2	11.5	13.5	11.5	12.7	13.0
- Liquid steel	1.3	1.2	1.2	1.2	1.6	1.6
- Ingots and other semis	9.9	10.4	12.3	10.3	11.1	11.5
Long products	35.1	35.8	40.7	37.4	40.6	41.6
- Heavy sections	6.5	6.7	7.6	6.7	7.1	7.2
- Light sections	17.5	17.5	20.3	19.0	20.9	21.2
- Wire rod	11.1	11.6	12.8	11.6	12.6	13.2
Flat products	52.2	53.0	57.5	53.8	57.4	60.0
- Strips and coils/sheet <3mm	23.2	24.2	25.2	23.4	23.8	25.0
- Coils/sheet >3mm	17.7	16.6	18.4	18.2	19.6	19.8
- Coated sheet	11.3	12.3	13.9	12.1	14.0	15.2
ECSC - TOTAL	98.5	100.3	111.7	102.6	110.7	114.7

(1) Actual consumption for forecasts and the reference period.

TABLE V-9

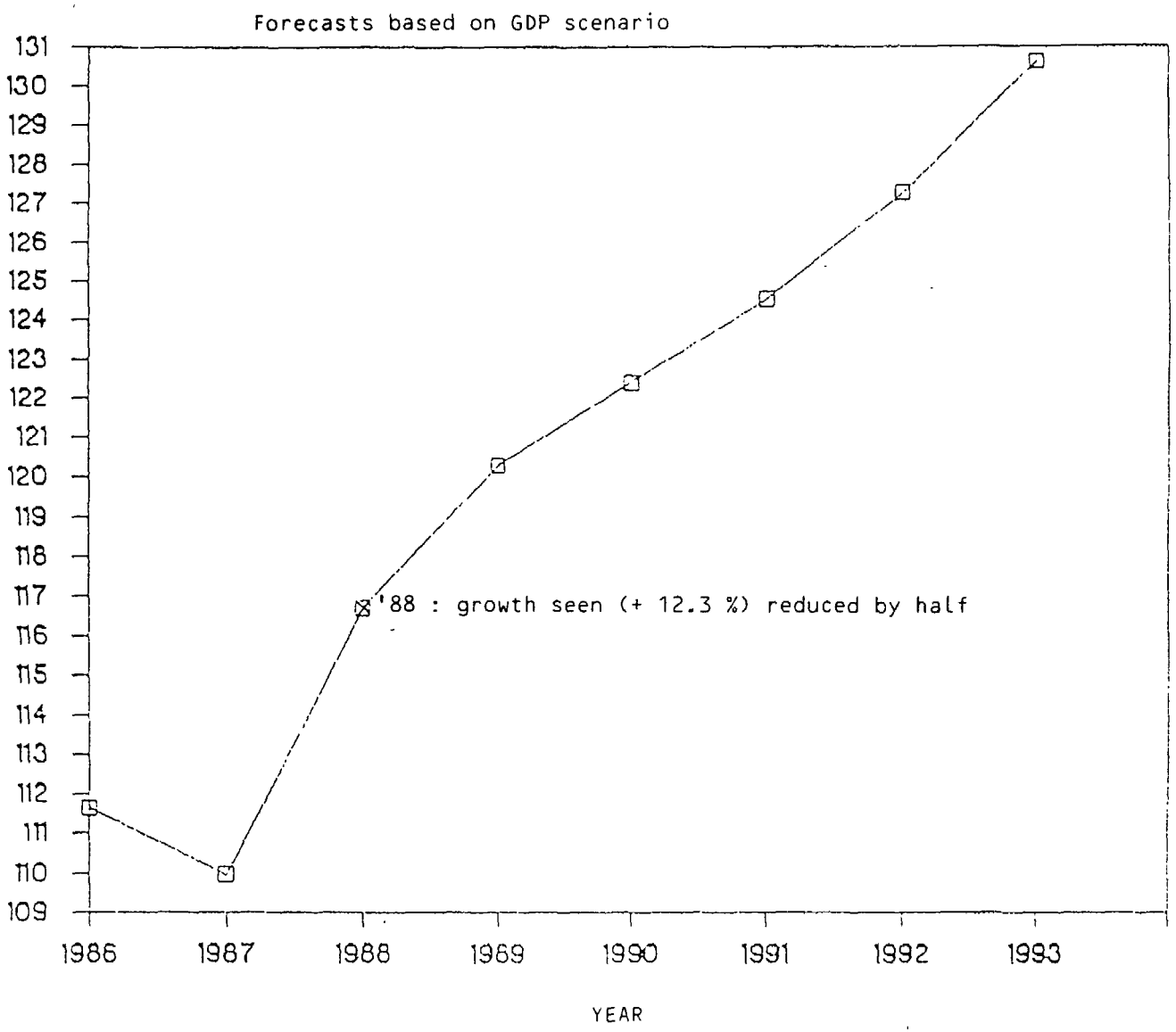
Apparent consumption of crude steel (ECSC products)

Comparison of macroeconomic and sectoral forecast results

(EUR12-Million t)

			Forecasts		
	1987	1988	1992	1993	1995
Macroeconomic approach	110	123	127	131	:
Sectoral approach (1)	110	123	124		129

(1) The coefficient used to convert finished products into crude steel consumption is 1.1360, which assumes the proportion for continuous casting to be 85% of the total.

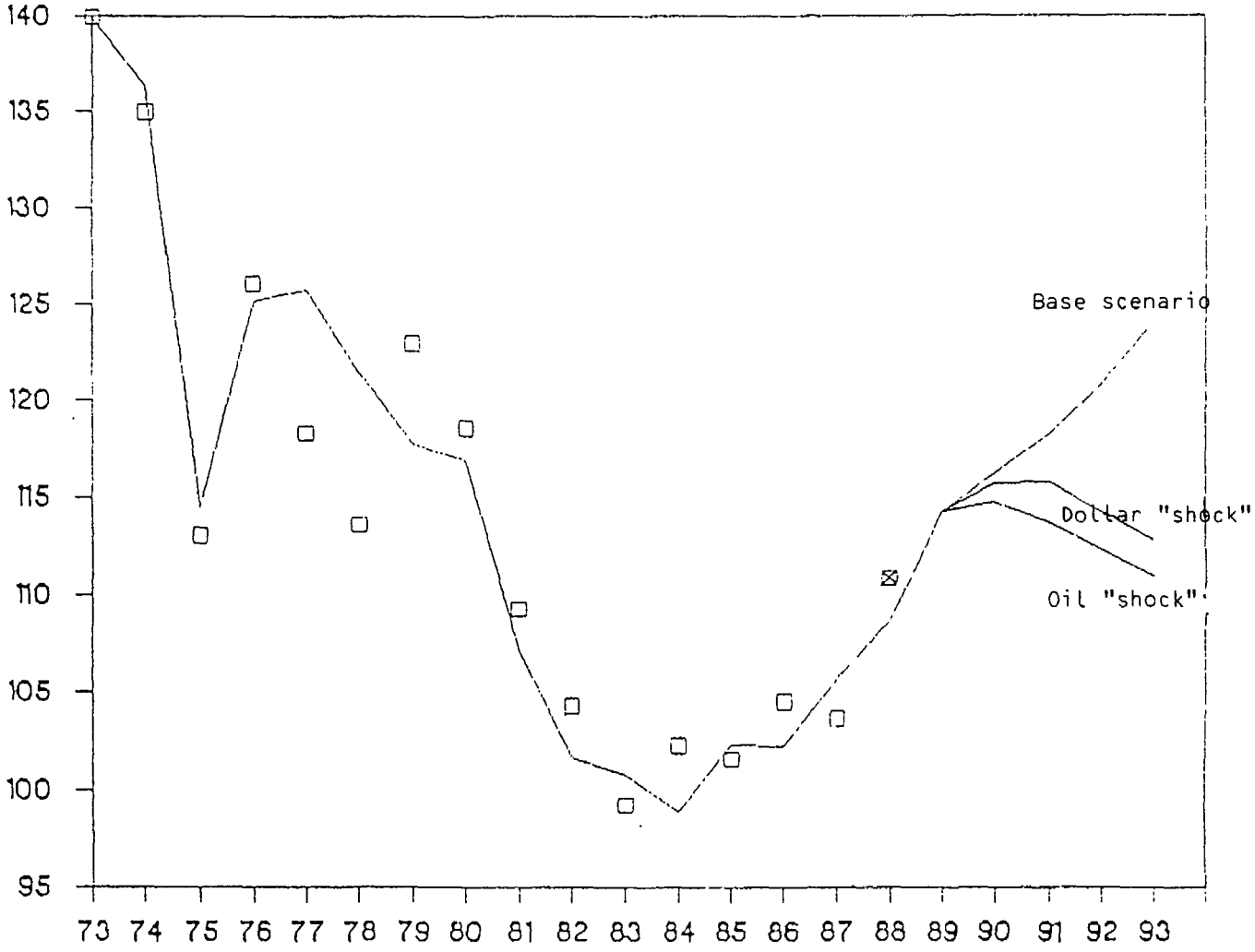


GRAPH V.1

Million tonnes of crude steel/EUR-12

APPARENT CRUDE STEEL CONSUMPTION

EUR-12/ECSC + non-ECSC steel



Million tonnes

GRAPH V.2

□ Observed ——— Forecast model

1988: growth observed (+ 10 %) reduced by half !

CHAPTER VI

EXTERNAL TRADE

1. RECENT TRENDS

This chapter examines the trends in the Community's external trade in steel over the last few years and to analyse the trend in Community imports and exports of steel by product and by geographical area.

In general, exports and imports of ECSC products were relatively stable during the 1980s. Imports ranged from 8 million to 10 million tonnes per year while annual exports were between 22 and 25 million tonnes, apart from a few exceptional years such as 1982. However, this overall stability conceals divergent trends for different products and different producer or consumer countries.

Community exports of long products declined (in the case of concrete reinforcing bars and merchant bars) or remained stable (e.g. heavy sections). In the case of flat products, exports of coil, strip and heavy plate, remained stable (or fell slightly) while exports of sheet, and in particular cold-rolled and coated sheet, rose to some extent. There is one exception to this logical tendency to export products with higher added value: the substantial increase in exports of semi-finished products.

Comparative figures for Japanese and Community steel exports show that semi-finished and long products account for a greater proportion (15% and 28% respectively) of the total exports from the Community than from Japan (1% and 18% respectively). Japan exports more flat products (81% of total exports as against 57% for the Community), especially coated products, which account for 21% of all Japanese exports as against only 13% of Community exports (1987 figures). These differences in the structure of exports between the Community and Japan seem to indicate that the Community industry should make a greater effort to export more sophisticated products rather than those with low added value.

The same pattern is seen in imports, with increases for volume and semi-finished products, concrete reinforcing bars, small sections and wire rod and relatively stable figures for the major categories of flat products.

Tables VI.1 and VI.2 show the trend in Community exports from 1986 to 1988.

The Community's trade balance worsened considerably over this period (1986-1988) in respect of semi-finished products (as a result of the growth in imports) and long products (as

a result of a sharp fall in exports of concrete reinforcing bars, merchant bars and wire rod and a growth in imports of wire rod). In semi-finished products, the overall trade surplus fell from nearly 2 million tonnes in 1986 to 1 million tonnes in 1988 while the surplus for long products fell from 4.7 million tonnes in 1986 to 2.7 million tonnes in 1988. The decline in the trade surplus in long products was particularly sharp in the case of concrete reinforcing bars and wire rod.

In the case of flat products, there was a fall in imports (except for hot-rolled sheet) and exports (in particular of coils and strip). The overall trade surplus rose from 7.2 million tonnes in 1986 to 7.7 million tonnes in 1988.

This very poor performance in respect of semi-finished and long products was not offset by the slight improvement in flat products, and consequently the overall balance fell from 13.8 million tonnes in 1986 to 11.4 million tonnes in 1988.

Geographical analysis of recent trends in the Community's external trade shows the importance of the rest of Europe (West and East) as a steel trading partner for the Community, which accounts for three quarters of its imports and a third of its exports. If Europe is added to the other traditional markets for the Community's steel exports (North America, Africa and the Arab countries), these countries also account for three quarters of all exports from the Community.

As far as distant or "exotic" markets are concerned, there were considerable fluctuations in trade with Latin America and China (the Community's trade surplus with these two regions was 2.5 million tonnes in 1986 and nil two years later) and marginal trade flows with Japan and the Pacific countries. On the other hand, the rest of Asia is becoming a very important market because of the great growth in domestic demand generated by rapid industrialization in those countries.

The Community has a large export and import trade in all categories of steel products with the other countries of Western Europe. It imports all categories from Eastern Europe (in particular heavy sections and heavy plate) but exports very little to these countries. On the other hand, the Community exports all types of flat product to the USSR, from which it imports only semi-finished products (Table VI.3).

The Community exports all steel products to North America (in very large quantities), Africa and the Middle East - three traditional export markets from which it imports very little.

Sheet and coated sheet are the main products exported to Latin America, from which the Community imports mainly semi-finished products and wire rod. Finally, Community exports to Asia (including China) cover the whole range of steel products but the Community imports hardly any products from those countries.

Clearly, the three key markets for Community exports are North America (particularly for semi-finished products, heavy sections, wire rod and coils), Western Europe (reinforced concrete bars, merchant bars and coated products) and the Soviet Union (in particular heavy plate and sheet).

The Community imports mainly from Western Europe (wire rod, concrete reinforcing bars, merchant bars, coils and plate, including coated sheet), Eastern Europe (heavy sections and heavy plate) and Latin America (semi-finished products).

2. FUTURE PROSPECTS

2.1 General trends

In the preparation of the General Objectives for Steel, the estimates of the net trade balance (exports - imports) has always been the chapter least supported by quantitative models and therefore the most subject to qualitative estimates.

It is easy to see why:

- the trends in steel consumption broken down by region and product are hedged with uncertainty, depending as they do on political, macroeconomic and industrial developments in each country or region;

- it is difficult to evaluate actual production capacities (because of different methods of calculation and utilization rates) and almost impossible to predict future trends with any accuracy. There is also a lack of systematic data for individual products;

- each firm has different commercial strategies and the future development of industrial and commercial policies is uncertain.

Nevertheless, it should be possible, by analysing recent trends in the Community's external trade in steel and the available forecasts for steel consumption and world production capacities, to identify certain medium-term trends in Community steel imports and exports.

The forecasts set out below are based on the following overall assumptions:

- a macroeconomic climate unaffected by major changes (no dollar or oil price shocks);

- stable exchange rates (no major fluctuations affecting competitiveness);

- a growth in steel consumption concentrated in the developing countries (particularly the NICs), as predicted by the IISI;

- growth of production capacity in these same countries, as predicted by the OECD;

- further restructuring, on the other hand, in the OECD countries, where steel consumption shows less dynamism.

These forecasts come also from the realisation that the Community steel industry has once more found its dynamism and overall competitivity vis-à-vis its competitors. It is consequently in a good position to maintain its part of the market and its exports, which could be achieved if companies were to adopt adequate strategies and behaviour, which should not in any case lead them to unprofitable export circumstances.

Steel trade between the OECD countries is also expected to remain as stable as it has been for the last decade. North-South trade in steel, on the other hand, will continue to be affected by the growth of capacity within the newly industrializing countries.

The NICs will take an increasing share of world markets if their domestic demand stagnates (in order to achieve satisfactory utilization rates for their new plants) and also because they need foreign currency. Steel consumption is booming in the Asian countries, whose new production capacity will enable them, in part, to satisfy this growth in domestic demand without becoming too dependent on imports (the case of South Korea).

"Zones of influence" and "natural markets" are also expected to play a greater role, as is to be expected for products with low added value whose price is considerably affected by transport costs.

A large part of the increased demand for steel in Asia (including China) may reasonably be expected to be met either by new production capacity in those countries (China and the ASEAN countries) or by exports from neighbouring countries (Japan, South Korea, Taiwan and Indonesia). It is also reasonable to expect European steel manufacturers to continue targeting neighbouring markets, i.e. the EFTA countries, Eastern European and Mediterranean countries, and traditional markets such as the United States.

In the case of the Eastern European countries, the political and economic changes currently taking place could bring about a very different industrial situation, with consequences for the steel industry. These changes will probably not have any substantial effect on trade in steel before 1995, though there may be some growth in imports due to a gradual liberalization of quantitative restrictions on imports from some of these countries.

In addition to this specialization in terms of major geographical areas, further specialization by products is also to be expected.

The Community, like Japan, should continue to adjust its product mix both for exports and for imports.

Exports of more sophisticated products (coated sheet and special steels) will probably increase and new producers are likely to concentrate on bottom-of-the-range products such as semi-manufactures, coils and certain long products. Consequently, the steel trade figures expressed in tonnes and in value should continue to diverge.

Finally, it must be stressed that although most of these trends have already been apparent for a number of years, they were held back by a whole range of commercial and industrial policy measures adopted in the OECD countries and most of the developing countries.

Any long-term forecast must now be based on the assumption of a gradual and multilateral liberalization of trade in steel.

The Community already began this process in 1989 by increasing the quantities authorized under the arrangements and reducing the geographical areas and types of products to which they apply. The new US Presidential Programme expires in 1992 and the attempt to achieve a multilateral consensus could lead to a certain world-wide discipline in non-tariff barriers, including State aids.

There has been a sharp rise in steel imports into Japan since the rise in the Yen.

All this seems to indicate that the major steel markets will be more open in 1995 than they are today, and this should enable the most competitive producers to increase their exports of certain products in which they enjoy a comparative advantage.

Naturally, this openness must go hand in hand with continued and even stiffer anti-dumping measures, which are often triggered by subsidies in the exporting countries.

It is too early to assess the effects of 1992 on steel products, i.e. the free movement within the Community of products from non-Community countries. But the discussion has started and the first indications are that there will be an increase in imports, although probably not a significant one.

Technological progress in the steel industry will affect trade in steel products in the medium or long term, and this should, in principle, favour the Community industry.

2.2. External trade balance

As mentioned above, the economics of the situation are such that, all other things being equal, there is a trend towards increasing product specialization, with European and Japanese producers increasingly concentrating on the manufacture of more sophisticated products and the new steel-producing countries increasing their output of volume products required for domestic consumption and for which they have a comparative advantage. These trends may, however, be checked or even reversed by deliberate strategies especially when the rediscovered good health of the Community steel industry is taken into account, at company level as well as at the level of the structure of the sector, even if, in particular at this level, further progress is necessary.

For all these reasons, the most reasonable scenario for the medium-term development of Community external trade seems to be for the Community industry to maintain its current position on the world market. It was decided to use the average figure for the last three years to allow for the fact that 1988, being the peak year in the steel cycle, was characterized by very high domestic demand with obvious consequences for our external trade. However, the development forecast by product do take into account the movements towards specialisation which seem to be appearing in international steel trade.

In table VI.4, export and import trends by product can be seen along with the resulting balances. Overall, exports should be around 22.5 million tonnes, with imports being around 9.5 million tonnes, the resulting net balance being 13 million tonnes. In 1988 Community exports were 21 million tonnes while imports had risen to 10 million tonnes (a surplus of 11.4 million tonnes).

At product level, and in comparison with the reference period (86-87-88), a certain reduction of the net balance for semis, reinforcing bars, and light profiles might be expected. On the other hand, the balance expected for heavy sections, sheet, and coated sheet, could improve slightly.

These trends are clearly influenced, in particular, by changes in the Community's internal demand. A slackening in internal demand would have the effect of curbing the growth in imports and would oblige the Community steel companies to look for new export outlets, whilst, at the same time, not endangering their profitability.

Furthermore, continued restructuring within the Community is bound to influence steel trade flows, either because of closures (e.g. foundry closures leading to imports of semi-finished products) or because of fresh investment (coating plants).

Finally, as has already been stated, the commercial strategies adopted by Community steel firms are still the key factor influencing their share of the world market.

TABLE VI.1

EXTERNAL TRADE: PRODUCTS (EUR 12)

(million tonnes)

	1986		1987		1988	
	EXP	IMP	EXP	IMP	EXP	IMP
Ingots, semi-finished products	3.0	1.1	3.6	1.2	2.9	1.9
Heavy sections	2.5	0.8	2.4	0.7	2.5	0.7
Concreting reinforcing bars and light sections	3.4	1.3	3.0	1.2	2.1	1.4
Wire rod	1.5	0.6	1.2	0.6	1.2	1.0
LONG PRODUCTS	7.4	2.7	6.6	2.5	5.8	3.1
Coils and strip	3.4	1.9	3.4	1.8	2.9	1.4
Heavy plate	1.8	1.6	2.0	1.3	2.0	1.2
Hot- and cold-rolled sheet	4.7	1.3	4.9	1.3	4.9	1.4
Coated sheet	2.8	0.7	3.0	0.7	2.6	0.7
FLAT PRODUCTS	12.7	5.5	13.5	5.1	12.4	4.7
TOTAL	23.1	9.3	23.7	8.8	21.1	9.7

SOURCE: EUROSTAT

TABLE VI.2

EXTERNAL TRADE IN STEEL (1): REGIONS

(million tonnes)

	1986		1987		1988	
	EXP	IMP	EXP	IMP	EXP	IMP
Western Europe	4.9	4.8	5.5	5.0	5.2	5.4
Eastern Europe	0.3	2.0	0.3	1.9	0.3	2.1
USSR	2.2	0.4	2.2	0.6	2.1	0.9
North America	5.7	0.4	6.1	0.4	5.9	0.4
Pacific Countries	0.1	0	0.2	0	0.2	0
Africa	2.4	0.6	2.2	0.7	2.0	0.6
Middle East	1.3	0	1.1	0	1.2	0
Latin America	1.7	1.4	1.7	0.9	0.9	1.4
Japan	0.1	0.4	0.2	0.2	0.2	0.1
China	2.2	0	1.1	0	0.5	0
Other countries in Asia	2.1	0.2	3.2	0.2	2.5	0.2
TOTAL EXTRA-COMMUNITY TRADE	23.1	10.3	23.8	9.9	21.1	11.2

(1) All ECSC products, including pig iron, cast iron and ferro-manganese.

SOURCE: EUROSTAT

TABLE VI.3

EXTERNAL TRADE: REGIONS AND PRODUCTS

('1000 tonnes)

YEAR: 1988	INGOTS & SEMI-FINISHED PRODUCTS		HEAVY SECTIONS		WIRE ROD		LIGHT SECTIONS & CONCRETE REINFORCING BARS		COILS AND STRIP		HEAVY PLATE		HOT- AND COLD-ROLLED SHEET		COATED SHEET	
Partners:	E	I	E	I	E	I	E	I	E	I	E	I	E	I	E	I
1) WESTERN EUROPE	567	479	462	228	392	551	664	1073	725	745	387	546	1257	1088	774	427
2) EASTERN EUROPE	2	197	4	395	20	191	22	241	18	233	74	570	60	174	68	67
3) SOVIET UNION	10	361	0	9	2	0	24	2	58	60	513	12	1403	1	93	0
4) NORTH AMERICA	1445	3	914	11	433	14	331	3	965	52	365	4	868	8	558	77
5) AUSTRALIA	0	0	51	0	8	0	48	1	21	0	9	0	11	0	8	3
6) AFRICA	300	87	147	25	93	46	464	12	221	98	98	48	331	28	338	46
7) MIDDLE EAST	68	10	73	3	10	1	175	0	302	0	195	0	99	0	268	0
8) LATIN AMERICA	54	696	50	33	49	124	76	35	197	110	122	33	204	46	180	33
9) ASIA	397	39	611	4	158	0	221	20	244	67	140	1	538	23	247	22
10) CHINA	21	0	74	0	31	0	64	0	73	0	37	0	119	0	106	0
11) JAPAN	1	2	77	0	4	49	1	8	72	21	22	8	4	14	8	49

TABLE VI.4

EXTERNAL TRADE FORECAST FOR 1995

(million tonnes)

	Exp.	Imp.	Balance
Semi-finished and ingots	2.9	1.7	1.2
Heavy sections	2.6	0.7	1.9
Concrete reinforcing bars and light sections	2.4	1.3	1.1
Wire rod	1.3	0.7	0.6
Long products	6.3	2.7	3.6
Coils and strip	3.2	1.7	1.5
Heavy plate	1.9	1.4	0.5
Hot- and cold-rolled sheet	5.1	1.3	3.8
Coated sheet	3.1	0.7	2.4
Flat products	13.3	5.1	8.2
Total	22.5	9.5	13.0

CHAPTER VII

COMMUNITY SUPPLY

The analysis of steel supply within the Community is made in two parts. The first is devoted to the production sector and looks at certain aspects relating to structure, specialisation, investments, and production capacities. It also presents production forecasts up to 1995, taking into account the internal demand and external balance forecasts analysed in the previous chapter. The second part gives a short analysis of the indirect steel distribution sector, that is, that affected by steel merchants.

1. PRODUCTION

1.1. Present structure

1.1.1. Now that Spain and Portugal have joined, the Community's steel industry comprises 379 companies with a total capacity of 190 million tonnes of steel production, that is, more than 20% of world capacity.

It has a turnover of around ECU 50 000 million with an added value of ECU 15 000 million and directly employs 400 000 people.

Following the major changes which occurred during the restructuring carried out in the Community of Ten between 1980 and 1986, and in Spain between 1984 and 1988, the structure of the Community steel industry, in terms of its geographical distribution, is now becoming settled. Historical factors determined the great changes of the past. Originally, the industry had been located around deposits of raw materials, such as the coalfields of the Saar and the Ruhr, which gave birth to the steel industries of France, Germany, Belgium and Luxembourg. The discovery in the Third World of cheap, high-quality ore deposits, and a secure supply of coal at competitive prices, led to the establishment of the coastal steelworks with port facilities (France, Italy, United Kingdom and Netherlands - see Table VII.1). Finally, the amount of very cheap scrap metal which became available at the end of the last world war led to the birth of the electric-steel industry near the major conurbations.

1.1.2. Today there are two types of steelworks: integrated and electric. Their market shares have now stabilized; the electric branch represents about 33% of production capacity and integrated works account for the remainder (Table VII.2).

Over the last decade the integrated steel industry has proved vulnerable to fluctuations in the market because it remains dependent on the heavy investments needed to optimize production capacity. However, it has recently improved production methods to guarantee higher-quality products.

The electric-steel industry developed in response to the availability of demolition scrap at the beginning of the Fifties. Its spectacular growth since then has been due primarily to massive industrialization within the Community, which has resulted in a substantial supply of scrap from manufacturing industry, on the one hand, and a rapid pay-back on industrial plant, on the other. Today manufacturing industry provides a third of all scrap metal on the market, the rest coming from scrap-metal collection, old machinery, demolition and ship-breaking etc.

Because scrap metal is a product of uncertain quality and chemical composition, the electric-steel industry has been confined to the production of ordinary steels such as concrete-reinforcing and merchant bar. In recent years, the demand for products of an ever-higher quality has caused steel producers to invest in quality improvement and to select higher-quality scrap.

Current electric-furnace technology is able to satisfy the market's quality requirements; plants are being constructed to produce flat rolled products.

The electric-steel industry enjoys an operational flexibility which makes it extremely competitive by comparison with the integrated industry (Table VII.2).

1.2. Specialization

Technical developments in the construction of industrial plant, machinery and means of transport are creating an ever-greater demand for steel products which meet strict physical and engineering specifications. Production of quality and special steels has therefore grown substantially in recent years and now represents 16.4% of total steel production (Table VII.3).

Although this growth is partly due to real expansion in sectors such as steels for ballbearings and high-speed steels, special steels often replace ordinary steels in order to improve the quality of the end-product. This is true of stainless and structural steels.
In other cases, steels with special properties are developed to compete with aluminium, plastics and other non-steel products.

This qualitative change is advancing apace. The Community steel industry is making a great research and technology effort to meet the challenge.

Coated steels are playing a special role. Anti-corrosion protection is an increasingly important requirement in an environment increasingly polluted by corrosive manufactured products, but it also meets the growing demand for steel suitable for use in difficult natural conditions (wet, saline etc.). Research into ever-higher performance coatings is expanding all the time. In recent years the industry has perfected, in addition to hot-galvanized sheet, electrogalvanized and mixed coatings involving zinc and other metals (aluminium, nickel and chrome) to meet the differing requirements of sectors such as the construction and motor industries. Coated steels currently represent 45.8% of the total production of cold-rolled sheet.

1.3. Investment and innovation

It is clear from the last paragraph that the steel industry is having to make a great effort to keep abreast of the needs of its customers. It will have to focus investment and much of its financial resources on modernization, innovation and research.

Reducing production costs and improving quality entails rationalizing the production process, improving the performance of existing plants or designing new production technology.

1.3.1. Smelting pig-iron is a crucial stage because of its high cost in terms of investment and energy (50% of the cost of a hot-rolled product). Work to reduce energy costs is concentrated on two areas:

- Replacing coke, an expensive energy form, with cheaper forms by injecting coal and oil into the blast furnace;

- Reducing specific energy consumption by optimizing processes. This intervention increasingly involves the use of high-precision, computerized measurement and control systems which allow necessary adjustments to be made in real time.

These methods have been successfully employed for several years now; their general use must be a medium-term objective.

Blast-furnace structure is not expected to change, although the Community average is still below optimum size, which requires a hearth between 10 and 12m in diameter.

In conclusion, no spectacular developments are expected at this stage in production.

It is not, therefore, surprising that investment in blast-furnaces is in relative decline. By contrast, investment in coking plants is expected to increase, particularly because, for a number of reasons, it is overdue.

The specific consumption of coke in blast furnaces has decreased (from 800 to 400 kg/t), following the introduction of fuel-oil and coal injection techniques and also because growth has been greater in the electric steel sector.

1.3.2. Major advances have recently been made in steelworking, both in the area of pneumatic plants with the application of combined top and bottom blowing, and in the area of electric steel plants, where productivity has been increased by a series of developments involving oxygen injection, raising the specific electric capacity, preheating scrap, cooling furnace walls and the bottom tap-hole.

If one adds to this the development of in-ladle refining and the robotization of steelwork operations, it is easy to understand the relatively high level of investment in this stage of production; this level should fall in the medium term because the margins for improvement are now small.

1.3.3. In recent years the steel industry has invested considerably in continuous casting plants. This phase is now almost completed and the level of investment should therefore decline.

At present, work is focused on increasing flexibility (format changes), productivity (high-speed casting) and levels of automation, but also on casting a product in its final or near-final dimensions. In the case of continuous slab casting, the first industrial applications are being set up for thin and ultra-thin slab plants, an important step towards continuously-cast sheet, a longer-term objective.

The margins for improvement in this area are enormous, and once the process has been mastered completely (a few years after the first such plants come on stream), thin-slab continuous casting could revolutionize the very structure of hot-strip production.

1.3.4. The design of hot-rolling mills is at present more or less stable. The only foreseeable technological developments in flat-rolling mills concern bending, and systems for shifting, CVC or similar rolls.

Any improvements to long-rolling mills will tend to be in the areas of robotization and automation, and no large-scale investment is therefore expected.

1.3.5. Increased investment will probably be focused on introducing continuous annealing into cold-rolling mills to pave the way for continuous rolling, i.e. without any interval between the different stages of rolling. Continuous annealing is the innovation which will permit this by eliminating bell annealing, the most important cause of discontinuity.

1.3.6. The coated-sheet sector is traditionally the most dynamic and, generally the most sensitive to the changing needs of manufacturing industry.
Customers seem to be satisfied with current product quality and the steel industry will be investing heavily to meet the growing demand for galvanized and electrogalvanized products. Research and innovation are concentrating on perfecting alloyed coatings (zinc-aluminium etc.) to meet the specifications of certain subsectors.

1.4. Capacity and output

1.4.1. General

Within the Community, steel supply is measured in terms of "maximum possible production" (MPP). The MPP for pig iron, steel and rolled products represents the maximum output achievable by all plants, taking into account the bottlenecks which some plants might impose on others.

More precisely, the MPP is the maximum output which can be achieved in a given year under normal working conditions, taking into account repairs, maintenance and normal holidays, with the plant available at the start of the year, together with the additional output of any plant brought into service and any reduction in output due to the definitive closure of existing plants. The assessment of production must be based on the probable share held by each of the plants in question, and on the assumption that raw materials will be available.

The MPP is therefore a realistic way of assessing capacity and, if properly calculated, it can be achieved by firms when all circumstances are favourable. This situation has almost been achieved in the past few months, during which the industry has been stimulated by very high demand.

But a certain caution is called for in this area. Of course it is interesting that in recent months production - at full throttle to meet very strong demand - should be nearing MPP, but this should not lead us to false conclusions. Only

certain plants are in the ideal position to achieve top performance. In some cases, technical problems have been encountered; some countries are involved in major restructuring and this is reflected by the level of capacity in production; labour is an increasingly inflexible factor of production and producers are very reluctant to take on new workers to meet a surge in demand. And, finally, the restructuring and rationalization of the means of production have not yet been completed: some firms' production processes are not yet perfectly proportioned, and, in general, supply does not yet perfectly match demand.

After the period of restructuring directed by the Commission and the Member States, the structure of the Community steel industry was both quantitively and qualitatively changed. Closures and reductions in capacity were easily accounted for, and the MPP reduced accordingly, but the formula failed to allow most of the changes resulting from improved productivity to be taken into account.

Firms were, therefore, asked to study, in addition to the survey on their 1989 investments, their own MPP and introduce any quantitative changes arising from improved productivity. The figures discussed below are those which firms have adjusted for this prupose.

1.4.2. Steel and continuous casting

In 1988, production of crude steel in the Community of Twelve stood at 138.0 million tonnes, compared with 126.6 million tonnes in 1987, an increase of 9%.

The Community of Twelve's 1988 MPP for crude steel was 190.9 million tonnes, 0.6% up on 1987's 189.8 million tonnes.

According to the information from steel produceers, the Twelve's 1992 MPP for crude steel should be 186.0 million tonnes.

Electric steel's share of this total is expected to stabilize at about 33% by 1991.

Continuous-cast steel accounted for 84% of the Twelve's 1988 production, compared with 81% in 1987. The Twelve's MPP rose from 143.1 million tonnes in 1987 to 151.2 million tonnes in 1988, an increase of 8.1 million tonnes or 5.7%.

According to the producers, the Twelve's continuous-casting capacity could amount to 152.5 million tonnes by 1992.

Of the expected reduction in the MPP, about 5 million tonnes by 1992, 4 million tonnes can be ascribed both to the integrated industry's technical reduction in crude steel requirements due to the development of continuous casting, and the necessary adjustment of its liquid-phase capacity, following the reduction of hot-rolling plant capacity.

1.4.3. Hot-rolled products

In 1986, following the decline observed during the preceding years, the steel market seems to have entered a new phase. This phase of expansion is, according to partial statistics for the first half of 1989, being sustained, in terms of both volume and selling prices. The Twelve's industry produced 115.4 million tonnes of hot-rolled products in 1988, compared with 105.1 million tonnes in 1987, an increase of 9.8%.

As for the breakdown by product, the overall increase in production (up 9.8%) was greater for hot-rolled flat products (up 10.4% on 1987), which were then still partly covered by Article 58, while long products showed very good, although less spectacular growth (up 8.9%).

The 1989 survey shows a reduction in the MPP for hot-rolled products from 165.2 to 162.4 million tonnes by 1992. This reduction is essentially the result of closures carried out during Spanish restructuring.

1.4.4. Cold-rolled and coated products

Cold-rolled sheet production rose to 33.4 million tonnes in 1988 from 30.9 million tonnes in 1987, an increase of 8.1%. The MPP for cold-rolled steel remained stable at 47.7 million tonnes and should fall slightly (by 1.0%) by 1992. Nevertheless, firms are predicting a slight rise, 0.4 million tonnes, in the MPP of cold-rolled stainless-steel sheet, offset by a greater decline for carbon steels.

The 1988 results were characterized by a substantial increase in the production of all types of coated sheet, which grew by 11.9% overall. In 1987 13.5 million tonnes of cold-rolled steel strip were coated; by 1988, the total was up to 15,3 million tonnes.

The figures for 1988 production of tinned and ECCS sheet, 4.8 million tonnes, is the highest recorded since the accession of the United Kingdom, Denmark and Ireland. The MPP, 6.8 million tonnes in 1988, should decline slightly to 6.5 million tonnes in 1992.

From 1987 to 1988, production of hot-coated sheet (galvanized or otherwise hot-coated) increased by 13.2%, rising from 6.8 to 7.7 million tonnes. The MPP rose from

8.0 to 8.4 million tonnes. Firms are expecting to increase capacity by 3.5 million tonnes for 1992, which would bring the MPP to 11.9 million tonnes.

The MPP for electrogalvanized sheet climbed from 2.8 million tonnes in 1987 to 3.4 million tonnes in 1988, a rise of 23%. This was due to several new lines entering production to supply, in the main, the motor industry and marked a major increase in demand for the third year in a row. The industry expected a further increase of 1.5 million tonnes by 1992.

Production of organic coatings rose by 12%, from 1.7 million tonnes in 1987 to 1.9 million tonnes in 1988. Over the same period, the MPP rose by 13%, from 2.3 to 2.6 million tonnes. This MPP should reach 3.6 million tonnes by 1992.

The statistics used in this section reflect the results of a study carried out by the Commission in 1988/89.

1.5. The outlook for production and MPP between 1992 and 1995

1.5.1. Methodology

The MPP development forecasts provided by producers reflect their medium-term strategies, and look no further than 1992. For 1995 we have adopted the hypothesis that MPP will remain at 1992 levels.

Production figures are derived from forecasts for the growth in consumption and for the external trade balance. It is assumed that fluctuations in stocks will balance out over the period in question and therefore have no impact between 1992 and 1995 (Table VII.4).

The production figures which can be obtained using this methodology refer to finished products; in the case of flat products, they are not comparable with figures for production at the different stages of rolling.

These figures must, therefore, be converted by identifying the quantities attributable to the different rolling plants.

1.5.2. Forecasts for 1992 to 1995

The forecasts show (Table VII.5) that production of hot-rolled strip in 1992 and 1995 will be at levels similar to, or even higher that, the very high levels of 1988.

The fall in cold-rolled production in 1992 is attributable to a forecast dip in the motor industry between 1991 and 1993, which should pick up again in 1994 and 1995.

Production of coated sheet, and in particular galvanized sheet, is forecast to rise. These forecasts were backed up by the study carried out by the Commission in 1988/89, which confirmed both the growing demand from user sectors and the need for major investment in hot-galvanized and electrogalvanized sheet.

Crude-steel production figures, although connected to figures for hot-rolled products, will be proportionally lower, following the entry into service of several more continuous-casting plants. At the same time, closures of liquid-phase capacity (Bagnoli, Rheinhausen etc.) already decided or under consideration will contribute to a 5 million-tonne reduction in capacity, compared to 1988. After such structural adjustments, the utilization rate forecast for 1995 will be around 77% (Table VII.6).

Production of hot-rolled wide strip, which was very high in 1988, will be at a similar level in 1995. At the same time, the exercise carried out with firms to assess the impact on MPP of investment in improving productivity has enabled figures to be revised upwards by some 2 million tonnes. Despite these corrections, the utilization rates forecast for 1992 and 1995 are between 76 and 80%. These rates, about 3 points down on those of 1988 and 1989, must still be regarded as acceptable, although this product's great sensitivity to fluctuating prices and production requires very cautious evaluation.

Reversing-mill plate capacity will experience quite low utilization rates because the average size of these plants makes reducing capacity difficult. Producing sheet 5 or 6 m wide - as the market requires - automatically imposes a capacity of 2 to 3 million tonnes, and the closure of such a plant would greatly exceed any individual sheetmaker's restructuring needs. Any solution will, therefore, require combined action by firms.

Because of their structure and the wide range of sections and dimensions which they have to produce, heavy and light-section mills never operate at very high rates. Despite this, the forecast rates are surely too low (between 62 and 64%) and restructuring seems necessary to restore a balance acceptable to the markets for such products.

In 1992 and 1995 respectively wire-rod mills will be operating at between 67 and 70% of capacity. In view of the specificity of these mills and their great elasticity, a utilization rate of 69% could suffice.

Cold rolling is a stage of production which is not expected to see any significant quantitative changes (utilization rates are less important in such plants than in hot rolling), while the coated-steel sector is particularly dynamic. In 1995, despite a 2.5 million-tonne increase on 1988 capacity, the expected utilization rate will be 82%.

In conclusion, the comparison between production and MPP for the period from 1992 to 1995 shows the situation to be satisfactory for hot-rolled wide strip and derivatives (cold-rolled and coated), while producers of reversing-mill plate and long products will have to expect utilization rates that are unsatisfactory on average.

2. STEEL DISTRIBUTION

2.1. The merchant sector, a very varied sector

Steel distribution constitutes a very varied sector. It is characterised, on the one hand, by 380 steel producers being concentrated in certain areas, notably the old raw materials (coal, iron ore) basins, and in certain coastal regions as well as near the big conurbations, and, on the other hand, by steel consumers being dispersed in all the areas of the Community. The merchant sector is the link between the user and the steel producer, and is essentially located near the steel-producing works of in large transformation industry.

The distribution of steel products manufactured within the Community or imported from third countries is carried out by steel producers themselves, merchants - with or without stocking facilities, and agents.

Nevertheless, within the distribution system, there is a certain allocation of functions.

Steel producers sell a large part of their production direct to consumers. In certain countries such as the United Kingdom, Italy, and Spain, these direct sales cover round about 50% of the market or more. On the other hand, direct sales cover around 30% in Germany, France, and Italy. Another part is sold via a merchant, deliveries going straight from the producer to the consumer. This type of transaction ("Strecke") is particularly known in Germany (40%), and in Benelux. In the United Kingdom, this type of transaction is not known at all.

Stockholders, supplied by Community producers and third countries, sell ex-stock between a quarter and two-thirds of the total consumption of commercial grade steels in most countries (see table below). Together with traders, they put on the market almost all imported products coming from third countries. Stockholders alone sell ex-stock a total of more than 25 million tonnes of commercial grade steels within the Community. To this figure must be added "Strecke" sales, and sales to third countries. In total, it is estimated that at least half the deliveries to the Community market is sold by the trade.

Ex-stock deliveries by merchants (1988)
Rolled products (special steels excluded)

	Ex-stock (x 1000 tonnes)	% share of supply to national market
Germany	6,002	24
UEBL	1,890	50
Dennmark	331	31
Spain	2,490	29
France	3,906	29
Italy	5,640	28
Netherlands	700	27
United Kingdom	> 6,000	+/- 55
Ireland		
Greece		
Portugal		
Luxembourg		

Note : These figures cover deliveries of commercial grade steels made by the merchants of each country on to their national market. Deliveries to other Community markets are not included.

Long products take a larger proportion of ex-stock sales. In France, Italy, and the United Kingdom, sales of long products are lower than those of flat products. In other countries, the reverse is the case : flat products are mostly sold direct by producers to final consumers (particularly to producers of motor vehicles, of domestic electrical appliances, and in other sectors).

It is to be noted also that in the special steels' sector, merchants play a significant role in distribution, particularly of stainless.

Many stockholders have further processing facilities (Steel Service Centres) for long and flat products. Approximately 85 000 people in several thousands of companies work in steel distribution. The size of these companies varies a great deal, between an annual sales volume of under 1 000 tonnes, up to 1 million tonnes.

There have always been strong financial links but different from country to country between a good number of steel producers and certain merchants. Interests taken by steel producers in the stock-holding sector have increased particularly over recent years in certain countries, and the integrated stockholding sector is very important today.

This moving of producers towards integration has been accompanied by a process of concentration, stimulated in part by acquisitions made by producers, but also by the development of the Steel Service Centre concept, and consequently the need for significant investment. On the other hand, small and medium merchants, able to adapt to the needs of their regional customers base, have a chance of success for the future.

2.2. The future

As indicated above, steel distribution carried out by steel merchants is currently in a period of structural change. Stocking, and re-sale to different steel consumers will be combined more and more with activities covering not only re-sale, but a system of supplying consumers which adds to standard steel products a whole range of new services. The scope ranges from further processing and product transformation to very close co-operation between distributor and consumer, as, for instance, "just-in-time" deliveries.

The growing transfer of certain steel user functions towards the distribution sector is extending merchant activities. In view of their new role on the steel market, merchants have looked to the setting up of new depots, and computerised premises, and to personnel training, in order to face the needs of a more and more sophisticated distribution system.

However, despite their importance on the steel market, merchant companies are not undertakings within the meaning of the ECSC Treaty. As far as Articles 65 and 66 of the ECSC Treaty are concerned (Agreements and Concentrations), only those companies which habitually exercise a distribution activity are undertakings within the meaning of the Treaty. Consequently, merchants are not subject to the Treaty's price rules except, according to Commission Decision 30-53, distribution companies which are controlled by a production company.

Nevertheless, during the crisis period between 1981 and 1985, the Commission obliged merchant companies to publish price-lists, on the basis of Article 63 of the Treaty[1]. In 1986, after the most serious phase of the crisis had been overcome, the Commission no longer saw the need to continue to impose this obligation on merchants. Nevertheless, it recommended[2] that merchants should follow a voluntary

(1) Recommendation No. 1835/81/ECSC of 3rd July 1981
Official Journal No. L 184 of 4th July 1981

(2) Communication from the Commission No. 86/C192/03 of 30th July 1986
Official Journal No. C 192 of 30th July 1986

discipline on price. In general, merchants followed the Commission's recommendation and published price lists.

No direct Commission intervention is likely in the immediate future. Nevertheless, the Commission is prepared to reinforce its co-operation with merchants to facilitate preparations for the open market after 1992. This co-operation is envisaged rather as (administrative and advisory) help in the production of statistics covering the sector, as well as the carrying out of studies on the current and future structure of distribution in Europe.

In fact, the situation of merchants' stocks is an example of where this generation of statistics is necessary. In the Community, some millions of tonnes of rolled products exist in permanence in merchants' stocks. The value of these stocks is worthy of note, rising and falling with the level of demand and variations in price. At a time when prices are going down, merchants lose a significant part of the value of their stocks with no possibility of compensating for this loss by reducing costs. For this reason, the existence of reliable information on merchants' stock levels would help the Commission to accomplish the tasks which it has to undertake under the provisions of Article 46 of the Treaty, that is, the continuous study of the market and the setting of Forward Programmes.

All the same, analyses and studies, particularly in view of the single market, will enable merchant companies to prepare trans-national activities. This is necessary because at the moment a large part of the activity of merchants is carried out only at national level. For the future, it is indispensable for merchants to create new logistics and marketing systems if they wish to benefit from the new market dimension.

TABLE VII.1

CHANGES IN CRUDE STEEL PRODUCTION CAPACITY IN COASTAL REGIONS OF SOME COUNTRIES (%)

	1980	1988
D	8	8
B	16	24
UK	17	21
F	42	53
I	49	52
NL	100	100
DK	100	100
Total	29	37

Source: questionnaires 2.61 of 1981 and 1989.

TABLE VII.2

ELECTRIC STEELWORKS' SHARE OF PRODUCTION CAPACITY 1980 - 1988

	TOTAL MPP (million t.)		MPP ELEC. ST. %	
	1980	1988	1980	1988
Germany	66.9	46.8	13.6	18.9
Belgium	19.7	13.9	6.1	11.0
France	32.5	27.9	15.1	23.9
Italy	39.4	37.5	51.0	49.6
Luxembourg	6.4	5.5	-	-
Netherlands	8.5	8.0	4.7	3.8
UK	28.0	23.5	34.6	29.0
Denmark	1.1	0.9	81.8	100.0
Ireland	0.1	0.3	100	100.0
Greece	2.3	4.5	76	77.8
Spain	:	21.2	:	67.8
Portugal	:	0.9	:	37.5
Total EUR 10	202.6	168.8	23.3	26.7
EUR 12	:	190.9	:	32.6

Source: Investment in the ECSC Industries - 1981 and 1989 surveys.

TABLE VII.3

PRODUCTION OF SPECIAL STEELS AND THEIR PERCENTAGE SHARE OF TOTAL STEEL PRODUCTION

(million tonnes)

EEC	1980	1988	
	(EUR 10)	(EUR 10)	(EUR 12)
Non-alloyed ingots	4 724	4 906	5 945
Structural steels	13 126	12 006	12 644
Stainless and heat-resistant steels	2 156	3 289	3 715
High-speed steels	61	53	54
CP/MS steels	18	21	44
Special steels: Total	20 086	20 275	22 402
Special steels/total steels (%)	15.7	16.3	16.4

Source: Special steels, Special Statistical Bulletin, December 1988.

TABLE VII.4

CONSUMPTION, EXTERNAL TRADE AND PRODUCTION FOR SALE - ROLLED PRODUCTS

(Million tonnes)

	1992 Consumption	Balance X - M	1992 Production	1995 Consumption	1995 Production (A)
Liquid steel for casting, ingots and semi-finished products for sale	12.7	1.2	13.9	13.0	14.2
Heavy sections	7.1	1.9	9.0	7.2	9.1
Merchant bar	20.9	1.1	22.0	21.2	22.3
Wire rod	12.6	0.6	13.2	13.2	13.8
Sub-total: long products	40.6	3.6	44.2	41.6	45.2
Strip and sheet < 3 mm	23.8	5.3	29.1	25.0	30.3
Strip and sheet ≥ 3 mm	19.6	0.5	20.1	19.8	20.3
Coated sheet	14.0	2.4	16.4	15.2	17.6
Sub-total: flat products	57.4	8.2	65.6	60.0	68.2
Sub-total: rolled products	98.0	11.8	109.8	101.6	113.4
Total: ECSC products	110.7	13.3	123.7	114.6	127.6

TABLE VII.5

1986-1995 PRODUCTION

(Million tonnes)

	1986	1987	1988	1992	1995
I. CRUDE STEEL	125.6	126.6	138.0	138.6	143.0
II. HOT-ROLLED STEEL					
Wide and narrow strip	53.8	56.5	62.5	60.2	62.9
Reversing-mill plate	8.6	8.3	9.0	9.0	9.1
Total: hot-rolled flat products	62.5	64.8	71.5	69.2	72.0
Heavy sections	8.2	8.3	9.4	9.0	9.1
Light sections	19.5	19.6	21.4	22.0	22.3
Wire rod	12.6	12.5	13.1	13.2	13.8
Total: long products	40.3	40.4	43.9	44.2	45.2
Total: hot-rolled products	102.8	105.2	115.4	113.4	117.2
III. OTHER FINISHED PRODUCTS					
Cold-rolled sheet	29.7	30.7	33.1	32.6	34.3
Coated sheet	13.3	14.2	15.0	16.4	17.6

TABLE VII.6

PRODUCTION CAPACITY AND PRODUCTION OF STEEL 1992-95

(Million tonnes)

	MPP 1992-95	Production 1992	Utilization rate %	Production 1995	Utilization rate %
I. CRUDE STEEL	186.0	138.6	74.5	143.0	76.9
II. HOT-ROLLED STEEL					
Wide and narrow strip	79.0	60.2	76.2	62.9	79.6
Reversing-mill plate	13.9	9.0	64.7	9.1	65.5
Total: hot-rolled flat products	92.9	69.2	74.5	72.0	77.5
Heavy sections	14.5	9.0	62.1	9.1	62.8
Light sections	35.2	22.0	62.5	22.3	63.4
Wire rod	19.8	13.2	66.7	13.8	69.7
Total: long products	69.5	44.2	63.6	45.2	65.0
Total: hot-rolled proudcts	162.4	113.4	69.8	117.2	72.2
III. OTHER FINISHED PRODUCTS					
Cold-rolled sheet	47.3	32.6	68.9	34.3	72.5
Coated sheet	21.5	16.4	76.3	17.6	81.9

CHAPTER VIII

PRICES TRENDS

1. GENERAL

Steel prices have always been subject to fluctuation. This product which was, and still is, the foundation of all European industrial activity has inevitably been subject to major ups and downs in demand and production capacity this century. Until the 1960s the fluctuations were largely the consequences of the two world wars and regular economic cycles. However, in the last twenty years or so, the situation in the Community's steel market appears to have changed. Long periods of oversupply, caused by capacity increases and/or a downturn in the economy, have followed periods of boom and there has been practically no transitional phase between the two. For instance, the boom year of 1974 was followed by the recession of 1975 and a long period of crisis lasting from 1980 to 1987. This in its turn suddenly gave way to a period of strong growth in the economy.

Such abrupt alternations between cyclic phases of varying lengths, combined with a period of structural crisis, have caused prices to slump or soar much more abruptly than in the decades preceding this period.

Although steel prices are subject to rules that differ from those for other industrial products, they have nevertheless reflected the various phases.

Community steelmakers are required to publish steel prices in the form of price lists but there are four exceptions to this requirement. List prices are not applicable to seconds or non-comparable transactions. Also, a producer may align his prices on the price list of any other Community producer and on prices for supplies from non-Community countries. Since prices charged for deliveries to non-Community countries (other than EFTA) are not subject to the pricing rules laid down in the ECSC Treaty, exemption from the price list obligation is naturally also granted in respect of steel used for manufacturing products for export outside the Community (rebate for indirect export).

To enable the Commission to monitor the market situation, steel undertakings are required to state at regular intervals which price system they are applying. An analysis of the structure of sales shows that undertakings are making increasing use of the above options in order to be able to react quickly to changes in the market.

It should also be noted that market prices do not move precisely in line with manufacturers' selling prices. Steelmakers sell part of their production directly to end users, but also depending on the country, some 30 to 50% to stockholders. Stockholders' prices are also governed by certain factors. These include not just the purchasing price but, primarily, the level of stocks and the stockholders' own costs. Consequently, the prices charged for products sold from stock differ from those the stockholder pay the manufacturers during the same period.

A general survey of steel price movements should therefore concentrate on prices actually charged in the market rather than on the price lists published by the undertakings.

2. 1986-89: "DOWNSWINGS AND UPTURNS"

During the crisis period, when production and therefore supplies to the market were held down, prices for certain steel products were also fixed compulsorily under Article 61 of the ECSC Treaty to ensure some degree of balance between prices and costs. At the end of 1985, once liberalization of the production quota system had begun, the crisis began to fade and prices started rising, the Commission abolished the minimum prices.

At the same time world market prices began to fall, a factor which also had consequences for the Community market.

Under such pressure Community undertakings had to lower their tariffs by temporarily granting higher rebates on their lists as well as rebates for certain groups of steel users under Article 5 of Decision No 31/53/ECSC.

In spite of the fall in prices, the Commission did not consider the situation critical and therefore did not reintroduce minimum prices since the drop simply reflected that in production costs, which in turn was due to the fall in the dollar resulting in lower purchasing prices for raw materials and energy. The price decreases during this period were some 3.5% for iron ore, 17% for scrap, 8% for coal, 41% for oil and 12% for gas. The price for scrap during this period also gave mini mills a relative advantage over integrated steel mills.

This situation prevailed for a relatively short period, and prices increased again both worldwide and in the Community in the second half of 1987. 1988 and 1989 were years of strong economic growth, the benefits of which were particularly evident in those sectors which are large-scale consumers of steel such as capital investment, building and motor manufacturing.

The expansion in world trade and the fact that manufacturers from different continents can offer their products for sale on all the world's markets mean that there are more factors to affect prices. Exchange rate fluctuations in non-Community as well as Community countries frequently have a very significant effect on price levels in the Community.

3. MEDIUM-TERM PROSPECTS

Experience has clearly shown that prices for steel products can no longer be relied on to remain within a certain band.

There are many reasons for this and all of them have to be taken into account if we want to assess future trends.

The world steel market is an open market, since there are now many more manufacturers world wide, and the number in the traditional steel-producing countries has increased with the creation of a number of mini mills. The situation is not, of course, the same in all sub-sectors.

In a market where the number of producers is reduced, undertakings with similar cost structures practice a kind of "price leadership". Any change in prices reflects variations in similar market and price conditions. By contrast, in a world market with numerous manufacturers whose variable costs differ (the present situation) every economic recession or even a temporary decrease in economic activity makes prices more unstable.

The large proportion of a steel firm's total costs accounted for by fixed costs plays a major part in its commercial strategy since any drop in capacity use causes a major increase in costs. The tendency to drop prices in order to maintain the utilization rate is therefore understandable.

However, the restructuring of European steel, with the reduction of capacity and costs, makes it less likely that undertakings will try to compensate for their losses by increasing production to the detriment of prices. This danger is further decreased by the fact that there are no longer any operating subsidies in the Community. What is more, undertakings are forced to maximize their profits in order to keep their installations permanently up to date, which is absolutely essential if the Community steel industry is to survive.

The increasing tendency for large steel undertakings to manufacture quality products with high added value is indicative. Such products could help lessen the price fluctuations. Although these are still volume products, the purchasers are manufacturers of expensive goods - for instance, motor manufacturers who can pass on their costs to their customers.

A large proportion of the investments being made in modernization is likely to have a beneficial effect on costs. A particular example is the introduction of advanced technology which could enable steel undertakings to charge relatively lower prices for their products without any negative effect on their margins.

On the question of prices for steel products in general, owing to the greater stability of exchange rates and the greater convergence of the Community's economies, the post-1992 single market should have the effect of levelling out the differences between prices charged in the various regions of the Community. Depending on the product, there is at present a difference of up to 10% in these prices.

It should also be noted that there is already a greater degree of concentration in certain consumer sectors and that this is likely to put pressure on prices.

Several major characteristics therefore play a part in price formation:

- the existence of an open market;

- the proportion of production costs accounted for by fixed costs and trends in total costs;

- the effort to maximize profits;

- developments in demand and market structure.

Since in the last few years the rules for steel prices have changed and there has been steady progress towards integrated markets and closer ties between steel manufacturers and steel users, pricing practices are also changing. The price lists are increasingly taking on the role of providing purchasers with information about prices, which are now fixed by undertakings in the light of the market situation, and using the options allowed under the instruments based on Article 60 of the ECSC Treaty. This indicates that the pricing practices are growing more similar between steel and other industries.

However, despite this increasing similarity, it must not be forgotten that the principal aim of Article 60 is to prohibit discriminatory practices involving, within the common market, the application by a seller of dissimilar conditions to comparable transactions. This is a valid principle accepted by all sellers of industrial and consumer products but is particularly important when it comes to products regarded as the raw materials for the production of investment and consumer goods (steel, energy and other raw materials preprocessed for use by industry).

It is a sign of understanding of the coherence of a developed industrial economy that the Community, followed by the EFTA countries, has introduced a non-discriminatory pricing policy for products which play a fundamental part in the development of the economy.

PART 3

FACTORS OF PRODUCTION: THE MARKET

CHAPTER IX

RAW MATERIALS

The raw materials used in steelmaking can be subdivided as follows:

- ferrous ores, concentrates and pellets
- ferro-alloys
- pig iron, foundry pig iron and scrap
- coal.

1. FERROUS MINERALS

1.1 Iron ore

The discovery and development of new iron-rich deposits, particularly in Australia and Brazil, has banished the spectre of a physical shortage of iron ore in the medium and long term. In the short term, mine operators are actually capable of satisfying higher demand, because they are technically in a position to activate additional production capacities. They have to be flexible, if only because the steel industry itself is subject to major fluctuations in production. By way of illustration, world production of crude steel was of the order of 747 million tonnes in 1979; it dropped to 647 million tonnes in 1982 and rose again to 780 million tonnes in 1988. Thus fluctuations of approximately 130 million tonnes of crude steel production were involved which, in the raw materials sector, had to be absorbed by the iron ore producers. In order to be able to respond at all times to demand for iron ore, producers must constantly have available as large a reserve of ore as possible. This means that they must maintain production capacities active which will probably not be used for years. The danger this involves is that, for lack of an adequate financial base, the smaller, poorer mines will have to close, leading to an oligopoly of the major ore-producing countries.

Forecasts of supplies of iron ore in the future are rendered difficult by a number of imponderables, such as:

- uncertainties regarding future developments in the production of crude steel by various processes both in industrialized and in developing countries (including requirements concerning ore quality and the development of specific charging);

- uncertainty regarding investment morale in the mining sector, which is not particularly profitable;

- development in scrap supply and demand.

1.1.1. Supplies of iron ore

World production of iron ore reached a peak in 1988 of almost 1 billion tonnes. Although there was some strain on the market, consumer demand was more or less satisfied, with the exception of some aspects of product quality. However, this was only possible with the aid of stocks left over from 1987 and a relatively tranquil employment situation.

The transition from a buyer's market to a producer's market also had consequences for the development of ore prices. As these are fixed in advance for the current year, price levels in 1988 remained relatively stable. With some exceptions, consumers were even able to negotiate a reduction in prices compared with 1987, particularly for sintering fines, while prices for lump ore and pellets rose. Conditions in the steel industry were fully reflected in the negotiations for 1989; prices rose by 10%, and by almost 20% for lump ores and pellets.

In addition to deposits which will have to close as they become exhausted, other deposits will probably close owing to increases in the costs of producing a market grade. On the other hand, the development of new mining projects will depend on political will, since from the purely economic point of view willingness to invest in the sector has declined considerably owing to a certain number of economic and political difficulties.

Community supplies of iron ore

The downward trend in Community supplies from indigenous sources will continue in the coming years. The mines still working in Lorraine can continue to supply approximately 7.5 million tonnes per annum with an iron content of around 32% in the coming years. However, the problems afflicting the mines are becoming ever more acute. They concern both the mineralogical composition of the ore (low iron content, high phosphorus content, high beneficiation costs) and socio-economic aspects (aging of the labour force, lack of new investment).

The situation in Spain is not much different. The Marquesado mine in the Sierra Nevada has the best prospects of survival. A hematite limonite is produced from this deep open-cast mine and processed to yield an ore marketed with 55% Fe. Although the alkali metal content appears to be relatively high (0.35%), the product, because it is a good basis for slag, currently finds buyers in Spain and the rest

of the Community. By contrast, when prices are low, the waste material (7.5 to 1) and the rail transport costs may put the economic viability of Marquesado in jeopardy.

Supplies from outside the Community

In 1988, the Community countries imported over 146 million tonnes of iron ore and pellets from third countries (see Table IX.1). As the total volume of iron ore transported by sea amounts to 400 million tonnes per annum, approximately 36.5% of the total is shipped to the Community. In considering supplies from non-Community countries, it is necessary to distinguish deliveries from mines in which the Community industries have a holding, deliveries under long-term contracts and traditional deliveries. Spot deliveries play a minor role.

There has been a decline in interest over the last few years in direct holdings by the Community steel industry in mining operations in third countries for the purpose of security of supply. The more the developing countries or the newly industrializing countries attempt to apply independent economic policies, the less the Community steel industry is interested in direct financial involvement in these countries' mining industry.

Today, the Community steel industry is still involved, either wholly or in the form of holdings, in mining operations in four countries: Liberia, Canada, Brazil and India. These commitments serve to cover approximately one quarter of supply. However, the steel industry hesitates to contemplate new direct investments in the mining sector of non-Community countries owing to a number of factors, in particular the economic and political instability of the developing countries and certain mining legislation (e.g. the new Brazilian constitution).

In future, new supply arrangements will be concluded only in the form of long-term delivery contracts. The steel industry should be aware of the dangers of such a policy of supply security, for such delivery contracts are generally concluded with undertakings possessing large, rich deposits. However, this leads to increased dependence, as the number of such rich deposits is limited. This could result in the market for iron ore becoming an oligopoly, which is certainly not in the interests of the steel industry.

Approximately three quarters of imported fines already come from only four countries, of which two, Brazil and Australia, increased their share of this from 34% in 1979 to 54% in 1988.

Community dependence on third countries is even greater in the case of pellets. Of 33.5 million tonnes of pellets imported, two thirds come from two countries (Brazil, Canada) and over 91% from four countries only (Table IX.1).

1.1.2 The supply of blast furnace ore

The supply of rich ore, in sufficient quantities and at attractive prices, has speeded the closure of mines producing low-grade, uneconomic ores with, to make matters worse, high phosphorus content and high energy consumption. In future, rich or enriched ores will be preferred as furnace charge. Although there may be differences in specific cases, the steel industry will generally tend to buy ore of stable chemical composition and physical behaviour meeting narrow specifications.

The integrated plants must, of course, take supplies from their own mines. As there is no such thing as the ideal configuration in the case of most raw materials, it is necessary to use additives, i.e. products facilitating a self-fluxing sinter or pellet. This may affect both the cost prices and the price of charge materials. It is therefore necessary to establish the extent to which it is more economic to beneficiate the raw materials, which makes them more expensive, or to use more energy inputs in the blast furnace.

As a result, the question of charging is a difficult issue for every blast furnace operator. With regard to the specific charging of lump ore, there are differences from one factory to another ranging from zero to 25%. This figure will probably remain at about 10% until the second half of the 1990s in the Community.

With account taken of production and imports, the total charge of lump ore and pellets in the Community was about 24.5% in 1988.

An important factor when pellets are used is the silica content, both in the ore and the binder. Trials are under way to reduce it; if they produce positive results, the charging of pellets will become more attractive.

As fines are in abundant supply, sinter will remain the most important raw material for the Community in future. However, its use will probably decline in the context of rationalization in the blast furnace sector and environmental protection requirements. In 1987, Community plants still had sintering capacity of 146.2 million tonnes, with capacity utilization running at 76% (compared with 153.4 million tonnes in 1986). In 1989 this capacity amounted to only 143.6 million tonnes per annum. A continuation of this trend is therefore not excluded.

1.1.3 New iron ore projects

Every producer country and every iron ore producer can at any moment be confronted with economic or socio-political problems, so that total security of supply for consumers is not possible. It is therefore worth examining the alternatives available in this field.

- No major iron deposits have been found since the discovery of the Carajas mine in Brazil in 1967. The Earth's surface has been increasingly studied, so that it is unlikely that new deposits of an equivalent size and quality will be found in future. For this reason, it would be advisable for the Community steel industry to participate actively in mining projects under discussion but not yet in operation, in particular since the best projects are located within the Community's direct sphere of interest. This concerns projects that have been on the drawing board for decades: Mifergui in Guinea and Falemé in Senegal.

- In West Africa, the private sector is represented in iron ore mining only in Liberia. The Bong Mining Co., a syndicate of German and Italian steelmakers, extract an itabiritic ore which is beneficiated and consumed in the form of concentrates or pellets in the operators' plants in Europe. As the main deposit will soon be exhausted, its "eastern" extension (Bong Peak) is being opened up with financial aid from the EDF and the EIB. Thus the life of the Bong mine can be extended until the year 2007.

- From 1964, the Liberian-American-Swedish Minerals Company (Lamco) had extracted a high-grade iron ore in the Nimba mountains in Liberia which was transported to the port of Buchanan by a private railway belonging to Lamco and the Liberian Government. Mining activities ceased on 29 July 1989 because the parts of the mine with ore rich in iron and low in phosphorus were exhausted. Lamco's concession contract provides that the entire infrastructure including the railway line and port be handed over to the Liberian Government on cessation of viable operations. Consequently, since the adjoining parts of the Nimba mine still contain ore, i.e. Tokadeh with 24 million tonnes of grade 62% Fe and 0.08% P, and over 100 million tonnes of grade 50% Fe, Gangra with over 100 million tonnes of grade 54% Fe, Yeuliton with approximately 100 million tonnes of grade 53% Fe, the Liberian Government has announced its intention of developing these resources itself. However, in order to do this, it must first of all find the necessary finance, operators and above all customers willing to purchase such a low-grade ore with excessively high contents of phosphorus, silica and alumina.

Apart from this, the Lamco deposit is still being worked on Guinean territory in the Nimba mountains, where until now approximately 600 million tonnes of high-grade ore in the Mifergui concession (Guinean Iron Mines Company) could not be exploited for various political and economic reasons.

According to a recent study, between 7.5 and 9 million tonnes per annum can be extracted provided that the Lamco installations, including the rolling stock, the railway line and the port of Buchanan, can be used; the investment costs in this case would amount to between US$ 200 and 250 million.
Bong for its part would also like to beneficiate in its installations the remaining Lamco reserves. However, to do so, it would be necessary to build a rail link of some 105 kilometres. The port of shipment in this case for ore from the "Western Area" would be Monrovia.

- The Falemé deposit is situated in the south east of Senegal, approximately 700 kilometres from Dakar. In 1975, the Miferso - East Senegal Iron Mining Company - was set up with the Republic of Senegal (28%), the BRGM (24%), Krupp Industrieanlagen (24%) and Kanematsu Gosho (24%) as partners. In October 1989, Miferso emerged from the study phase and become a project undertaking.

  The three largest ore bodies contain at least 360 million tonnes of extractable ore. A product of grade 62.5% Fe can be obtained by simple washing. The fact that almost half concerns lump ore - which is comparable with the good Australian lump ores - is an additional plus point.

  If the reaction of the market is positive, Miferso would be able to produce some 7.5 million tonnes per annum from 1995, of which the lump ore would tend to be shipped to the Community and the fine ore to Japan.

1.1.4 Conclusion

Assuming that the business cycle for steel is normal, at least in the medium term, consumers can be supplied with a sufficient quantity of good high-grade ore. The development of new production capacities in Australia and Brazil broadly makes up for the mines which will probably have to be closed because of exhaustion or for quality reasons. The new M'Haoudat project in Mauritania should be mentioned, whose lump ores should replace those at Kedia d'Idjil, another mine which will be exhausted soon.

As already indicated, there is a risk that consumer requirements in respect of ore quality will lead to the closure of the leaner deposits and thus to a producer

oligopoly; this is all the more likely in that there is clearly little prospect of finding new deposits which can meet the ideal requirements of blast furnace operators.

In addition, some of the countries supplying the Community with good ores will one day probably be confronted with economic or socio-political problems. It is therefore possible that deliveries from these countries will be temporarily suspended. One way of guaranteeing supplies would be to lower the requirements as to the quality of the basic materials. In such a case, the blast furnaces would have to contemplate pretreatment of ores. This would have the advantage, in addition to putting an end to costly new exploration schemes and the related problems, of being able to continue working some mines currently in danger of closure, which in turn would contribute to a diversification of resources and origins.

2. FERRO-ALLOYS

2.1 Other ore-based raw materials for ferro-alloys

The other metal raw materials used in steelmaking - in particular to produce fine and special steels - are ores containing manganese, chromium, nickel, cobalt, vanadium, niobium, tantalum or tungsten. The Community is totally dependent on imports from third countries for practically all of these metals. The supply situation did improve slightly, at least in the chromium, nickel and tungsten sectors, following the accession of Greece, Portugal and Spain. Furthermore, in addition to the known mines, there are several regions in these countries where there is a possibility of finding new deposits. The Commission sent a communication to the Council as early as 1975 on the supply situation in the Community regarding indigenous raw materials. On various occasions between 1982 and 1986, Parliament drew attention to the importance of raw material exploration and exploitation in the Community. However, it was not until 1988 that the Council of Ministers for Industry, at its meeting of 13 December, asked the Commission to prepare a study on mining in the Community, to analyse the results and, if possible, to present proposals on a Community mining policy. At its meeting of 21 June 1989, the Council approved a corresponding communication drafted by the Commission.

The Community, including the overseas territories, merely has deposits of nickel and chromium in New Caledonia and Greece, and tin/tungsten mines in Spain and Portugal, France and the UK. The nickel producers in Greece and the tungsten producers face strong competition from non-Community countries mainly for reasons of viability.

In the absence of indigenous production, Community dependence on third countries, apart from secondary raw materials, is of the order of:

65-70% for nickel,
90% for chromium,
70-80% for tungsten.

The Mediterranean countries in particular offer favourable preconditions for the exploration of new deposits. Greece is rich in ultrabasic rocks of the type considered to be parent rock for chromite. Apart from the areas around Kozani and Domokos which are already being explored for chromium, there are a number of mineralogical pointers which have not yet been assessed in detail.

Manganese ores were worked in the past in Eastern Macedonia. As the deposits were not completely exhausted - there are still about 9 million tonnes of viable ore - they could be reactivated. If research was to confirm these data, or even establish the presence of further ores, Chalcidice could become a source - if only a modest one - of manganese for the Community.

Similar considerations apply to Spain. Good manganese ores were worked until the 1960s at Soloviejo in the south west of Spain. Research is under way to establish the viability of renewing operations.

Several tungsten deposits in the Iberian Peninsula, France and the United Kingdom have been known for some time. Unfortunately, mining activities had to cease owing to abundant supplies from non-Community countries. Only the Panasqueira mine in Portugal is still in operation. As a result, Community dependence on third countries has increased from about 60% in the middle of the decade to about 70-80% today. However, particularly in Spain and Portugal, careful prospecting will still reveal new deposits.

Irrespective of searches within the Community, the steel industry - and also the ferro-alloy industry - should not fail to secure its supply of alloying elements by means of contracts with the mining companies in third countries, including the acquisition of holdings in mining operations. This can take the form of direct cooperation - e.g. in the form of joint ventures - or the Community could provide support using the financial means provided by the Treaties.

2.2 Market structures and outlook

The North-South transfer which can be observed in the steel sector has also occurred in the ferro-alloy industry. There are a number of reasons for this:

- the discovery of large, rich deposits in the developing countries
- the presence of massive energy resources
- cheap labour
- less stringent environmental protection requirements in many cases
- a favourable exchange rate against the dollar in countries with high rates of inflation.

In addition, the developing countries have made good progress in assimilating and utilizing new technologies over the last few years - often with the aid of European technical advisers and capital - so that the argument that the industrialized countries have better know-how has lost weight, at least for the standard products.

Finally, countries with mining resources are justified in wishing to beneficiate their own low-cost raw materials by transforming them into ferro-alloys with high value added. It can be conceded from the Community point of view that this reasoning is partially correct, even if there may be strong reservations regarding cheap labour or environmental protection. Cost prices depend above all on the price and quality of raw materials, the price of energy and its utilization (including recovery) and the quality of the finished product required. For this reason, the three parameters of raw materials, energy and know-how are always valid.

By contrast, close cooperation between the steel industry and producers of ferro-alloys is essential to improve the quality of certain special alloys. There is no such cooperation with most ferro-alloy producers from non-Community countries. For them, it is mass production of alloys that is profitable, unless they dominate certain sectors (e.g. for niobium ores and their processing). On the other hand, for the manufacture of certain ferro-alloys it is better to mix ores of different origins. In this case, the best location for the ferro-alloy industry is doubtless one close to the consumers.

With the increasing production of special steels, the ferro-alloy industry has - with a few exceptions - been experiencing an unparalleled boom since 1987. As a result, and following the increase in prices, new production capacities have been created in a number of countries and others are being built or planned. Overcapacity in the ferro-alloy industry is a distinct possibility if there should be a drop in production of special steels.

In 1978, 60 companies with 76 plants were still producing ferro-alloys in the territory of the present Community (12 countries). This figure also includes companies - whether or not integrated - producing high-carbon ferromanganese (ECSC product). Ten years on, there were only 44 companies with 60 plants. These figures include three new companies

with one plant each, so that a total of 19 companies with 29 plants have disappeared during that period. However, in the case of most of the surviving producers, the product range has changed. In addition, these changes were frequently linked to streamlining of production capacities, sometimes involving a transfer of production from one alloy to another, depending on demand and the product price. Table IX.2 shows the development of production capacities for the more common alloys.

It shows that actual production capacities for ferrosilicon, ferrochromium and high-carbon ferromanganese have diminished substantially. While this is due in the case of ferrosilicon and ferrochromium to problems of production costs, availability of raw materials or regional location of companies, the decline in high-carbon ferromanganese is due above all to excess blast furnace production capacity. The ratio of capacity to consumption has diminished practically everywhere while there has been no decline in crude steel production. Part of the drop in consumption in ferrosilicon and high-carbon ferromanganese can be made good by the increase in silicomanganese consumption.

At the beginning of the 1980s, ferrochromium and to a lesser extent ferromanganese consumption tended towards a higher-carbon product; this trend has recently been reversed. It therefore appears that the "more noble" alloys are regaining a share of the market that they lost some years ago.

The decline in specific consumption per tonne of steel produced and the substitution of cheaper for more expensive alloys form part of steel policy. The ferro-alloy industry must take this into account and draw its own conclusions. Between 1978 and 1988, the volume produced fell from 2 million to 1.7 million tonnes and the size of the labour force was reduced from 20 000 to about 13 000.

For the purpose of increasing production capacities, it is important also to consider the origin of the raw material, particularly in the case of metals such as chromium, vanadium or manganese. Increased demand would eventually lead to competition for resources, not only in the ferro-alloy sector but also in raw materials.

3. PIG IRON AND FOUNDRY PIG IRON

For supply reasons, pig iron and foundry pig iron can be viewed together.

Apart from scrap, pig iron is the most important direct raw material for both the steel industry and the foundry industry.

All the above considerations regarding the grain size of iron ore concern the production of pig iron at the lowest possible cost. The iron content of the charge is increasing, while the quantity of iron ore and in particular of coke charged is declining. The specific charge of raw materials per tonne of pig iron is therefore constantly declining.

In the Community, pig iron is produced in coke blast furnaces, which are naturally upstream of steelworks in the manufacturing process. In 1988, some 93.7 million tonnes of pig iron (including blast furnace spiegel iron and ferromanganese) were produced. By contrast, production capacity amounts to 124 million tonnes. Since pig iron production is directly linked to crude steel production, closure of pig iron capacities will doubtless be inevitable in the context of continued restructuring of the steel sector.

Consumption of pig iron by the Community steel industry amounted to about 90.6 million tonnes in 1988. Given that production of crude steel was 137.4 million tonnes, this corresponds to a specific consumption of 660 kg per tonne of crude steel. It is probable that this relationship will remain valid until 1995.

Of course, the steelworks and casting works can alter the relative proportions of pig iron and scrap in the charge depending on the prices of these raw materials and of energy. If the supply of good quality scrap is shrinking - particularly scrap that must be free of zinc and other impurities - and scrap prices are rising as a result, it is possible, if price differences narrow, to replace scrap by pig iron.

As already indicated, the foundry industry is also a pig iron consumer, but on a much more modest scale than the steel industry. In 1988, the Community foundry industry consumed the following to produce 9.4 million tonnes of products:

2.6 million tonnes of pig iron
6.6 million tonnes of scrap
1.4 million tonnes of recuperated pig iron (downward trend), and
341 000 tonnes of ferro-alloys.

When 5 344 000 tonnes of recycled scrap is added - which must not be taken into account for the primary raw material balances - the total raw material requirements amount to 16.2 million tonnes, representing a yield of 58%.

Since, with the exception of the integrated plants, the Community foundry industry does not produce pig iron, it must obtain supplies either from Community pig iron producers or from those of third countries. The foundry pig

Iron charge must have a special chemical composition and quality, with hematite pig iron accounting for two thirds of consumption and spheroidal graphite cast iron and pig iron for steelworks accounting for the remainder.

In theory, the foundries are also able to use prereduced ore pellets or sponge iron. However, the excessively large quantities of slag are still an inseparable drawback.

Even if, in view of existing production overcapacities, the Community blast furnace industry is capable - and will continue to be so in future - of supplying the casting industry with the necessary pig iron, the latter obtains approximately 40% of its supplies from third countries for economic reasons.

Deliveries on the Community market in 1988 were as follows:

1988: Supply of the Community market with foundry pig iron (all grades)

('000 tonnes)

Community deliveries	1 162	65%
Canada	236	13%
Brazil	234	13%
South Africa (old contracts expiring)	21	1%
Norway	19	1%
Other non-Community countries (mainly COMECON)	123	7%
	1 795	100%

Deliveries of pig iron from Brazil are limited by bilateral arrangements.

Norway is present again on the Community market following the creation of a titanium extraction plant at Tyssedal. Finally, in spite of quantitative restrictions, some centrally planned economies are attempting, owing to shortage of foreign exchange, to maintain, or expand, their share of the Community market, in particular where the quantitative restrictions are due to fall in 1993.

4. SCRAP

Scrap is a secondary raw material. As it is made up of waste material from several production sectors, its physical and chemical composition - and thus its quality - is

extremely variable. Consequently, it cannot offer the uniformity provided, for example, by the liquid metal from blast furnaces.

On the other hand, it can be easily stored and transported, which makes it a typical trading commodity. Its market is unrestricted and the price varies depending on supply and demand. It is indicative that 70% of the scrap consumed in the Community is handled by dealers, and 35% of deliveries come from other Member States. The scrap is used in the manufacture of 40% of Community steel; it makes up about 100% of the charge in electric furnaces and, on average, 20% of the charge in oxygen converters.

Its availability, quality and price are therefore variables which may have a decisive role for the future of the Community steel industry, in particular the electric steelmaking process.

4.1 Supply

Scrap, as a raw material for the steel industry, is obtained from:

- scrap arisings in the various stages of steel production
- scrap arisings in manufacturing industry
- recovery of steel from obsolete equipment.

- Scrap arisings in the steel industry

Steelmaking generates scrap at various points of the production chain. The nature and age of plant and the structure of the products and their quality generate a greater or smaller quantity of scrap, and determine differences in internal scrap production in the steel industry in the various countries.

Technical innovations have reduced the amount of scrap arisings, but the most important development has been the introduction of continuous casting for the processing of liquid steel into semi-finished products. Continuous casting produces some 10% less scrap than the ingot cycle, i.e. a reduction of 100 kg/t.

As a result of all these innovations, internal scrap in the steel industry now amounts to only 12% of steel production. This figure should decline further, as the introduction of continuous casting is not yet complete; the limit value is situated at around 10%, so that the available margins are relatively modest.

- Scrap arisings in manufacturing industry

Scrap production in the industries consuming steel as a raw material depends, firstly, on their activities and, secondly, on their ability to make maximum use of the steel product. The motor industry is an eloquent example: computer-aided vehicle design has helped reduce scrap arisings from 30% to 15%; at the same time, the increase in the average weight of the vehicles produced has offset this trend. While the quantity of this scrap should not be subject to major fluctuations (barring fundamental changes in the industries, e.g. plastic cars), there are likely to be some modifications in quality. The consumer industries are increasingly specifying coated products, or the products contain alloying elements, which frequently represents a pollutant factor and adversely affects the quality of the scrap. However, these "pollutant" scrap grades can easily be identified and segregated at the point of production, with the result that the real effect is a quantitative reduction in the production of good quality scrap.

- Scrap from obsolete equipment

Every steel product which ends its useful industrial life and/or becomes obsolete is destined for the scrapyard. The variety is enormous, ranging from tin cans to the metal structure of a factory and large ocean liners.

Every country has a current or potential reserve of this scrap which is linked to the average life of the steel consumed (about 15 years in the Community), the level of consumption, the national industrial tradition and external trade in steel products.

The largest reserves are located in the highly industrialized countries with their high per-capita consumption of steel, but the development of indirect exports (e.g. exports of Japanese cars) has transferred a significant volume of potential scrap to other countries, usually less developed. The size of the reserve is growing in the main steel importing countries, i.e. countries in which consumption exceeds production. This group includes several developing countries and the USA. The USA, which also has a very high per-capita consumption, has the largest reserve in the world. This category of scrap covers 50% of Community requirements.

The real problem of this scrap is its variety, which prevents proper quality control.

4.2 Collection

As a result of technological improvements, internal scrap from steelmaking currently covers 20% of scrap requirements, down from 30% ten years ago. As internal foundry scrap has

remained stable at around 10%, 70% of requirements have to be covered by purchased scrap. As about 25% of this is supplied by scrap from the manufacturing industries, scrap from obsolete steel products will gradually have to fill the gap.

The development of the structure of collected scrap shows a downward trend in the production of good quality scrap (internal steelmaking scrap and manufacturing scrap). The effects of this trend were already evident at the beginning of 1984 in the form of market tensions and, occasionally, a lack of good quality scrap. It is important to note in this connection that the increasing trends in the steel industry towards the production of high-quality steel - particularly the long products from electric furnaces - creates growing demand for good quality scrap.

The greatest change in the scrap sector has occurred in the structure of collection. Traditionally a collecting, storage and dealing activity, it has now become an industrial activity in the full sense of the term; in addition, scrap "production centres" are emerging, capable of supplying the steel industry with a specific product adapted to every application. In the preparation of the raw material, the scrap sector is keeping step with the qualitative progress of the client steel industry (electric steel-making).

This structural change obviously poses some problems, whether in relations between scrap suppliers and the steel industry or with regard to investment.

The industrial path on which the scrap sector is embarked (which implies increasing investment) involves greater rigidity in the formation of prices, a substantial proportion of which is made up of amortization costs. This implies that the interplay of supply and demand between suppliers and users (which led to extraordinary price fluctuations over the last twenty years) is now restricted by the increase in fixed costs and investment requirements in the scrap sector.

By the same token, the sector is confronted with environmental problems, more specifically the pollution prevention laws and regulations which are no longer properly adapted to the development of this activity. Scrap continues to be regarded by the lawmakers as waste and is therefore included in the body of legislation covering all sorts of materials, including non-recyclable products. The concept of scrap as an industrial raw material is only slowly gaining ground in the difficult terrain of environmental protection.

4.3 Demand

The demand for scrap depends on the activity of electric steelworks, oxygen steelworks and foundries.

Electric steelmaking seems to have levelled off at about 33% of total steelmaking capacity, the remaining 67% being accounted for by oxygen converters.

Theoretically, greatly varying amounts of scrap can be used in oxygen steelworks. However, from a strictly technical point of view, increasing the scrap charge produces a better conversion by using the exothermic reaction heat for fusion, and keeps the molten mass near to optimum temperature.

In practice, the scrap charge may vary between 10 and 30%, but the actual figure is determined above all by the availability of scrap and its price. Japan, an importer of scrap, uses on average 11% compared with the United States with more than 30%. In the EEC the level is about 22%.

By contrast, electric furnaces use at least 95% scrap as raw material because it is readily available at lower price levels than pig iron and prereduced products.

Scrap consumption in steelmaking therefore depends on the scale of use of electric furnaces and on the percentage of scrap used in oxygen converters.

For foundries, scrap accounts for about 75% of raw material requirements, of which 45% is internal foundry scrap, 30% being bought on the market.

4.4 Projected scrap demand and requirements

On the basis of the trends of demand and structures described in the previous chapters, we can try to calculate the medium-term scrap requirements. The basic assumptions are:

- that steel production will stay at similar levels as today;
- that the share of electric steelworks will remain constant at about 33%;
- that internal scrap in steelmaking could fall slightly following the increasing introduction of continuous casting.

The calculation produces the following figures:

Scrap requirements in 1992

	(million t)
Steel production	138.0
of which electric	46.0
Scrap requirements	64.0
of which: internal scrap	15.0
purchased scrap	49.0
Foundry purchases	5.0
Total requirement	54.0

Quantitatively, these requirements can be satisfied easily by Community resources.

On the other hand, the quality requirements will pose a problem, as already mentioned in the preceding paragraphs. It is in this area that the Commission will be able to introduce a policy to promote investments to improve the quality of scrap, using its own (in particular financial) resources, and addressed in equal measure to both steelmakers and scrap dealers.

The shift among the latter towards an industrial structure of scrap processors must be encouraged.

4.5 Scrap and the environment

As far as legal criteria and regulations are concerned, scrap currently falls into the category of products considered as "waste". Although this is correct from an etymological point of view, it does bring with it a series of negative consequences because of the fact that, in Community as well as in national legislation, the term implies specific treatment, given the fight against pollution.

Whilst it is true that stocking scrap may constitute an attack on the environment, this does not in itself imply pollution. Additionally, scrap is a raw material which can be recycled almost without any pollutant prior treatment.

As it is an essential raw material for the European steel industry, it is even possible to envisage environmental regulations which positively encourage the collection of scrap, thus having a doubly positive effect, on the environment itself as well as on steel industry supply.

5. COAL

Steel production involves enormous amounts of energy, irrespective of the techniques used. Of the various steel production processes, this section will concentrate on those which are based mainly on coal, which means two of the main techniques used in the steel industry:

- the blast furnace, converting pig iron into crude steel;
- the processes of direct reduction based on coal.

In addition to a brief description of the energy aspects of these techniques and an analysis of energy consumption and fuel substitution over the last three decades, we offer an assessment of the medium-term trends up to 1995.

5.1 The blast furnace process

The traditional method of making steel in Europe is the blast furnace, which produces pig iron and consumes large amounts of energy. Of the various processes for converting pig iron into crude steel, only the oxygen process is still in use today, the electric furnace being initially confined to using scrap.

An examination of the blast furnace's energy consumption reveals two main features:

- firstly, energy consumption per tonne of pig iron produced has decreased substantially over the last thirty years;
- secondly, the composition of fuels consumed by the steel industry has changed considerably as a function of relative energy prices.

Energy consumption fell everywhere from 30 GJ/t of pig iron in 1960 to some 18-19 GJ/t in 1988: this is a drop in specific consumption of more than one third. Although indispensable for the process, coke consumption was also cut by 40% to some 510 kg/t in 1988. However, coke is still the main source of energy for pig iron production. In addition to coke, other fuels such as oil, coal and gas are used in the blast furnace process to varying extents, depending mainly on the relative energy prices. With the low oil prices of the 1960s and up to 1973, heavy fuel oil injection became more and more common. Oil consumption peaked at 52 kg/t of pig iron in 1973. In 1985 - when oil prices were still high - consumption fell to only 6 kg/t, while coke consumption increased temporarily. In spite of the drop in oil prices in recent years, there has been only a limited return to the use of oil. Today instead of using more oil,

coal dust is commonly injected into blast furnaces. In 1988 coal injection reached a record level of 40 kg/t of pig iron compared with only 15 kg/t three years before.

Among the advantages of using injection coal in blast furnaces - the greater choice of coal grades which can be used, lower fuel costs, improved blast furnace performance - the most important compared with coking coal demand is the fact that one tonne of injection coal represents more than one tonne of coking coal. As coal injection increases (about 100 kg/t of pig iron or often more have been shown to be perfectly feasible), a marked decline in coking coal demand is to be expected. Another way of reducing coke costs is to use large quantities of gas for high-temperature melting. However, gas consumption statistics indicate that so far the steel industry has not resorted to this method of cutting coke costs to any great extent, no doubt as a result of the rather high natural gas prices compared with coal and coke.

The trend in the coming years is likely to be a continuation of the developments in the past. In view of its high energy costs, the steel industry will continue to use higher-efficiency energy. In addition, with steel production remaining at best constant, and a slight increase in the share of electric furnaces, pig iron production will fall and, as a result, will centre on the most efficient blast furnaces, unless new and more profitable blast furnaces are built to replace the older ones. Even for existing blast furnaces, there are new methods of cutting energy consumption, such as using reduced pellets, improving the grain size of the sinter or the pellets, or reducing the slag volume.

As to the composition of fuels, coal dust injection is expected to increase from almost 4 mt in 1988 to 6 mt in 1990 (estimate by CEPCEO, the Western European Coal Producers' Association). This represents almost 70 kg/t of pig iron. Since it has been established that coal consumption rates of 100 kg are perfectly feasible, the steel industry could consume some 7 to 8 Mt of coal in 1995. Coke consumption is expected to be about 35 to 37 Mt, i.e. about 10 Mt less than today, while the use of oil will continue to be limited.

5.2 The direct reduction process based on coal

In addition to the traditional process based on blast furnaces, there are a number of fairly recently developed techniques for the direct reduction of iron ore. These processes (including the Japanese pig iron reduction process and the European COREX system) completely eliminate the need for coke by direct reduction based on coal.

In particular, the COREX system, which has started up successively on an industrial scale in South Africa, has the following main advantages: it is a clean coal technology and is very flexible, especially as regards the choice of coal grades, and operates at a fairly low cost.

However, in the Community as in other industrialized areas, the classic set-up of steelworks based on furnaces should, in general, continue to prevail in the next few years, and only a gradual shift towards the introduction of small steelworks using electric furnaces and direct reduction processes can be expected. Coke and coal will therefore continue to be the main fuels in steelmaking.

Furthermore, the product of the direct reduction processes, sponge iron, could also be used in electric furnaces to replace very high-quality scrap, which is becoming ever scarcer. Consequently, in the coming years more coal could be used outside blast furnaces without a simultaneous fall in coke consumption as scrap is possibly replaced.

The steel production process itself involves more or less energy depending on the technology used. Electric furnaces consume large amounts of energy. By contrast, the energy balance of the oxygen process is quite favourable. However, with the exception of some R&D work, coal is not normally used directly to make steel itself.

5.3 Medium-term prospects

As regards the future market for coal used in steelmaking, the CIF Europe prices for coking coal are predicted to rise by Wharton Econometrics Forecasting Associates, in 1987 dollars to about $75 per tonne in 1992 and some $76 per tonne in 1995, compared with an average of $51 per tonne in 1987. This increase overestimates the future rise in prices in that the coal market was depressed in 1987 and consequently prices were low. Nevertheless, the import prices for coking coal in the Community increased by $3 per tonne last year. Although the fuel costs for blast furnace steel production should rise despite some efficiency gains, the increase in coke prices of some 5% per year in real terms up to 1995 will not make the use of coke in steelmaking uncompetitive, since in the early 1980s, coking coal prices in 1987 dollars were even higher than those forecast for 1995.

The prices for coke and coking coal produced in the Community and supplied to the steel industry are broadly at the same level as world market prices, so that in principle the difference between import prices and production costs is at present covered by state aids.

On average, the price of steam coal is expected to increase slightly less sharply than the price of coking coal. However, some recent technological developments should lead to somewhat increased prices for those steam coal grades which are used in metallurgy. In particular, the market for this friable coking coal, which some years ago was only used to produce steam, is now greatly influenced by the various technological improvements in coke production. This coal is now processed by being mixed with high-grade traditional coking coal to obtain a high-quality coke. In addition, this coal is also used for coal dust injection. As a result, the gap between the price of very high-quality steam coal and traditional coking coal can be expected to narrow.

At present more than 50% of the coking coal supplied to the steel industry is produced in the Community. Reliance on the subsidized production of Community coal should decrease in the next few years when it is probable that state aids for supplies to the steel industry will be cut. The share of Community coal in supplying the steel industry depends largely on state aid. This scheme will be revised in 1990 and will disappear at the end of 1993 (Decision 2064/86/ECSC).

Coking coal imports are traditionally based on deliveries from the USA, which account for some 60% of supplies. At present almost 30% is supplied by Australia. Less than 1% of coking coal imports come from non-OECD sources, mainly Poland and the USSR.

In any case, no shortage of coal is to be feared in the coming years and prices are forecast to stay at a reasonable level.

TABLE IX.1

IMPORTS INTO THE EEC FROM NON-MEMBER STATES OF SINTER, PELLETS AND BRIQUETTES

Country	1979(a)		1983(a)		1986(b)		1988(b)	
	million t	%	million t	%	million t	%	million t	%
Brazil	4,20	27,4	3,77	30,75	14,21	40,88	16,09	48,10
Canada	3,91	25,5	2,88	23,49	7,86	22,61	5,85	17,49
Liberia	3,01	19,7	1,59	12,97	5,24	15,07	4,25	12,71
Norway	2,07	13,5	2,63	21,45	1,85	5,32	1,54	4,60
Sweden	1,20	6,5	1,20	9,8	3,86	11,1	4,36	13,03
Australia	0,32	2,1	-	-	1,07	3,08	0,50	1,50
South Africa	0,25	1,6	-	-	0,57	1,64	0,07	0,21
Others	0,25	-	0,19	1,55	0,01	0,28	0,79	2,36
Total	15,31	-	12,26	-	34,76	-	33,45	-

(a) 10 Member States
(b) 12 Member States

Source : Eurostat

TABLE IX.1A

IMPORTS OF FINES AND CONCENTRATES FROM NON-MEMBER STATES

Country	1979(a)		1983(a)		1986(b)		1988(b)	
	million t	%	million t	%	million t	%	million t	%
Brazil	26.54	24.12	21.95	27.44	22.70	28.09	35.64	31.74
Sweden	18.41	16.73	7.21	9.01	7.94	9.83	5.90	5.25
Canada	14.84	13.50	9.37	11.70	9.44	11.68	11.38	10.13
Liberia	11.50	10.50	10.86	13.58	6.44	7.97	10.08	8.98
Australia	11.29	10.26	12.06	15.08	14.28	17.67	25.17	22.41
South Africa	8.46	7.67	2.93	3.66	2.30	2.85	5.39	4.80
Mauretania	7.38	6.71	6.05	7.56	7.51	9.29	8.32	7.41
Venezuela	5.76	5.23	3.44	4.30	6.27	7.76	6.03	5.37
Norway	1.67	1.52	1.80	2.25	1.01	1.25	2.40	2.14
Algeria	1.28	1.16	1.13	1.41	0.27	-		
Spain	1.27	1.15	1.46	1.83	(1.75)	-	-	-
India	0.34	0.31	0.41	0.51	1.57	1.94	1.43	1.27
Others	1.40	1.27	1.31	1.64	1.07	1.32	0.56	0.50
Total	110.04	-	79.98	-	80.80	-	112.30	-

(a) 10 Member States
(b) 12 Member States

Source : Eurostat

TABLE IX.2

PRODUCTION CAPACITIES AND CONSUMPTION OF SOME COMMON ALLOYS

	1978		1988	
	EFFECTIVE CAPACITY	CAPACITY / CONSUMPTION	EFFECTIVE CAPACITY	CAPACITY / CONSUMPTION
FERROSILICON	450	450 / 510 = 88 %	250	250 / 505 = 50 %
SILICON METAL	160	160 / 130 = 123 %	160	160 / 210 = 76 %
FERROCHROMIUM hc + charge	270	270 / 500 = 54 %	195	195 / 840 = 23 %
refined and over-refined	100	100 / 200 = 50 %	55	55 / 70 = 78 %
FERROMANGANESE hc	1300	1300 / 930 = 140 %	815	815 / 760 = 107 %
refined and over-refined	150	150 / 129 = 116 %	300	300 / 210 = 143 %
SILICOMANGANESE including the capacities for FeMn l.m.c.	280	280 / 400 = 70 %	280	280 / 450 = 62 %

Source : Ferro-alloy industry liaison committee

CHAPTER X

EMPLOYMENT: TRENDS AND PROSPECTS

1. INTRODUCTION

The restructuring of the steel industry was based on a review of all the economic and technical factors that govern the life of an industry. Capacity reduction was accompanied by a thoroughgoing rationalization of the remaining plants and their management. New techniques were systematically introduced which further boosted the higher productivity that had already resulted from the reorganization of the undertakings.

This transformation of the industry was fully in line with the Community's policy objectives but, although it had the desired effect, it has also had extremely serious consequences for employment.

The Commission advocated exceptional social measures from the outset of the crisis - at the same time as it proposed the industrial measures. This was necessary to ensure that restructuring could take place in a controlled fashion and that the legitimate interests of all concerned could be taken into account and the sacrifices equitably shared.

It is indicative of the importance the Commission attaches to the employment problem that this chapter tries to pinpoint all the aspects which enter into an assessment of the problem. Although most of the restructuring between 1980 and 1986 meant the closure and rationalization of undertakings, much still remains to be done in respect of capacity management, the drive towards greater productivity and, possibly, restructuring at company level.

This means that social measures have to be continued, albeit in a form adapted to new needs - particularly the sort of training that will be required as a result of changes yet to come in the sector. The phase of massive capacity closures is now over. What remains is mainly rationalization, changes in production techniques and, possibly, the relocation of certain production processes.

We should therefore study the outcome of previous measures, learn from the results and prepare for further action in this field.

2. PAST TRENDS

(a) The following are some of the more important facts about employment in the Community's steel industry over the past decade:

- The sector went through a long period of massive job losses, particularly in 1980 and 1981 when the annual rate of losses exceeded 10% and net departures from the industry in each of the two years exceeded 120 000, which meant that over 230 000 persons left the industry during that period. Between 1981 and 1987 jobs were lost at an annual average rate of around 6.5% but this then slowed down to 4% by the end of 1988 (Table X.1).

- The national steel industries conducted their restructuring at different rates, and over different periods. For instance, job losses were spread over a period in the Federal Republic of Germany, were particularly abrupt in the United Kingdom and came relatively late in Italy (Table X.2).

- The structure of departures changed during this period of manpower redundancy policies. Whereas in 1980 redundancies and termination of employment was 3.5 times higher than retirement and early retirement, in 1984 there were 2.5 times more retirement than redundancies or voluntarily termination of employment (Table V.3).

(b) The period from 1985 to 1990 was still dominated by the need to manage the flow of departures from steel caused by the restructuring suddenly imposed on the industry in the preceding period. But the way the employment problem was managed - directed primarily at the redeployment of surplus staff - involved changes in the use of the measures available, a factor which makes this a pivotal period.

Man power reductions: Initially this meant massive job-shedding, which reached a peak in 1980 (Table X.4) but increasingly early retirement was used. In the last five years this has accounted for the largest share of departures but should account for relatively fewer by 1995. Although socially more acceptable, despite the cost, early retirement can only be used for those in the eligible age brackets unless the age of eligibility is lowered again. This is unlikely for both financial and social reasons.

Reduction of working hours: Used to differing degrees in the EEC countries, this technique has come to be applied in different ways.

* Short-time working is still used in Italy but not at all in some countries (such as France) and less and less in others (like Belgium and the Federal Republic of Germany) (Table X.5).

* The technique generally used until 1985 as a means of counteracting the decline in employment in steel has been to reduce working hours generally. At the same

time the question of maintaining the same level of wages for less time worked has been settled in different ways in different countries (Table X.6).

* Part-time working has been little used in steel compared with other industries, possibly because steel employs fewer women. In Luxembourg it is possible to combine it with a temporary job in another undertaking.

Retraining and re-employment policies: These have come to play an increasingly important part and there is a general trend towards solutions which promote reemployment of manpower. At the same time incentives to mobility, both geographical and occupational, have been increased. Where geographical mobility is concerned, steelworkers continued to benefit from older and more developed policies than workers in the rest of the economy: removal and resettlement grants and interest-free loans. Nevertheless there are still major obstacles to geographical mobility such as the loss of the network of family and friends and the problem of settling the spouse and children in the new environment. Except in the United Kingdom, where geographical mobility seems to be a major plank in government strategy, such mobility will therefore probably remain limited. In occupational mobility, the key question is the training to enable employees to adjust to job changes in steel or to find other employment in another sector. This concern has been more systematically faced in steel than in many other industries and has been dealt with by setting up training schemes to ensure the better redeployment of manpower. As a result, more recently there has been more movement of manpower both out of the industry (external redeployment) and within the industry (transfers).

3. PROSPECTS FOR 1995

An analysis of past trends shows that manpower policy objectives have changed. Whilst restructuring and social protection remain firmly entrenched, redeployment policies have steadily gained in importance, making simple redundancies relatively less common.

This change has gone hand in hand with others in steel industry working conditions caused partly by changes in the industry and partly by the general situation.

Trends in the steel industry in wages, working hours and jobs - and therefore the way in which production is organized - have resulted in some loss of the relative advantages that steel had over other industries and also suggest that the organization of production is changing.

3.1. Erosion of advantages linked with earlier methods of organizing production

Mastering the crisis of surplus capacity entailed a major reduction in the workforce together with an alignment of the conditions of employment of those remaining in the industry on conditions elsewhere. Closing this gap eroded certain advantages enjoyed by steelworkers, as other industries caught up and national measures were introduced.

(a) Wages: Compared with other industries, wages, particularly for "blue-collar" workers, are still higher than the average for industry as a whole. There is therefore still a positive "wage differential" in steel. Nevertheless, between 1975 and 1985 this differential was eroded - the more sharply in that during this period average skill levels in the industry rose and working hours fell overall more than in other industries. Therefore, although gross hourly wages are still higher than in other industries and since 1980 have again tended to rise faster, the fact remains that the general pressure on social security contributions and trends in working hours is likely to result in a lower net monthly remuneration for any given skill. Maintaining the wage differential is a motivating factor for labour which should not be overlooked just when wage earners are being asked to make a special effort as regards adjustment, training and mobility.

Against this background a policy of wage incentives covering not just wage levels but also work content and career prospects can be consistent with the rapid staffing adjustments demanded by both technology conditions (rationalization within undertakings) and macroeconomics (worldwide overcapacity, greater competition).

(b) Reorganization of working hours: This heading covers two contradictory purposes: on the one hand, to absorb excess manpower in steel undertakings by reorganizing the entire production process; and on the other, to take advantage of shorter working hours to avoid redundancies. This leaves very little margin for manoeuvre and depends in the last analysis on training and reskilling since the resulting productivity gains may make it possible to reduce working hours. Yet it is difficult to advocate better use of plant and equipment in a production context where overcapacity persists. On the other hand, modulating working hours within the year to meet seasonal demand could be compatible with reducing the total hours worked per year. However, minimum rules would have to be negotiated to avoid distortions in competition and adverse social repercussions.

(c) Age-based measures: Early retirement at 55 is predominant throughout the steel industry, with an increasing tendency to reduce this to 50 years, giving steelworkers a "relative" advantage of 5 to 10 years over ordinary retirement. Any further reduction in the

retirement age, or making 50 years standard throughout steel, would therefore cause a distortion between steel and other industries, all the less acceptable as the conditions which gave rise to this policy in the steel industry have now spread to other sectors (shipbuilding, textiles, etc.). On the other hand we may expect the advantages now enjoyed by steelworkers to spread gradually to other areas as general pension schemes are aligned on the standards applied in steel. Here too, it is likely that the relative age advantage for early retirement in steel will be no more than maintained or even reduced as the incentives to ever earlier departure are causing many problems (pension costs, resulting inflexibility in staff management, lower acceptance both by society and by the individual).

It will therefore become more and more difficult to arrange the departure of workers from the industry through early retirement under attractive conditions and at the same time foster mobility, be it out of or within an undertaking, by providing the training for change.

3.2 Emergence of new methods of work organization and the consequences for jobs

Everyone agrees that technological change in the steel industry has already altered the very nature of the steelworker's job, and now demands different skills. But, over and above this, the whole production process is tending to change and is thereby fundamentally altering job requirements in the industry.

(a) Internal factors of change

Three factors have played, and will continue to play, a decisive role in the qualitative changes in employment:

- Technological innovation in production, particularly the general introduction of continuous casting, have increasingly changed steel into a process and "continuous flow" industry, with fewer processing stages and less idle time between stages. At the same time, these stages are being integrated, with central coordination to regulate the whole movement.

- This whole movement is increasingly determined by the market. The start-up and planning of production is determined at the warehouses for finished products and the message travels back to the steelworks. The importance of the product in determining the organization of production is largely due to the difficulties of marketing and to the greater competition.

This product-based approach becomes a line of thrust for reorganizing the production system, using production management methods which guarantee downstream steerage-way and a dynamic approach to cost formation and product characteristics (quality analysis).

- The expansion of computerized systems and the ever closer links between systems (production control, stock management and maintenance, personnel management, research and development) have encouraged these changes whilst at the same time creating new constraints as regards work and job organization.

(b) External factors of change

As opposed to the internal factors, the external factors are not directly linked with changes in steel production processes but to demographic, social and societal changes which mainly affect the job supply characteristics in the industry.

We are currently witnessing a general rise in the average level of education in the workforce.

There are also more further training courses, more temporary work and more sandwich-type training and work schemes, all of which is tending to standardize the conditions under which young people enter the labour market.

In a wider context, studies of the behaviour and values of young people seem to indicate a levelling in their attitudes to work.

(c) Consequences for the components of the labour factor in steel and their management by the industry

From the industry's point of view, the workforce can be divided into two groups to each of which different policies are applied.

The first group comprises wage earners leaving or entering the industry and brings with it the question of how to manage the entry and departure flows in the steel industry.

- Departures; early retirement, redeployment in other industries or unemployment. Where the last two categories are concerned it would seem that, in a context in which it is generally difficult to find a new job, the main problem is to slot measures specific to the steel industry into a given regional environment or into the different countries' general re-employment or job creation incentive schemes. Because the steel crisis has been so long-lasting, massive and frequently of a regional nature, it has laid a certain responsibility upon the sector, but in the long run

there is the danger that sectoral policies may be seen as distortions to the labour market or even as between undertakings.

Early retirement has the advantage of being relatively acceptable to society at large but it brings with it many long-term problems: workers who at an increasingly early age feel they have lived their lives and are "useless" to society or undertakings which may lose a skilled workforce.

- New entrants: in spite of new requirements, particularly for more highly skilled workers, restructuring has had the result of limiting the number of new workers entering the steel industry. These new manpower requirements have put undertakings on the spot and, where their internal adjustment policies do not solve the problem, they are reacting with policies of recruiting, taking on casual labour or putting work out to contract.

The second group comprises those who stay. There will probably be further cuts in the workforce together with many qualitative changes such as:

- shorter and more straightforward careers;
- a levelling out of the skills required for different jobs;
- a simpler wage structure with narrower differentials;
- greater integration combined with a simplified management structure;
- higher qualifications with more stress laid on social skills, i.e. capacity for responsibility, sense of initiative, ability to work in a team and to communicate.

For undertakings, the new problem they will have to solve may be expressed as follows: How to manufacture as economically as possible with a smaller workforce that is as highly qualified and integrated as possible.

At the same time a number of the old features of work organization will disappear:

- routine work (both manual and manual machine operation);
- certain traditional occupational characteristics (like the ability to perform narrow subtasks correctly and at speed).

This means that a whole series of layers and filters between the shop floor and management will tend to disappear. There will be fewer middle management layers as many control and coordination functions as well as increasing powers of decision are mechanized and

automated. Overall, the general direction is towards a certain merging of the characteristics of the work done by blue-collar workers, technicians and office workers. Against this background the concept of competence becomes decisive since it combines occupational skills (ability to carry out a function) and social skills (ability to communicate and sense of initiative).

3.3 Need to modify supporting policies

In a context of further job-shedding combined with new requirements, there is even greater need to encourage internal and external mobility.

Training therefore comes to occupy a central position as a primary means of matching workforce skills to job requirements. Regarded increasingly as an investment, training is the subject of forward planning and is seen in conjunction with the new methods of work organization.

In practice, when training measures are adopted this is always associated with a reorganization of the workplace, though to an extent that varies from one undertaking to the next.

In this way the industry has moved from a defensive attitude of ad hoc adjustment to "spontaneous" market factors, in which training served to upgrade skills after the event, to an attitude of anticipating medium-term needs.

At the same time training is increasingly provided for all categories of workers, or at least for those likely to remain in the undertaking.

This massive requirement for training has resulted in an expansion of training facilities and schemes which can be used more flexibly and a change in their content, which includes an increasingly large "social skills" component.

These trends, common to many industries, will become more marked by 1995. Nevertheless, steel poses a special problem since a very large proportion of its workers possess skills that are directly linked with their present jobs. But from now on steel will be manufactured and processed increasingly by small, highly skilled and highly integrated teams. There will be much greater need for initial wide-ranging and multi-skill training followed by continuous training schemes. More effort will therefore have to go into vocational training, both at the initial and the further training stages. Forecasts of the number of employees needed should therefore take into consideration the number undergoing training at any one time.

Thus the accompanying social policies are being concentrated more on the question of the qualitative adaptation of the workforce to employment, and this in the context of the pursuit of the quantitative reduction in jobs.

The sharing of the burden implied in this necessary effort can be fixed as a function of today's national differences, but also of the objectives fixed for 1995. The ECSC for its part, participates, within the framework of Article 56 of the ECSC Treaty, in the expenses linked to the rehabilitation of employees whose jobs are affected as a consequence of measures of definitive cessation, reduction, or changing of activity. A new framework of intervention, which sets a ceiling on expenses and harmonises ECSC intervention, has been set up. In it are defined the levels at which the Commission intervenes in 5 standard situations (early retirement, unemployment, training, internal resettlement, and external redeployment).

Meanwhile, the question of the possible modification of the field of application of Article 56 could be put, in view of the new economic and social context which is being seen. In fact, insofar as it is thought that social accompanying policies, for which Article 56 constitutes the legal basis for ECSC intervention, are the indispensible corollary to the industrial changes underway in the steel industry, they must be able to meet the new requirements stemming from the processes of restructuring and modernisation in this sector.

TABLE X.1 : TOTAL NUMBERS EMPLOYED IN THE STEEL INDUSTRY (EUR 9 then EUR 12)

(Source : EUROSTAT)

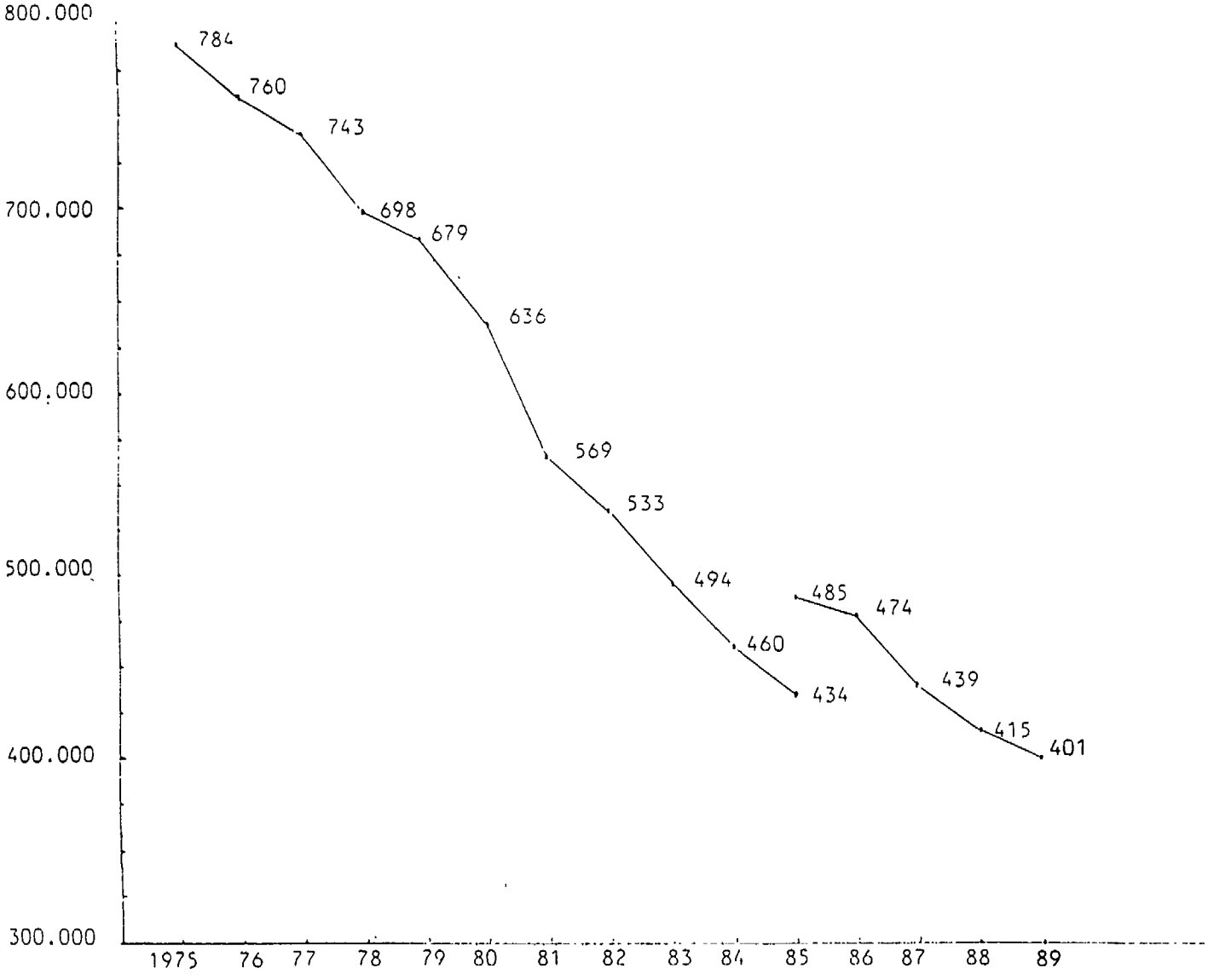


TABLE X.2: RATE OF DECREASE IN NUMBERS EMPLOYED, BY COUNTRY (%)

	CEE	B	DK	D	F	IR	IT	L	NL	UK	Ellas	ESP	PORT
1976/75	- 3,0	- 4,9	0	- 2,9	- 1,2	-12,5	0,9	- 2,3	- 2,2	- 6,2			
1977/76	- 2,3	- 7,0	0	- 2,8	- 3,6	0	0,5	- 9,1	- 3,4	0,4			
1978/77	- 6,0	- 9,3	0	- 4,3	- 9,1	0	- 1,1	- 13,5	- 11,2	- 5,6			
1979/78	- 2,9	- 0,9	0	- 0,6	- 8,0	0	1,7	- 3,9	- 2,3	- 4,7			
1980/79	- 6,3	- 3,1	- 7,6	- 1,4	- 9,1	- 2,7	2,7	- 4,0	0,2	- 17,7			
1981/80	-10,6	- 5,5	- 22,2	- 4,4	- 11,8	- 14,4	- 2,2	- 13,2	- 0,6	- 28,0			
1982/81	- 6,3	- 3,6	- 12,4	- 5,6	- 3,5	11,5	- 4,5	- 3,9	- 2,1	- 14,7			
1983/82	- 7,4	- 6,3	- 10,8	- 6,8	- 4,3	- 3,1	- 3,9	- 6,7	- 3,9	- 17,8			
1984/83	- 6,8	- 4,2	5,2	- 7,3	- 6,0	6,0	- 9,4	1,9	- 4,8	- 7,5			
1985/84	- 5,7	- 8,2	4,3	- 2,8	- 7,3	- 7,8	- 13,0	- 2,5	0,8	- 2,5			
1986/85	- 5,0	- 8,4	5	- 2,7	- 10,9	- 11,2	- 3,0	1,0	0	- 6,2	3,9		
1987/86	- 7,5	- 11,2	- 9,3	- 7,16	- 12,7	8,6	- 5,6	- 7,4	- 0,5	- 3,2	- 6,5	- 9,1	- 2,4
1988/87	- 5,4	- 2,0	- 2,9	- 4,6	- 12,0	5,0	- 5,7	- 7,4	- 2,0	0,3	- 1,4	- 8,6	- 3,8
1989/88	- 3,5	- 1,2		- 0,4		8,2	- 3,4	- 4,7	- 2,9	- 1,2	-14,7		-13,0

Source: EUROSTAT

TABLE X.3: CHANGES IN THE STRUCTURE OF DEPARTURES
(EUR 9 and EUR 12)

		Total	Redundancies	Termination of contract	Retired	Early Retirement	Others
1980		133.362	46.859 67.102	20.243	18.552	14.721	37.866
1981		97.025	19.598 33.970	14.372	21.181	19.760	29.430
1982		76.452	11.285 20.762	9.477	19.533	16.897	27.904
1983		72.734	10.607 18.378	7.771	20.279	17.706	25.100
1984		77.020	5.046 11.307	6.261	29.234	27.550	29.006
1985		64.264	5.637 11.407	5.770	17.854	16.210	27.552
1986	EUR 9	66.869	5.395	(1)	22.073	20.280	26.331
	EUR 12	73.714	5.821	(1)	25.587	23.261	28.617
1987	EUR 9	61.099	7.128	(1)	14.535	12.720	27.399
	EUR 12	69.676	7.538	(1)	19.141	16.260	30.311
1988	EUR 9	55.270	2.880	(1)	13.242	11.428	26.528
	EUR 12	62.594	3.045	(1)	16.256	13.812	29.892

(1) Included in "Others"

TABLE X.4: ENTRY AND DEPARTURE FLOWS (EEC 9 and 12)

	Entrants	Departures	Net departures
1980	59.257	133.362	74.105
1981	47.902	97.025	49.123
1982	41.497	76.452	34.995
1983	38.259	72.734	34.475
1984	43.519	77.020	33.501
1985	39.842	64.264	24.422
1986 (EEC 9)	38.377	66.869	28.492
(EEC 12)	41.180	73.714	32.534
1987 (EEC 9)	31.143	61.099	29.956
(EEC 12)	34.524	69.676	35.152
1988 (EEC 9)	41.538	55.270	13.732
(EEC 12)	45.202	62.594	17.392

Source: EUROSTAT

TABLE X.5

ANZHAL DER KURZARBAITER
NUMBER OF SHORT TIME WORKERS

NOMBRE DES CHOMEURS PARTIELS
NUMERI DI OPERAI IN CASSA INTEGRAZIONE

		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	annual average
EUR	1987	31802	19751	14896	16713	17499	10549	12623	12920	16186	13150	10487	8655	15436
	1988	8280	7520	6730	6561	6989	6415	5216	5115	5682	5348	4874	5966	6143
	1989	4348	5018	5293	4591	4661	4562	4792	7481	6222	11487			
BR DEUTSCHLAND	1987	18936	8556	5735	7533	2995	4541	4699	5585	7648	5709	4547	1810	6525
	1988	1505	901	465	304	417	102	133	334	467	1436	1231	1164	705
	1989	1068	1170	1170	1006	1010	1067	1173	1154	1126	1244	1198	1211	1133
FRANCE	1987	2394	2927	1230	370	7194	15	228	141	225	15	15	101	1238
	1988	15	15	10	10	10	10	10	0	0	0	0	0	7
	1989	0	0	0	0	0	0	213	0	0	0	0		
ITALIA	1987	6620	5371	5715	5712	4325	4307	5586	5811	6665	5940	4392	4647	5424
	1988	4754	4982	4779	4777	5227	5109	4447	3934	3588	3102	2993	4325	4335
	1989	2830	3458	3833	3285	3291	3155	3206	6127	4926	10093	4584	6158	4579
BELGIQUE	1987	2894	2487	1824	2436	2448	1227	1655	920	1200	1080	1085	1760	1751
	1988	1655	1285	1160	1180	1054	950	410	650	440	630	475	305	850
	1989	450	390	290	300	360	340	200	200	170	150	310	531	308
LUXEMBOURG	1987	346	355	267	449	452	459	455	463	448	406	448	337	406
	1988	351	337	316	290	281	244	216	197	187	180	175	172	246
	1989	0	0	0	0	0	0	0	0	0	0	0		
UNITED KINGDOM	1987	612	55	135	213	85	0	0	0	0	0	0	0	92
	1988	0	0	0	0	0	0	0	0	0	0	0	0	0
	1989	0	0	0	0	0	0	0	0	0	0			

FUER SPANIEN : KEIN NACHWEISS VORHANDEN
FOR SPAIN : FIGURES NOT AVAILABLE
POUR L'ESPAGNE : DONNEES NON DISPONIBLES
PER LA SPAGNE : DATI NON DISPONIBILI

Source : EUROSTAT

TABLE X.6

Anzahl der wegen Kurzarbeit nicht gelefsteten Stunden

- Working hours lost due to reduction of working time

- Heures de travail effectivement perdues pour réduction de la durée de travail

	CEE	EUR 9	B	DK	D	ELLAS	ESP	F	IRL	IT	LUX	NL	PORT	UK
1986	11 415	11 275	1 427	-	2 946	-	140	143	-	6 104	542	0	-	113
1987	9 626	9 583	787	-	2 320	-	43	166	-	5 647	616	0	-	47
1988	7 173	7 173	262	-	819	-	10	27	-	5 620	421	0	-	14
1989			146	-	1 708	-			-	7 222	0	0	-	
1989.07	604	604	6	-	141	-	0	0	-	457	0	0	-	0
1989.08	949	949	11	-	168	-	0	0	-	770	0	0	-	0
1989.09	808	808	5	-	147	-	0	0	-	656	0	0	-	0
1989.10	1 195	1 195	12	-	163	-	0	0	-	1 020	0	0	-	0
1989.11			5	-	144	-	0	0	-	737	0	0	-	
1989.12			46	-	131	-			-	631	0	0		
1990.01			12	-	70	-			-			0	-	
1990.02			12	-	115	-								

Source : EUROSTAT