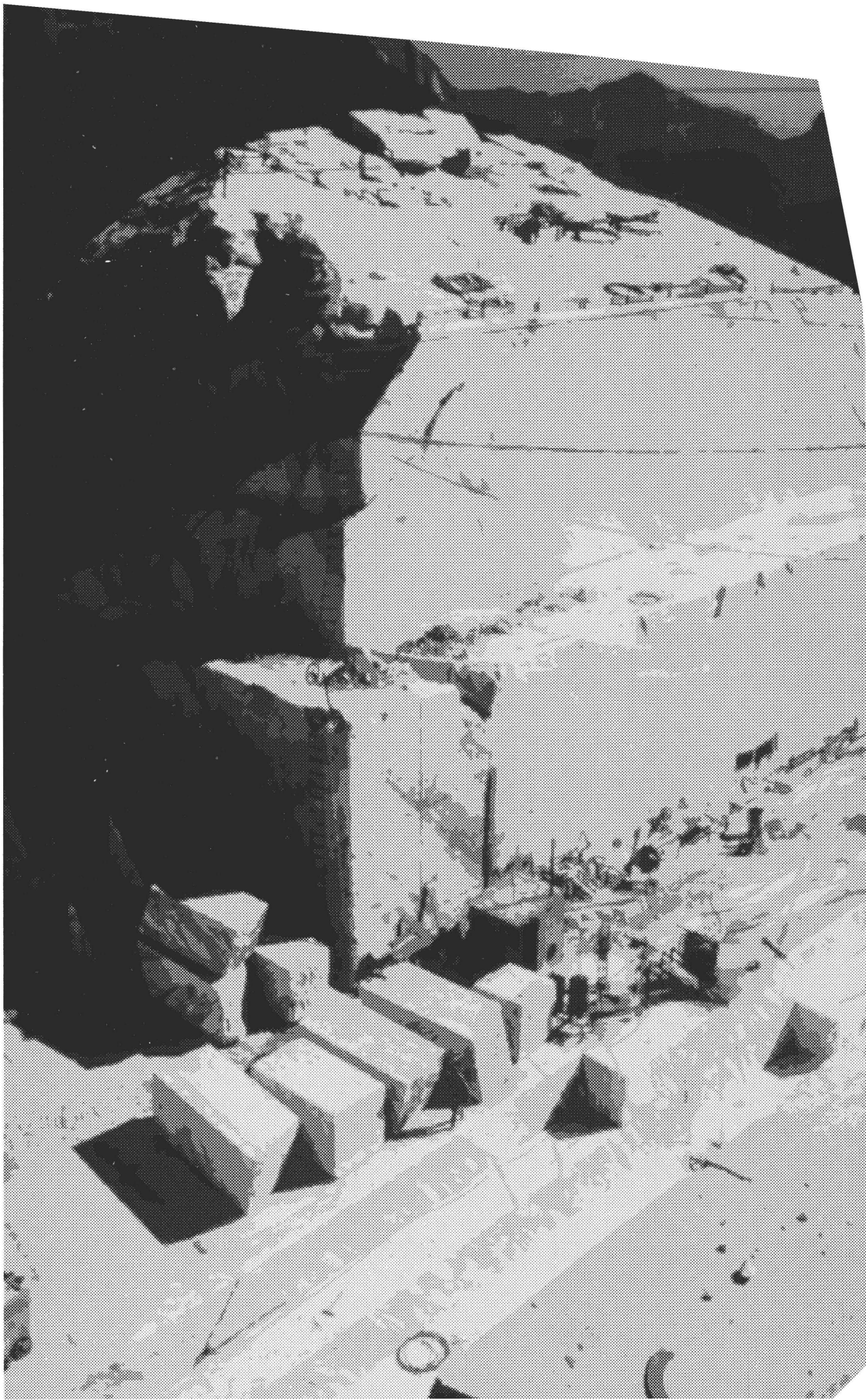


Construction materials



Fluctuations in the activity of this industry are closely linked to those in the construction sector. During the first half of the 1980s, the crisis in the construction sector resulted in a sharp drop in real production in the construction materials industry. Since 1987, the sector has resumed its upward trend and the situation is much improved thanks to major efforts in rationalisation and productivity. The medium-term prospects are good. The manufacture of construction materials causes a fair amount of pollution and requires large amounts of energy. The industry's profitability will therefore depend on the future pattern of energy prices and any tightening of EC policy on environmental matters.

Description of the industry

Construction materials fall into NACE categories 241 to 246 and do not therefore include glass products or ceramics.

- ❖ NACE 241: terracotta materials;
- ❖ NACE 242: cement, lime and chalk plaster;
- ❖ NACE 243: cement, concrete or chalk plaster construction materials;
- ❖ NACE 244: asbestos products;
- ❖ NACE 245: stonework;
- ❖ NACE 246: grinding stones and other grinding products.

The extraction of raw materials used to manufacture construction materials, such as gravel or sand, is not included in this chapter. A monograph relating to mineral wool is, however, included.

This sector corresponds to a different NACE category but is basically governed by the same factors as other construction materials. In terms of production, the most

important sector is cement, concrete or chalk plaster construction materials, which alone account for nearly 42% of the sector's total output. It includes prefabricated and ready-mix concrete firms, which account for 17% and 14% respectively of total production of construction materials. The other sectors described in this chapter are cement (26% of total production when classed together with the chalk plaster industry), terracotta materials (10% of total production) and finally stonework (14% of total production).

Importance of the sector in European industry

In 1989, the European construction materials industry produced goods worth 67 162 million ECU and employed 664 000 people.

This represents approximately 20% of the output and 18% of the workforce of its main outlet; the construction sector. Following the upturn in 1987, the construction

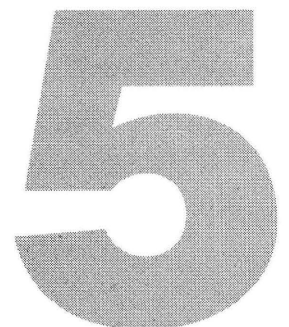
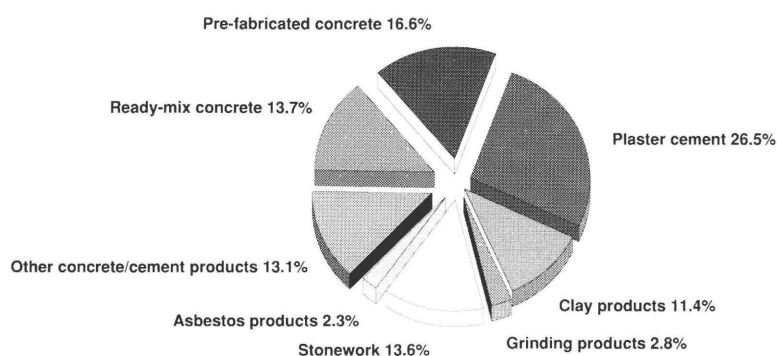


Figure 1
Construction materials
Composition of the industry: % of production 1989



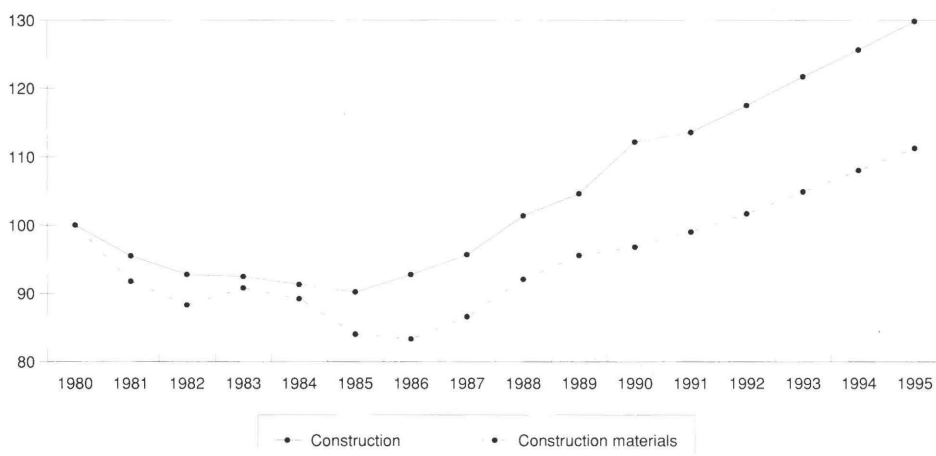
Source: Eurostat, DRI Europe

materials sector continued to recover in 1988 and 1989, with an increase in real production of 6.4% and 3.8% respectively. The recovery came after a particularly tough period in the first half of the eighties, when production of construction materials fell, in real terms, by about 16% between 1980 and 1985.

Main characteristics of supply and demand

The sector's production is mainly composed of intermediary goods which account for roughly 95% of its value. Most of these intermediary goods are absorbed by the construction sector, while the rest are mainly used by the industry itself (pur-

Figure 2
Construction industry and construction materials industry
Real production index



Source: DRI Europe

Table 1
Construction materials
Main indicators, 1980-90

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 ^(*)
Apparent consumption	44 925	47 567	48 857	51 118	52 179	50 987	52 974	56 684	59 581	65 164	66 961
Net exports	834	1 257	1 466	1 749	1 835	1 795	1 921	1 852	1 824	1 998	1 880
EC Production ⁽¹⁾	45 758	48 825	50 322	52 867	54 014	52 781	54 895	58 536	61 406	67 162	68 841
Employment (in thousands)	881	859	803	768	731	680	667	669	659	664	670

⁽¹⁾ excluding Ireland

⁽²⁾ Estimates

Source: Eurostat (Inde, Bise, Comext)

chases of cement by the concrete industry for example). The main reason for fluctuations in the sector's sales, therefore, lies in the fluctuations affecting the construction market. The link between these two industries is clearly illustrated in graph 2. During the first half of the 1980s, the combination of high interest rates and low real income led to a drop in demand for construction, on the part of both households and firms.

From 1986 onwards, the recovery in capacity investments helped to boost the growth of non-residential construction. Demand for residential construction, on the other hand, did not really recover until 1988.

Structure of the industry

With the exception of the cement industry, the construction materials sector tends to be relatively dispersed. Taking the construction materials sector as a whole, i.e. including glass and ceramic manufacturers, the five leading EC firms barely account for 22% of total production.

Compare this with the chemical industry where the five leading firms account for 42% of EC production, or the carmaking industry where the figure is as high as 66%. The low level of concentration is mainly due to the weight of the materials, which makes for excessively onerous transport costs and the emergence of local monopolies, serving fairly small regions.

Another factor is the lack of economies of

Table 2
Construction materials
Production and external trade, 1980-90

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 ^(*)
Production at current prices											
EC ⁽¹⁾	45 758	48 825	50 322	52 867	54 014	52 781	54 895	58 536	61 406	67 162	68 841
Index	86.7	92.5	95.3	100.2	102.3	100.0	104.0	110.9	116.3	127.2	130.4
USA ⁽²⁾											
Index	20 894	26 368	27 969	33 815	42 499	42 725	36 895	34 823	33 952	36 697	N/A
Index	48.9	61.7	65.5	79.1	99.5	100.0	86.4	81.5	79.5	85.9	N/A
Trade at current price											
Extra-EC exports	1 228	1 671	1 908	2 239	2 415	2 441	2 430	2 388	2 535	2 848	2 950
Extra-EC imports	394	413	442	489	581	647	510	535	711	850	1 070
X/M	3.1	4.0	4.3	4.6	4.2	3.8	4.8	4.5	3.6	3.3	2.8
Intra-EC trade	1 650	1 606	1 680	1 888	2 105	2 191	2 700	2 902	3 483	4 027	N/A

(¹) excluding Ireland

(²) Census of manufactures and Eurostat estimates

(³) Estimates

Source: Eurostat (Inde, Bise, Comext)

scale in most of the sectors concerned, except for the cement sector.

Recent years, however, have seen a certain trend towards greater concentration, particularly in the cement sector, which is becoming increasingly internationalised.

Employment

The crisis in the early 1980s resulted in large-scale cuts in staff. The trend was not reversed after 1986, and employment levels have continued to fall.

Between 1980 and 1989, the number of people employed in the sector fell by approximately 25%.

The reductions are part of a major rationalisation programme based on the closure of unproductive units - as in the case of terracotta materials - or greater reliance on automation, as in the case of the cement industry.

Such efforts brought about an increase in production of over 34% between 1980 and 1989.

Geographical characteristics

All the Member States produce construction materials. There are, however, certain discrepancies of a North/South nature:

Italy, Portugal, Spain and Greece tend to

specialise the most in construction materials (see figure 3).

The pattern has been very similar in all the Member States over the past ten years. The only notable exceptions are Germany and the United Kingdom: Germany's market share dropped from 33.4% to 29.1% between 1980 and 1989, in favour of the latter whose share increased from 15.4% to 22.8%.

This is largely determined by changes in the activity of the construction sector, which rapidly gathered pace in the United Kingdom in the mid-1980s. Bearing in mind recent events, the situation may well be reversed during the 1990s.

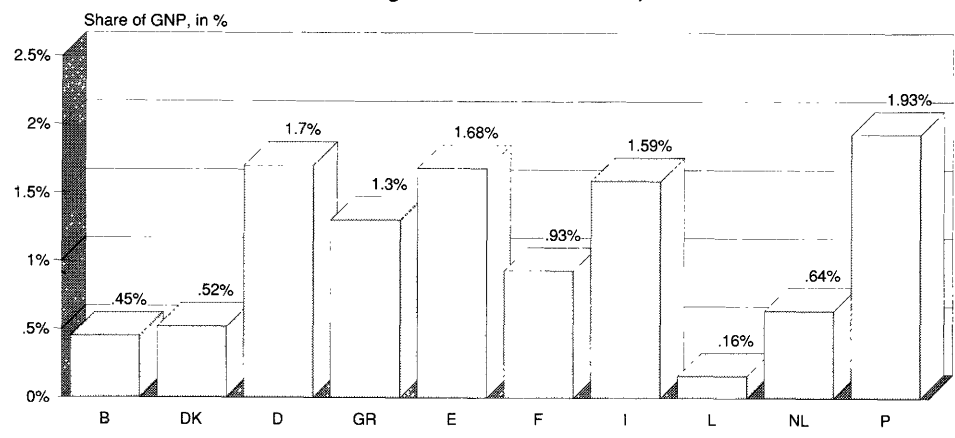
Environment

The construction materials sector consumes large amounts of energy and is a major user of furnaces.

As a result, the manufacture of construction materials gives rise to gassy emissions, mainly nitrogen oxides (NOx), sulphur dioxide (SO₂) (which causes acid rain) or carbon monoxide (CO).

Discharges of dust also pose a common problem, particularly as regards the manufacture of cement or terracotta. Efforts to reduce the atmospheric pollution caused by the sector cost companies large amounts of money. By way of an example, dedusting equipment can account for up to 15% of the value of investments

Figure 3
Construction materials
Percentage of turnover in the GNP, 1989



Source: Eurostat, DRI Europe

Table 3
The construction materials industry
within the EC
Production by country, 1980 and 1989

(%)	1980	1989
EC (%)	100	100
Belgique/België	1.3	1.0
Danmark	1.3	0.8
BR Deutschland	33.4	29.1
Hellas	1.4	1.0
España	9.7	9.3
France	17.6	12.8
Italia	16.1	19.8
Luxembourg	0.0	0.1
Nederland	2.5	2.1
Portugal	1.2	1.3
United Kingdom	15.4	22.8

Source: Eurostat (Inde)

in the cement industry. Finally, consumption of fossil fuels is also posing an increasingly serious problem in terms of carbon dioxide emissions (CO₂) (which contribute to the greenhouse effect).

Other problems include the disposal of solid waste (such as that produced by stonework, for example) and water pollution.

The task of supplying the industry with raw materials, therefore, is hampered to a certain extent by a growing awareness of environmental issues within Europe. Mining companies are having to face a reduction in the number of licences to open new sites or even extend existing sites. In time, this could bring about a rise in the price of raw materials. Similarly, the construction materials sector would be among the first to suffer from a tighter environmental policy, aimed at the more rational use of energy.

Although major energy savings could still be achieved by modifying or replacing production facilities, a pro-environmentalist EC policy involving the introduction of a tax on carbon and hence, an increase in energy prices in order to encourage firms to switch to less harmful sources of en-

ergy and a reduction in consumption in absolute terms, would lead to a marked increase in the sector's production costs, with unavoidable repercussions on prices. Energy accounts for around 30% of the inputs used in the manufacture of cement, chalk plaster, etc, 13% for terracotta products and 10% for concrete.

1992

Construction materials do not constitute a key sector of the single market, insofar as trade in such products is structurally limited by transport costs.

The industry is however affected by a certain number of trade barriers such as standards, certification, etc, the removal of which would have a positive effect on production costs. In addition, with the creation of a single market, the industry will probably become more concentrated, in response to a higher level of concentration on the part of its main client sector, construction, which will itself be influenced by the deregulation of public contracts.

External trade

External trade figures differ markedly depending on the source - the OECD or Eurostat. The following observations are based on OECD figures.

The construction materials industry is very much a locally-based industry, insofar as the weight and volume of production give rise to exceptionally high transport costs. International trade is therefore fairly limited. The EC is still the leading world exporter, however, well ahead of Japan, Australia and New Zealand (the Pacific region), EFTA or North America.

In addition, the EC has a trade surplus which grew slightly during the 1980s. Imports, meanwhile, barely account for 25% of exports and are lower than North Ameri-

ca's imports or even those of the EFTA countries.

The EC's chief trading partners are EFTA, North America and the Rest of the World. These three regions are - in this order - the leading exporters to the EC and the leading importers of European construction materials. South-East Asia and the Pacific region also trade with the EC, albeit to a lesser extent.

The EC is a net exporter in relation to all its main trading partners. The pattern of these surpluses differed, however, throughout the 1980s. The largest surplus is that relating to "other" regions, i.e. mainly Africa, the Middle East and Latin America. This surplus deteriorated sharply during the 1980s, as the aforementioned countries began to acquire their own production capabilities.

The second largest surplus stems from trade with North America.

This surplus increased during the eighties but since the drop in the value of the dollar, imports from North America have grown at a faster rate than exports to the same region. The third largest surplus stems from trade with the EFTA nations; it grew steadily throughout the past decade.

One final point worth noting is that the surplus with Eastern European countries declined constantly between 1982 and 1989, under the combined pressure of a drop in exports from the EC to Eastern Europe and a sharp rise in imports.

The competitiveness of Eastern Europe's industry is linked, however, to large-scale operating subsidies, which may well be cut as part of the liberalisation process. It is quite possible, therefore, that the trend will be reversed in the medium term.

Outlook

In 1991, the construction sector should see relatively low average growth within the EC, insofar as it will be hampered by the poor performance of the British market. The projected recovery in this market from 1992 onwards will enable the construction sector to achieve real growth of over 3% within the EC.

The construction materials industry, meanwhile, should follow a very similar pattern. According to the projections of DRI Europe (see figure 2), real production is ex-

pected to increase by 2.3% in 1991, 2.7% in 1992 and 3.1% in 1993.

All of these prospects will be entirely conditional upon a rapid solution to the crisis in the Middle East and a drop in real oil prices from 1992 onwards.

A lasting increase in oil prices would have a doubly adverse effect on the construction materials industry.

As a major consumer of energy - the two sub-sectors with the highest unit consumption levels are cement and bricks - its costs would undergo a long-term increase.

In addition, the combination of high interest rates and a decline in disposable income could seriously dampen demand for new construction.

Only the mineral wool sector would be able to avoid the slump, thanks to its positive contribution to the problems of energy saving.

Written by: DRI

With 60% of world production, the Community stone industry is today the foremost in the world. This position is largely due to the supremacy of the Italian industry which accounts for 30% of world production. Stone - principally marble and granite - has for a long time been a basic building material.

The use of more modern materials, particularly concrete, has not caused the industry to disappear; it has diversified into funerary monuments as well as into decoration and building facades.

Description of the sector

The two main branches of this sector are the granite industry and the marble industry. The stone industry includes quarrying and stone transformation.

The main outlet for the granite industry is the manufacture of funerary monuments. In France, three-quarters of the turnover in this sub-sector is accounted for by funerary monuments. This area of the market has grown particularly during the last fifteen years, taking over from the construction industry, where concrete has replaced stone as basic material. This situation could, however, change. In fact, the fall in mortality and the development of cremation in several European countries should result in a certain consolidation of activity in this segment of the market. For several years there has been an annual drop in sales of funerary monuments of around 2% in France. Granite used for building could, on the other hand, become more popular in the next few years. Building facades, in thin slabs, represent a sizeable potential market. The development of urban renewal projects and recreational

space is also a very promising market, for all construction materials. Despite a higher construction cost, the qualities of durability and the aesthetic character of granite are major assets. The maintenance costs of granite are considerably lower than those of concrete.

The marble industry is also being transformed. Mainly aimed at the building market, which accounts for over 90% of the demand for its products, this branch has encountered great difficulties during the building crisis of the last ten years. Used less and less for shell construction (quarry stones, etc.), these materials are now in demand for interior features (ornamental works, slabs, decorative fireplaces, etc.). The biggest area in this market is buildings for the service industry (banks, offices).

Current situation

World production from quarries is 25 million tonnes of stone per annum today, i.e. a volume 17 times greater than 40 years ago. It can be broken down as follows: 53% (13.3 million tonnes) of limestone material (chiefly marble), 32% (9.6 million tonnes) of siliceous materials (granite,

Table 1
Stone industry
Production and employment

	Production (1000 tonnes)			Employment
	1987	1989	% world 1989	1988
Belgique/België	800	800	3.2	10 000
Danmark	300	100	0.4	6 100
BR Deutschland	600	600	2.4	20 000
Hellas	1 000	1 800	7.2	15 000
España	2 800	2 600	10.4	27 000
France	800	1 000	4.0	25 600
Ireland	N/D	150	0.6	6 200
Italia	6 600	7 500	30.0	76 000
Portugal	500	750	3.0	10 200
United-Kingdom	23	20	0.1	6 200
Total	13 423	15 320	61.3	202 300

Data not available for Luxembourg and the Netherlands
Source: FIMIGCEE

sandstone) and 8% (2.1 million tonnes) of travertine, onyx and other stone. International trade puts around 6 million tonnes of stone products into circulation, of which 4 million are raw stone products (blocks or slabs), while the other 2 million tonnes consist of dressed products.

Considering that 95% of world production is concentrated in 27 countries which are mostly without modern production technology, it can be assumed that this sector uses worldwide at least

500,000 people; this figure is increased considerably by adding those who work in collateral branches (abrasive products, industrial tooling, methods of locomotion, packaging products)

The European Community, comprising

some of the largest world producers, is the world leader in the stone industry. In 1989, Community production (excluding Luxembourg and the Netherlands for which there is no available data) was around 15.3 million tonnes, i.e. 61% of world production. This production grows at a regular rate, increasing by 13% between 1987 and 1989. It can be subdivided as follows: 9.91 million tonnes of marble (74% of world marble production), 3.37 million tonnes of granite (35% of world siliceous production) and 2.02 million tonnes of other stones (i.e. 96% of world production). These figures show clearly that marble remains the stone in most demand. However, the need to respond better to ever more exacting requirements, both as

Table 2
Stone industry
EC stone production, by product, 1989

(1000 tonnes)	Marble	Granit	Other
Belgique/België	100	700	
Danmark			100
BR Deutschland		600	
Hellas	1 800		
España	1 950	650	
France	630	370	
Ireland	150		
Italia	4 600	1 000	1 900
Portugal	680	70	
United-Kingdom	N/A	N/A	20

Data not available for Luxembourg and the Netherlands
Source: FIMIGCEE

regards quality and quantity, has driven the stone industry to make up its own resources with supplies of other materials, particularly granite; bought raw, granite can be transformed into finished products and then sold on the market.

The European stone industry profits not only from its professionalism, but also from a technological mastery which gives it top world ranking. Indeed, 70% of the 5,000 installations in the world operate within the EC, while 90% of the firms producing technology for the extraction and transformation of stone materials are situated in Europe.

Italy is by far the biggest world producer of stone since, in 1989, it produced 7.5 million tonnes, i.e. 30% of world production; its reputation in this field is assured. There are an estimated 4,000 stone-masonry workshops in the world, half of which are in Italy. Spain is the second European producer: with 2.6 million tonnes in 1989, it represents 10% of world production. Greece has enjoyed considerable growth recently: its production has increased by 80% between 1987 and 1989; today it produces 7% of world production.

Structure of the industry

Historically, the stone industry developed near the quarries which supplied the raw material. It was mainly composed of small family firms. During the last two decades, production processes have become mechanised as fast as possible, some activities being naturally manual ones - productivity in this sector of intensive labour increases and more slowly than the industrial average. The small family firms have not always been able to confront the financial needs of this mechanisation, which has

resulted in extensive restructuring of the sector. Firms which have not been able to afford such modernisation have had to either close or become integrated into larger companies. This trend towards concentration will continue in the next few years.

Employment

In the Community, this sector employs around 200,000 people, i.e. around 40% of the world manpower. Italy employs the most manpower with 76,000 employees in 1988 (38% of Community employment), followed by Spain (27,000 people), France (25,600 people) and the German Federal Republic (20,000 people).

External trade

The international stone trade is relatively limited - 25% of world production, in view of the weight of materials transported. The transport of stone over long distances is however possible, as these materials benefit from preferential tariffs in maritime transport, where they act as ballast.

The EC holds a very important place in the international stone trade. Italy is the foremost world exporter, with 25% of its production sold abroad. Spain exports around half its production. The countries

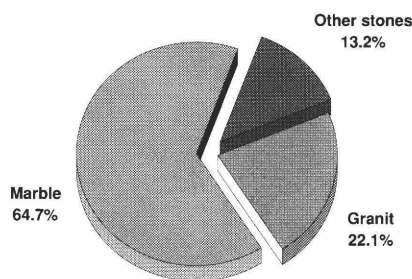
situated in the North of the Community have a less active external trade: France, for example, exports 5% of its production. The EC is a net exporter of marble and other calcareous stones: extra-Community exports have always exceeded in volume extra-Community imports, although they are showing a tendency to fall. In 1988, marble exports reached 217,445 t. - which is the lowest figure registered since 1980 - compared with 158,894 t. for imports. Italy accounts for most exports of marble and calcareous stones: 80% of extra-Community exports in 1988.

The situation is completely the opposite regarding granite, sandstone and porphyry as extra-Community imports have for a long time exceeded exports. This move-

ment is even accelerating: extra-Community imports have grown by over 100% between 1980 and 1988 to reach the record level of 2,105,603 t. in 1988. In parallel, exports only increased by 60% over the same period: they were 253,190 t. in 1988. Trade in dressed stone or construction products (marble, granite, sandstone) is one of the Community industry's trump cards; extra-Community exports are considerably higher than imports: 1,259,572 t. compared with 63,338 t. in 1988. Italy takes the lion's share in these exports, with 83.3%.

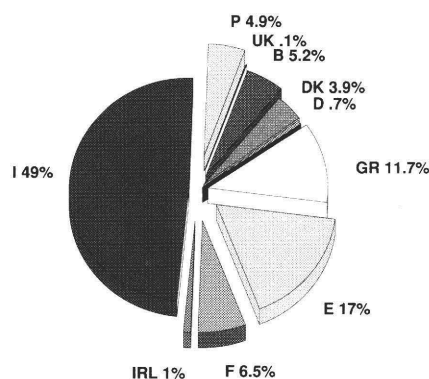
Intra-Community trade has also developed during the 80's: operating costs and sometimes the difficulty of extending certain quarries have combined to intensify stone trade between the Member States. This largely consists of the transport of raw stones from the producing countries (Italy, Spain, etc.) to the Northern Community countries, where the heavily mechanised stone-masonry workshops are situated. In 1988, intra-Community trade represented 1,200,008 t. for granite, 596,780 t. for marble and calcareous stones, 816,199 t. for dressed stone and construction works. The Community industry must, more and more frequently, face up to protectionist measures in the geographical areas which

Figure 1
EC stone industry by product, 1989
Total: 15.3 million tonnes



Data not available for Luxembourg and the Netherlands
Source: FIMIGCEE

Figure 2
EC stone production by countries, 1989
Total: 15.3 million tonnes



Data not available for Luxembourg and the Netherlands
Source: FIMIGCEE

benefit most from the market offered by the EC. These include past vicissitudes in the South Korean market, closed to European products during the years preceding the Olympic Games, or even the restrictions on imports of stone products from the EC which still apply in Brazil, India, in the Eastern European countries or South Africa. In the same way, the American authorities recently accused the EC member countries of practicing a dumping policy in their stone exports.

Research and technological developments

The stone industry has changed greatly during the last fifteen years and the technological innovations introduced have enabled this sector to round off its industrial development. There are still numerous innovation and technological development possibilities, both from a production and a product point of view. As regards production, development trends will be as follows:

- ❖ using diamonds to cut granite, which will eliminate the present use of abrasive compounds (which are the main cause of slurry poisoning) and which will allow for substantial savings in the transformation stages;
- ❖ specific technology application to improve working conditions (noise reduction, easier material handling during transport and greater transformation stage automation);
- ❖ stone working slurry waste recycling;
- ❖ use of innovative production technologies (laser, robotisation, electronics, computers).

In the product field, research and development effort will be devoted to the following aspects:

- ❖ stone product and prefabricated construction product integration to allow for standard material stocking.
- ❖ technology development to preserve and conserve stone manufactured products.
- ❖ criteria and component definition for the combined usage of stone products and products made from other materials.

Protection of the environment

With regard to the stone industry, the most urgent problems concerning environmental protection are:

- ❖ evacuation and storage of stone extraction or transformation waste;
- ❖ the frequent proximity of production sites to residential areas;
- ❖ site destruction caused by quarrying.

Waste disposal is a problem which concerns both quarrying activities and the transformation companies. In the first case, the problem stems from preparing stone blocks which create a considerable amount of debris which has to be stored. This debris is dumped near quarries.

Its accumulation degrades the environment and creates obstacles to continued activity, as well as to starting new quarrying activity. Recycling this waste could consist of transforming it by crushing in order to obtain an inert material aimed at concrete production; such an eventuality would have the advantage of limiting the exploitation of the water table and would protect the environment around the quarries.

With regard to stone transformation, ecological problems arise from the production of solid or slurry waste accompanying the transformation process. Here again the waste is generally abandoned around the saw mills as no tips capable of absorbing such large volumes exist at present.

This practice seriously harms the environment and prejudices the companies operations, as they are obliged to operate in smaller and smaller areas and spend large sums to clear and transport the debris elsewhere. Waste slurry evacuation creates a special problem as the annual quantity produced (more than 10 million tonnes in the EC alone) makes it unthinkable to store it without any further consideration.

Therefore a method of recycling this mass of mud must be found.

It is even more important to carefully monitor the locations of production sites. In the main these grew up in a spontaneous fashion without any planning scheme, generally alongside waterways or in areas with the appropriate infrastructure (roads, energy supplies etc) Later on, dwellings have been established in these zones.

Conflicts then sometimes arise between the population and the industrialists, the inhabitants complaining about the noise and the negative impact of the activity on the natural surroundings. A joint area structure plan must be put in place for all stone production sites.

With regard to quarrying, environmental problems are becoming a major issue in Europe. Intense ecological pressure against the opening of new quarries and for the care of sites is increasing daily, which at the same time increases the value of existing quarries. Already, it is no longer possible to quarry without returning the site to its original state. More and more frequently, the quarries must take responsibility for site renovation: urbanisation, industrial zones, leisure centres, replanting or reforestation.

Outlook

The prospects are relatively good for the stone industry, thanks to the durability and aesthetic qualities of this material. Production diversification, notably towards decorative and interior works and the increasing use of these materials for urban fixtures, should guarantee sustained demand. This will more than compensate for the anticipated slowdown in activity in the funerary monuments sector.

The community annual stone production growth rate should be 2.5% between 1990 and 1992. The EC will doubtless retain its world leadership position for a long time to come.

Written by: DRI Europe

This sector is represented at EC level by:

FIMIGCEE: Federation de l'Industrie Marbrière et de l'Industrie Granitière de la C.E.

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The clay products industry underwent a deep crisis from 1980 to 1985, a period marked by a fall in production and large-scale redundancies.

Bricks were particularly affected by the decline in new construction.

Rooftiles, often used in renovation work, were less affected. The clay products industry in 1988 and 1989 experienced two years of strong growth in both consumption and production.

Today the industry represents 5.7 billion ECU and employs 86 000 people, this is characterised by little intra and extra-Community trade, the clay products industry is essentially a local one, and the arrival of the single European market will have a limited impact upon it. Prospects depend largely on the building activity within each country.

Description of the sector

Bricks and rooftiles have been an inherent part of the historic and cultural heritage of almost every country in the world. This has influenced standards and national building regulations based on local traditions such as brick sizes or construction methods. In European countries such as France and Germany, noticeable differences exist even between regions. A facing brick in Northern France will have completely different dimensions to one in Southern France. In Northern Germany, cavity walls and facing bricks are generally used for building, whilst facing bricks are almost unheard of in Southern Germany. As a general rule, there are two categories of clay construction products: bricks and rooftiles.

Bricks Brick is a construction material made from oven-baked pre-formed clay mass. Classification of various brick styles is carried out on the basis of national standards, but the following classification applies to all European categories:

- ❖ solid brick without perforations, or one in which the number of perforations does not exceed a fixed percentage (15 - 20% of total brick volume, according to the country);
- ❖ perforated brick with a large number of small perforations, generally vertical;
- ❖ hollow brick with large perforations, generally horizontal (normally more than 50% of gross volume).

The type of brick used varies between countries. In the Netherlands, the United Kingdom and Ireland solid brick is the

Table 1
Clay products (1)
Main indicators, 1980-90

(millions ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990(*)
Apparent consumption (2)	3 781.0	3 789.5	3 687.3	3 725.4	4 046.8	3 947.5	4 168.8	4 340.7	4 955.9	5 474.5	5 602.7
Net exports	57	72.5	66.7	88.6	100.2	106.5	208.2	218.3	174.1	195.5	208.3
Production (2)	3 838.0	3 862.0	3 754.0	3 814.0	4 147.0	4 054.0	4 377.0	4 559.0	5 130.0	5 670.0	5 811
Employment (in thousands) (2)	137	127	118	105	104	95	83	87	86	86	86

(1) 1980 EC 9, 1981-85 EC 10.

(2) Estimates for Ireland

(3) Estimate

Sources: TBE, Eurostat (Inde, Bise)

most widely used; in Belgium and Denmark solid brick is used as much as perforated brick, whilst in France, Spain, Portugal and Greece hollow and solid bricks are mainly used. In Northern Europe (United Kingdom, Denmark, Netherlands, Belgium and Northern Germany) facing bricks are used to build cavity walls which are composed of an outer layer (facing bricks) and an inner layer which can be constructed with solid bricks, perforated bricks or other materials. In Southern European countries, the majority of buildings have hollow brick walls, which walls are rendered, however, in some parts, it is customary to cover areas of the facade with facing bricks (for example, Toulouse, Barcelona, Venice).

Rooftiles Rooftiles have a special shape which facilitates roof covering. The production method is the same as for brick. The clay is kneaded until the required shape is obtained and the rooftile is then oven-baked. Rooftiles vary with each manufacturer and therefore are not interchangeable. Generally, it is possible to distinguish between the Mediterranean type (for roofs with a slight slope) and the Northern European type (for roofs with a steep slope). The brick and rooftile industry's main market is house construction and buildings of up to six storeys, as well as pavements.

The rooftile industry covers maintenance, repair and transformation of existing buildings. In the majority of countries the comparison between building activity and brick sales is impressive. When the housing sector experiences a sharp upturn, brick manufacture does not always follow, and other competing construction methods have an opportunity to compete.

In periods of downturn, traditional brick construction is more resilient than competing techniques and bricks' relative market share increases.

After the Second World War, housing construction experienced, in most European countries, a long period of intense activity, followed by a considerable decline.

This crisis did not affect all countries at the same time, but occurred between 1980 and 1985. However, over the last few years, an increase has been noticed, particularly in the single family home sector, and this has benefitted the brick sector. The situation has been different for rooftiles: the sale of rooftiles is highly dependent on consumer demand for roofs and for concrete rooftiles. After the Second World War, clay tiles were abandoned everywhere, but a clear rebirth of demand has been noted over the last fifteen years. The statistics for this sector are difficult to analyse. With regard to brick, numerous national statistics show brick production

converted into a brick of standard size, and the figures are given "in thousands". This unit is only useful if the standard size on which the figures are based is known; this size varies according to the country. Certain countries use square metres, others calculate production in tonnes. The weight of a cubic metre of brick can vary from 600 to 2 200 kg, and statistics expressed in tonnes are not comparable with those expressed in m³. In the same way, the value of a cubic metre of bricks varies between 50 and 300 ECU according to the type of brick. Similar difficulties exist for rooftiles, which are measured either in thousands of units, or in m², or again in tonnes.

Production

The crisis that hit the Community clay products industry at the beginning of the 80's was particularly felt between 1982 and 1985. The fall in demand was caused by a decline in building activity, a decline brought about by an increase in interest rates on mortgages, by budgetary deficits in European countries which created a fall in council housing construction, and by increasing employment uncertainty. The consequence of this was a reduction in the total production capacity of clay products linked to a very low level of investment. Community production at constant prices dropped steadily from 1980 to

Table 2
Clay products production

(In thousands)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Bricks:									
m3 (1)	35 942	33 312	29 996	29 281	29 790	27 626	28 488	29 186	30 877
Index	130.1	120.6	108.6	106	107.8	100	103.1	105.6	111.8
Tonnes (2)	22 340	21 396	20 306	18 732	17 654	16 031	16 525	17 115	N/A
Index	139.4	133.5	126.7	116.8	110.1	100	103.1	106.8	N/A
Rooftiles:(3)									
m2 (4)	429 497	427 946	451 520	468 686	483 988	452 056	445 693	470 900	532 000
Index	95	94.7	99.9	103.7	107.1	100	98.6	104.2	117.7
Tonnes	3 158	2 757	2 734	2 739	2 720	2 671	2 725	2 903	N/A
Index	118.2	103.2	102.4	102.5	101.8	100	102	108.7	N/A
m2 (4)	27 998	28 035	27 632	29 706	35 051	28 444	32 587	32 019	34 659
Index	98.4	98.6	97.1	104.4	123.2	100	114.6	112.6	121.8

(1) Belgium, Denmark, German Federal Republic, Ireland, Italy, the Netherlands and the United Kingdom; estimates for Ireland in 1988

(2) Spain, France and Portugal

(3) Denmark, the Netherlands and the German Federal Republic

(4) Italy and the United Kingdom

Source: TBE, Eurostat (Inde)

1986, the date at which the upturn started: +3.7% in 1987, +6.6% in 1988, +4.8% in 1989. Community production at current prices increased by 4.2% in 1987, by 12.5% in 1988 and by 10.5% in 1989.

In 1989, it reached 5,670 million ECU which is still 7% lower in constant prices than that of 1981. With regard to brick production, the situation varies according to country: while some Member States (Italy and Belgium) managed to return to the 1980 production level, others (German Federal Republic, France and Denmark) are still far from that level. However, no Community country has managed to exceed the pre-crisis level.

With regard to rooftiles, the upturn was more quickly felt and several countries (German Federal Republic, the United Kingdom and Denmark) are experiencing production levels far higher than those of the beginning of the 80's. Over the period 1980-1985, the rooftile sector and the existing building renovation sector, experienced reasonable activity levels, even moderate growth in certain countries.

Whilst during the 1960s and 1970s, priority was given to new construction,

since 1980 the emphasis has been on renovating existing heritage. For traditionally designed houses, masonry is generally still serviceable but roofs must be renovated.

Structure of the industry

The typical Community brickyard is a family firm with 10 to 50 employees, depending on the degree of technology.

In most countries, there are companies which own a number of brickyards more or less concentrated in a particular region. The modernisation of these firms has resulted in a continued trend towards concentration: in all countries, the number of brickyards has fallen considerably (in Belgium, there were around 800 in 1950, compared with 50 in 1990).

The oldest factories mostly have a seasonal activity with employees unemployed during the winter.

Even in countries where the brick industry is strongly automated (mainly Northern Europe), there are still older, more traditional brickyards which have survived by specialising in the manufacture of hand-crafted products, which is sometimes a very profitable activity.

In the older factories, the main expense is salaries; in the more modern ones, it is energy and capital depreciation.

Although the effect of energy on the production cost of a brick is fairly small (around 25% of the total cost), the brick industry has always been sensitive to fluctuations in energy prices. Many brickyards regularly change their fuel type (coal, fuel oil, natural gas, LPG) as prices change. However, the client is very conservative, does not easily accept slight modifications caused by changes in production methods. The number of firms manufacturing clay products has fallen by 40% between 1980 and 1988: dropping from 3 196 to 1 849. This concentration trend has been particularly evident in Italy, Denmark and Belgium. It has been less apparent in the United Kingdom, France, Greece and the German Federal Republic. Between 1988 and 1990, it extended beyond national borders with the establishment of several multinational companies.

Employment

The number of people employed in the brick and rooftile industry has dropped over the years, owing to the closing of

Table 3
Clay products
Employment

	1980	1981	1982	1983	1984	1985	1986	1987	1988 ^(*)	1989
EC	137 271	126 856	117 548	104 540	103 671	95 465	89 301	87 295	85 844	86304
Belgique/België	3 942	2 682	2 290	2 206	2 204	2 155	2 126	2 072	2 044	2052
Danmark	1 976	1 485	1 279	1 242	1 335	1 376	1 137	1 124	1 068	1072
BR Deutschland	20 745	20 610	19 221	17 662	17 721	16 290	15 901	15 628	15 526	15 672
Hellas	2 474	2 261	2 084	2 731	2 740	2 825	2 828	2 791	2 791	2818
España	25 384	22 407	19 247	16 490	15 372	13 680	13 645	13 310	13 310	13363
France	12 140	10 595	10 186	9 154	8 514	7 928	7 077	6 916	6 804	6782
Irland	169	182	155	149	142	137	132	124	120	117
Italia	28 566	27 480	26 151	20 011	20 714	18 619	15 519	14 918	14 468	14106
Nederland	5 224	4 854	3 782	2 944	2 871	2 679	2 567	2 594	2 620	2630
Portugal	14 702	15 041	15 379	14 462	13 036	11 815	11 357	11 094	11 128	11172
United Kingdom	21 969	19 279	17 774	17 489	19 022	17 961	17 012	16 724	15 965	16520

(*) Estimates
Source: TBE, Eurostat (Inde)

many old factories which employed a large number of manual workers and the modernisation of existing firms, so that only a small number of workers are now required for production. Between 1980 and 1989, the number of people employed in this sector in the EC fell from 137 271 to 86 304, an average decrease of 5.7% per annum. Except for Greece which registered an average annual rise of 1.5%, all EC countries had a sharp decrease in manpower; the countries most affected by this reduction were France (-8.7% per annum between 1980 and 1988), the Netherlands (-8.3%), Italy (-8.2%) and Belgium (-7.9%). The least-affected countries were Portugal (-3.4%), the German Federal Republic (-3.6%), the United Kingdom (-3.9%) and Ireland (-4.2%).

The largest employers in the EC in this sector are the United Kingdom (16 000 people in 1988), the German Federal Republic (15 500 people), Italy (14 500 people) and Spain (13 300). Due to increasing mechanisation, the clay products industry's productivity continues to rise.

This phenomenon is demonstrated by the trend registered in the average annual pro-

duction (expressed in m³) per worker in the Belgian brick industry:

- 1950: 150
- 1960: 196
- 1970: 390
- 1980: 685
- 1987: 814
- 1988: 858
- 1989: 993

Trade trends

Extra-Community trade in this sector is extremely small: exports represent less than 4% of the value of Community production and imports are negligible (0.3% of apparent consumption). The EC trade balance for clay products is traditionally a high surplus value.

The integration of Spain and Portugal only accentuated this trend, as the extra-Community exports/imports ratio between 1985 and 1986 (date of entry of these two countries into the EC) went from 7.7 to 34.6. Exports increased at current prices by 6% in 1987, dropping by 18% in 1988, and in 1989 they returned to their 1986 level: 212 million ECU.

As for imports, the amounts are still very small: 17 million ECU in 1989; they have however been growing steadily since 1986.

Intra-Community trade in clay products is very limited, it does not reach 7% of Community production. It fluctuates greatly after reaching the record figure of 576 million ECU in 1986, it fell to 301 million in 1987 and since then has grown at the pace of production, in 1989, it was 384 million ECU.

Intra-Community brick trade is not extensive owing to the weight of the material which makes long-distance transport relatively unprofitable; moreover, national standards and regulations raise difficulties regarding exports. Since national regulations generally arise from local building traditions, the opportunity to eliminate these trade barriers via Community level harmonisation is limited.

Consequently, the brick industry is essentially a local one: most brickyards sell their products within a maximum radius of 70 km around the factory. Convenient locations for transport have always facilitated sales. For historic and geological reasons, brickyards are situated along navigable waterways and canals. Transporting bricks by boat is however rare today.

The brick exports of some small countries (especially the Netherlands and Belgium)

Table 4
Clay products
Number of firms

	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC	3 196	2 912	2 832	2 692	2 481	2 259	2 165	2 155	1 849
Belgique/België	99	82	72	64	58	57	56	55	54
Danmark	68	58	51	45	45	46	40	36	36
BR Deutschland	395	390	370	350	325	300	290	287	287
Hellas (¹)	70	68	64	66	61	55	53	53	N/A
España	1 000	800	750	700	650	600	650	700	700
France	234	208	270	252	244	213	197	190	178
Ireland	3	3	3	3	3	3	3	3	2
Italia	680	650	615	590	513	440	390	370	355
Nederland	106	105	97	94	86	62	63	67	69
Portugal (²)	321	333	330	328	296	283	233	232	N/A
United Kingdom	220	215	210	200	200	200	190	162	168

(¹) Estimates 1984-87

(²) Estimates 1987

Source: TBE

are noteworthy. In the Netherlands, exports represent up to 20% of national production and, in Belgium, up to 10%. In view of the size of these countries, the producers are not too far from foreign clients. However, the markets are still mainly regional and exports rarely cross more than one border. Extra-Community exports are few. Exports to overseas countries which sometimes appear in the customs statistics mostly relate to a single building: for example, the exporting country's embassy, the church of a religious community or the premises of a large group's foreign subsidiary.

As regards rooftiles, the price/weight ratio is more favourable. There is intra-Community rooftile trade, and the Community industry even exports to extra-Community countries. These exports are however small compared to the whole EC market. Extra-Community imports are rare. The international rooftile trade is badly affected by the problems of product liability due to the nature of the product.

Outlook

Clay products industrialists are of the opinion that housing construction will stagnate during the next decade and will not

reach the high levels of the 60's and 70's during the next ten years. A lower production volume is therefore expected.

The possibility of exporting outside the EC is improbable and it is unlikely that imports will invade the Community.

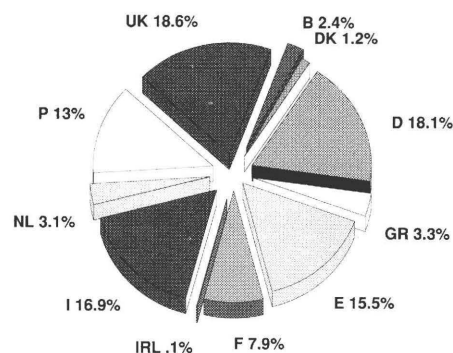
The sector is therefore trying to maintain its turnover at the present level, by offering top quality products such as hand-made facing bricks, insulating bricks and glazed bricks. Furthermore, every action is being taken to increase productivity, while strengthening the chances of survival in a smaller market. The creation of the large single European market should have little effect on this industry, in view of the small proportion of production exported.

The establishment of the internal market will only result in major changes for firms situated near borders. It is thought that the trend towards concentration and increased size of firms, a trend which started about thirty years ago, will become more marked.

Prospects vary greatly depending on the country:

- ❖ In France and the German Federal Republic, the volume of clay products should increase annually by 4% during the next few years. Demand will be stimulated by the increases in building in these two countries: in the German Federal Republic, several hundred thousand immigrants are looking for lodgings in a mar-

Figure 1
Clay products
Employment in the EC 1988 Total: 85 800
(number of people)



Source: TBE, Eurostat (Inde)

Table 5
Clay construction products (1)
EC trade at current prices

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Extra-EC exports	71.8	88.6	83.2	108.2	118.2	122.3	214.4	226.9	186.5	212.3	221.1
Extra-EC imports	14.8	16.1	16.5	19.6	18.0	15.8	6.2	8.6	12.4	16.8	17.3
X/M	4.9	5.5	5.0	5.5	6.6	7.7	34.6	26.4	15.0	12.6	12.8
Intra-EC trade	216.8	164.9	152.7	172.2	190.5	184.4	576.6	301.3	338.8	384.4	N/A

(1) 1980 EC 9, 1981-85 EC 10
Source: Eurostat (Comext)

ket with a deficit of 1.7 million homes; in France, the construction sector should be one of the most dynamic in the EC in the forthcoming years.

- ❖ In Belgium, Italy and the Netherlands, the market will remain almost static: annual growth should be 1%.
- ❖ In 1990 and 1991 the United Kingdom

should be the worst placed in the EC, with a nil growth rate, owing to the decline in the building sector. Production capacities of clay products will remain surplus to requirements. The recession presently affecting the United Kingdom building sector is due to high interest rates. The trend should reverse from 1992.

Growth at Community level should reach 2.5 to 2.7% per annum between 1990 and 1992.

Written by: DRI Europe

This sector is represented at EC level by: TBE: Federation Europeenne des Fabricants de Tuiles et Briques

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Activity in the cement industry is linked closely to general economic development and to that of the building sector in particular.

The cement industry is relatively concentrated in the world. In view of the heavy nature of the material, external trade remains limited. In 1989, it represented about 4% of production in the EC. However, trade within the EC more than doubled between 1986 and 1989. Conversely, the emergence of a cement industry in markets supplied in the past by European cement works has limited Europe's major export openings, particularly to the Middle East. Throughout the recession, less competitive firms disappeared, which to some extent reinforced the concentration of centres of production in the EC. At present, the production capacities of EC countries are more than sufficient to cover internal demand, while imports of cement from eastern countries and developing countries have risen rapidly over the last few years, aided chiefly by artificially low prices.

Description of the sector

The production of cement comprises two essential phases:

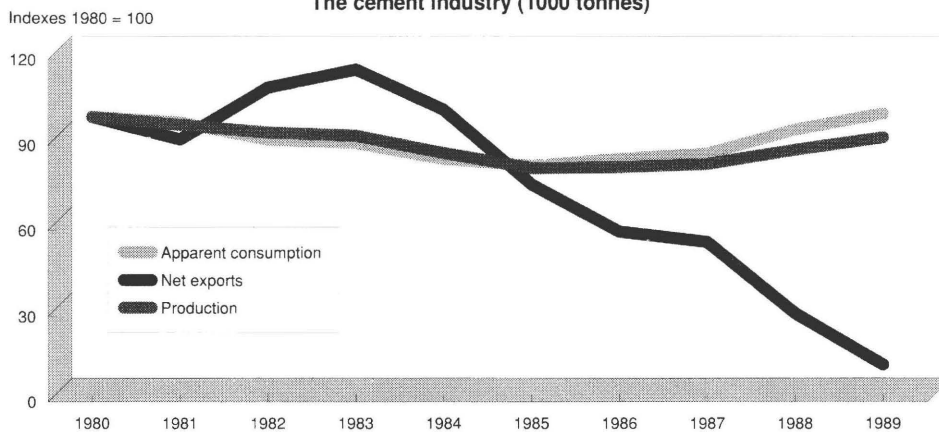
- ❖ the manufacture of a semi-finished product, clinker, which is obtained from the calcination, in a high temperature oven (1450°C), of raw materials such as (clay, limestone, depending on the manufacturing process used (wet method or dry method));
- ❖ the manufacture of cement as a finished product is obtained through the homogeneous mixing of clinker and calcium sulphate, with or without one or several of the following constituents, according to

the type of cement: slag, flying embers, "pozzolana", fillers, (according to the type of cement).

Current situation

In 1989, world cement production reached 1 143 million tonnes, that is to say 30% more than in 1980. In 1989, the ten main cement producing countries were, in order: China (208 million tonnes), the U.S.S.R. (140 million), the U.S.A. (70.3 mio), Japan (81.9 mio), India (42 mio), Italy (40,5 mio), South Korea (31.4 mio), Brazil (25.9 mio), Spain (28.2 mio) and France (26.8 mio). On the world market, the EC represented about 15% of cement production (against

Figure 1
The cement industry (1000 tonnes)



Source: CEMBUREAU

21% in 1980), that is to say 169 million tonnes. Under the effects of the building recession which affected Europe during the 1970s and particularly at the beginning of the 1980s, production in EC countries fell up until 1985 at the rate of about 1.4% a year.

Since then, an improvement has been recorded, linked to the recovery in the business volume of building.

In 1989, cement production within the EC grew by 5%.

Consumption

Cement consumption is directly linked to activity in the building sector and, more accurately, to investments made in residential and non-residential buildings, as well as in civil engineering works.

High interest rates, restrictive policies on credit, the fall in real purchasing power and very low profitability levels in trade and industry had a negative influence on

investment in housing and non-residential buildings. Similarly, the gap in public funds led at times to drastic cutbacks in public sector investment in civil engineering works.

It was only from 1986 that European countries began once again to increase their investment in building and that cement production resumed positive growth.

In 1989, cement consumption per inhabitant in the EC stood at a level that was virtually unchanged since 1980.

External trade

The geographical distribution of trade in cement is the result of the heavy nature of the product: its modest price per unit of weight makes it highly sensitive to the impact of transport costs, especially for road transport. It is for this reason that deliveries of cement are usually made to markets close to the centre of production.

This also explains why world trade in ce-

ment currently represents less than 6% of production. Moreover, its geographical polarization is very pronounced. Thus, in 1989, over 40% of world cement exports came from six countries (Greece, Spain, Japan, South Korea, Indonesia and Mexico), while 40% of imports were accounted for by only four countries (U.S.A., Hong Kong, China and the United Kingdom). Demands from distant markets, which are often provoked by a temporary or accidental shortfall in local production, allow some countries to make better use of their industrial equipment and, therefore, of their investment. Between 1986 and 1989, the volume of trade in cement within the Community more than doubled, whilst exports outside the EC fell by more than half. Parallel to this, their share of world trade dropped progressively. The implementation of equipment in distant markets led to the loss of, or greatly reduced the many traditional openings enjoyed by the European cement industry, chiefly in the Middle East.

In 1989, the main customers of European countries were the U.S.A. (3.5 million tonnes), Algeria (1 million), Nigeria (0.5 million) and the Ivory Coast (0.4 million).

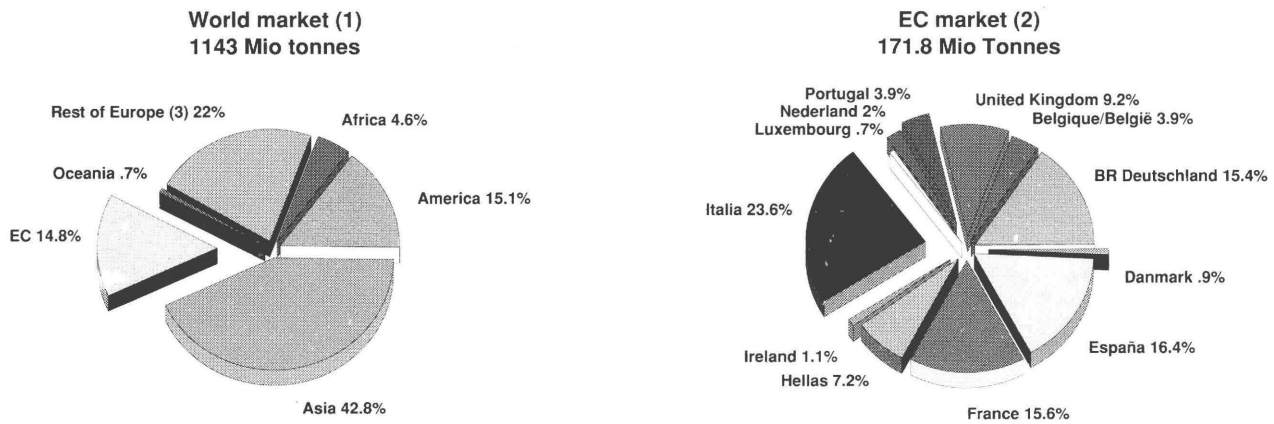
At present, the production capacities of EC countries are more than sufficient to meet internal demand. For some years now, however, there has been an upsurge in cement imports from eastern countries and developing countries at artificially low

Table 1
The cement Industry
Main Indicators

(million tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 (*)
Apparent consumption	163	160	150	148	139	135	139	142	155	167	N/A
Net exports	19	17	22	22	20	14	11	10	6	2	N/A
Production	182	177	172	170	159	149	150	152	161	169	174
Employment (thousands)	80	79	77	75	72	69	65	63	61	61	N/A

(*) Estimated
Source: Cembureau

Figure 2
Geographical structure of cement
production in 1989



(1) Total adjusted for clinker exported outside Cembureau member countries

(2) Cement plus exports of clinker outside the EC

(3) Including the U.S.S.R.

Source: CEMBUREAU and World Statistical Review

prices (taking account of dumping conditions or variable expenses alone), or at prices administered by the authorities in the countries involved.

The means of defence against dumping concentrated at borders have proved to be inefficient. While discrimination may seem negligible in the EC as a whole, the same cannot be said at regional level, where these practices are threatening the existence of local firms.

Employment

During the period under review, overall employment fell from some 80,000 in 1980 to less than 62,000 in 1989, that is to say a fall of over 22%. Conversely, cement industry productivity by 15% between 1982 and 1989, due to the deployment of more effi-

cient and sophisticated production tools which entailed a highly advanced automation of operations, and which necessitated additional efforts in the training and qualifying of staff.

Investment

The cement industry is an industry with very high capital intensity: it handles large quantities of low-value raw materials in very costly installations in order to manufacture a product with a low unit price. The structure of cement production costs has altered considerably in the course of the last few years, chiefly because of variations in energy costs. It is generally felt that, within the cement industry, half the production costs may be considered as fixed costs.

Investments in energy saving

The manufacture of cement requires large amounts of energy. Average energy consumption per tonne of clinker produced in the EC currently stands at 900 Kcal/Kg. This value may vary from 800 to 1 400 Kcal/Kg per country, depending on the production method used.

The consumption of energy used for the production of cement depends equally on the policy followed by the industries in investment and the development of the use of composite cement.

After the oil crisis of 1973, the industry pursued measures to save energy in two directions: research into cheaper fuels (diversification of fuels through versatility of equipment) and the rational use of energy

Table 2
Average cement consumption per head

(kg/capital)	1980	1985	1986	1987	1988	1989(*)
EC	516	425	428	438	479	492
Japan	704	561	567	583	632	638
USA	300	332	344	349	343	329
Asia	105	139	143	151	162	163
Africa	87	101	97	94	90	90
World	192	199	204	209	217	219

(*) Estimated
Source: Cembureau

Table 3
The cement industry - external trade

	1980	1981	1982	1983	1984	1985	1986	1987	1988 ⁽¹⁾	1989 ⁽²⁾
Exports extra-EC										
Value (million ECU) ⁽³⁾	398.7	806.4	1 013.5	877.1	810.3	584.0	411.1	236.8	N/A	N/A
Quantity (million tonnes)	20.1	19.3	22.9	23.9	21	16	13	12.6	9.5	7.4
Imports extra-EC										
Value (million ECU) ⁽³⁾	27.7	44.9	73.3	59.8	46.7	52.4	60.2	75.5	N/A	N/A
Quantity (million tonnes) ⁽⁴⁾	0.8	1.5	1.6	1.4	1.2	1.3	1.5	1.8	3.5	4.9
X/M										
Value	14.4	17.9	13.8	14.7	17.3	11.2	6.8	3.1	N/A	N/A
Quantity	26.5	16.8	14.1	17.5	17.8	12	8.9	7.2	2.7	1.5
Imports intra-EC										
Value (million ECU)	166.3	176.4	185.8	219	228.2	236.3	259.5	284.3	N/A	N/A
Quantity (million tonnes)	4.7	4.3	3.8	4.3	4.4	4.3	4.6	5.2	7.9	10

(¹) Estimated and excluding special cements such as white and aluminous.

(²) 1980 excluding Spain; 1987 excluding Greece.

(³) 1987 excluding Greece and Portugal.

(⁴) 1987 excluding Portugal.

Source: Cembureau

(new manufacturing processes, the development of composite cement, heat recovery, etc...).

Environmental protection The cement industry is investing more and more money in environmental protection.

Investments in dust removal equipment can reach 15% of total investment.

Main structural characteristics and geographical implantation of the sector

The cement industry is characterised by a high capital density. The process of concentration initiated over the past few years is set to continue as before, due for instance to the growing importance of new investment. At the present time, 150 firms make up the cement industry, whereas there were 175 in 1980 and 195 in 1975.

Structure of the industry

There is no single unanimously supported criterion for the classification of cement industries or groups. Like turnover, capacity may be defined in many ways. Turnover published in the accounts may include non-cement activities, just as the existence of commercial subsidiaries can lead to differ-

ent quantities being produced by the same firm. In the case of co-ownership, the distribution of capacity is also calculated differently. While keeping these various reservations in mind, the cement groups generally recognised as the most important in the EC are Blue Circle Industries (United Kingdom), Les Ciments Francais (France), Holdrebank (Switzerland), Italcementi (Italy) and Lafarge Coppee (France). None of these groups has a total market share of over 10%. Some EC producers are still nationalised; in Greece, Italy and Portugal, their combined production represents less than 10% of the Community market. In each of these cases, privatisation has been studied, so that their status may change in the future.

Outlook

1990 may see the approach in the peak of the cycle of private sector investment in the EC as a whole. This is already widely under way in the United Kingdom, where, in 1989, a recession in housing demand could already be observed. Interest rates are high, tax reforms foreseen in several countries have already been applied, and investment to be made within the perspective of the 1993 Single Market has broadly

begun. Consequently, a tailing off in overall market growth can be expected, although this will vary considerably from one country to another. There could still be good prospects in the Federal Republic of Germany, following the developments in the East, and in Spain. Elsewhere, other countries (Italy for example) remain subject to major budgetary constraints, which act as a brake on investment in public works and restrict the growth of upside sectors such as cement. A big rise in the price of a barrel could increase the production costs of the cement industry and once again destabilize the building sector and its dependent industries.

Table 4
Investments by the European cement industry, 1980-86

(million ECU)	Investment
1980	813.5
1981	1 035.3
1982	1 043.1
1983	879.1
1984	830.7
1985	893.5
1986	741.1
1987	N/A
1988	N/A
1989	N/A

Source: Cembureau

Table 5
The cement industry
Forecasts

(million tonnes)	1989	1990	1991	91/90 %var	95/92 %var
Production	169	174	176	1%	3%

Source: DRI Europe

CEMBUREAU: The European Cement
Association-Liaison Committee of the Cement
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Reviewed by: DRI Europe

In 1989 the turnover of the precast concrete industry approached 17 billion ECU.

The development of the precast concrete industry within the construction sector varies from one Member State to another.

Generally, its share is greater in the northern than in the southern regions of the Community.

Description of the sector

The precast concrete industry manufactures goods for the construction sector, including road building, ready to be installed. These include from light or heavy concrete, either reinforced or prestressed. Products are manufactured at specially equipped plants, with a permanent location, independently of weather conditions. Since non-reinforced concrete began replacing natural stone, timber and cast iron in many applications, the precast concrete industry became highly mechanised. The rapid technological development of reinforced or prestressed concrete led to the breakthrough of various plant-manufactured structural elements for building construction and civil engineering works. Lightweight concrete was first applied in the precast concrete industry for the manufacture of masonry units, wall and floor elements. The specific and scientific approach of the concrete technology helped guarantee a high and consistent quality of precast concrete products. The construction boom in the 1960s and early 1970s as well as the increase in building costs over that same period led to a further industrialisation of the precast concrete industry.

Profits were reinvested in modern equipment and plant such as semi and fully-automated batching and manufacturing equipment. Handling, packaging and transporting techniques were equally revolutionised.

Over the years, the precast concrete industry has learned to adapt to the rapidly growing and changing demand of the construction sector, and has thus acquired a place of its own as a supplier to the construction sector.

For the industrialised countries, the activity of the precast concrete industry largely depends on the overall economic climate and on activity in the construction sector in particular (99% of the precast concrete production goes to the construction sector), though trend differences can be observed between residential building, non-residential building and road construction (the latter absorbs roughly 30% of the precast concrete production).

The economic crisis caused a 30% to 40% drop in precast concrete production in the Community with an almost equal fall in employment from the mid- 1970s to 1984. With the economic revival, production has increased, with figures varying depending upon the country considered.

For the countries for which data are avail-

Table 1
Precast concrete, 1989 - main indicators

	B-L (1)	DK (2)	D	F (3)	I	NL (4)	UK (5)
Turnover (million ECU)	456	384	3 039	1 733	1 673	745	2 575
Production (thousand tonnes)	7 300	3 400	41 258	31 368	N/A	N/A	N/A
Employment	5 650	5 000	44 143	24 000	N/A	7 580	13 500
No. of precast concrete plants							
Total	377	180	1421	N/A	534	148	250
With 50 or more employees	19	40	242	N/A	131	44	N/A

(1) Turnover and production estimated
(2) 1988 estimated
(3) Estimated
(4) 1988
(5) 1988; employment estimated
Source: BIBM

able, production at current prices has grown at a rate of between 5% and 6% (table 2).

In recent years significant efforts in the sector toward innovation have been made in most industrialised countries.

Although, basically most "new" products are "evolutions" of existing elements, the industry has developed - and is successfully marketing - valuable solutions in fields relative to, for instance, environmental problems such as sound barrier walls to protect residents living near highways or railways from noise hindrance.

Precasters have become increasingly aware of the market advantages of guaranteeing the adequate durability of products (durability implying here both soundness and long-term appearance) and improved design. Through closer inter-professional collaboration, research, technical and technological innovation, precasters are trying

to improve the image of the precast concrete industry.

Indeed, the public opinion generally confuses the building material with the architectural expression.

Employment

Even though there is no complete information on employment in the precast concrete industry, a reasonable estimate is around 170 000 persons in the European Community.

This number of employees is spread over nearly 5 000 precast concrete plants of which approximately 600 employ more than 50 people.

The typical precast concrete firm is in fact a small family-owned business.

Although, in the first years of economic recovery, growth in employment did not follow exactly the growth in output

(as the industry used other means than hiring additional labour to increase

production) this situation could not continue indefinitely. Hence, an increase of about 1% in 1987 vs. 1986, 2% in 1988 and 3% in 1989. It is estimated that productivity has risen by roughly 30% over the last fifteen years.

On the labour market, wage costs are on the rise as a result of reduced working hours, as well as a shortage of skilled labour. The average hourly labour cost in 1989 varied between 5.5 ECU and 15 ECU with an overall average of 12.3 ECU (see table 4).

The following types of worker, can be distinguished:

- ♦ technical workers mainly; electronic engineers, in charge of operating, controlling and repairing machines and equipment; these jobs are well remunerated and well-regarded;
- ♦ skilled manual workers; about one fourth to one fifth of the labour in the precast

Table 2
Precast concrete - Production by country, 1980-91

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 (1)	1991 (2)
Belgique/België (1)	313	265	248	231	232	249	297	347	350	351	N/A	N/A
Danmark	215	180	169	215	265	320	387	392	384	365	373	370
BR Deutschland	1 879	1 768	2 031	2 311	2 411	2 082	2 280	2 402	2 628	2 942	3 060	3 250
France (1)	1 155	1 208	1 195	1 148	1 144	1 216	1 322	1 405	1 561	1 622	1 700	1 755
Italia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1700	N/A	1 673	N/A	N/A
Nederland	470	470	465	466	470	475	523	550	633	680	680	N/A
United Kingdom	N/A	1 300	1 535	1 696	1 300	1 852	1 821	2 094	2 575	N/A	N/A	N/A

(1) 1989 estimated
(2) 1990 estimated
(3) 1991 forecasted
Source: BIBM

Table 3
Precast concrete - Employees by country, 1980-90

(thousands)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 (*)
Belgique/België	7.7	6.1	6.2	5.5	5.4	5.3	5	5.1	5.3	5.7	5.9
Danmark	5.2	4	3.2	3.4	3.6	4	4.3	4.8	5	4.9	4.5
BR Deutschland	51.9	47.5	43.1	42.2	40.9	43.6	42.3	43.2	43.7	44.1	44.8
France (*)	30.7	29.3	28	26.2	26.2	24.6	23.6	23.3	23.7	N/A	N/A
Nederland	10	9.4	8.5	8.2	8.1	7.9	7.7	7.6	7.6	8	8
United Kingdom (*)	N/A	N/A	N/A	N/A	N/A	13	13	13	13.5	N/A	N/A

(*) 1989 estimated
(*) Estimated
Source: BIBM

concrete industry, involved in special production procedures such as reinforcement steel bending and netting, finishing of architectural concrete (e.g. polishing);

❖ workers involved in other production related jobs such as handling of raw materials and finished products, supervising packing; no special skills are required but merely some training at the plant.

In several Western European countries skilled manual workers are especially in demand, all the more so since these jobs (and training) seem rather unattractive to the younger generation.

To cope with this problem the industry is promoting its activities as, for instance, in the Federal Republic of Germany, where for the third consecutive year a nationwide Promotion Day was organised, offering youngsters the opportunity to visit precast concrete plants.

This initiative is part of a joint strategy by the federations of the construction and precast concrete industries, which also includes providing adequate training in special schools and courses, publication of manuals and promotion brochures and press campaigns.

Trade

Generally, precast concrete products are heavy and bulky in relation to value.

The average value of one metric tonne of precast concrete products is approximately

100 ECU (but for some standardised unreinforced products manufactured on a large scale, this value can be as low as 35 ECU). Consequently, long-distance transportation of precast concrete products is unusual.

A typical exception is, however, the technologically highly-advanced precast concrete products such as the sophisticated cladding frame elements in architectural concrete, that have been shipped from Western Europe to Middle East countries. Hence, trade is mostly limited to a simple border crossing.

Major structural and geographical features

Over the years, the building sector had to adapt to changing structures of demand, which led to the emergence of a precast concrete industry. The latter is particularly important in the Federal Republic of Germany, relatively important and advanced in the Netherlands and Belgium, and to some extent, in France. In some countries, there is a higher concentration of

the precast concrete industry in certain regions (e.g. the south west of the UK). Industrialisation stimulates demand for the precast concrete products as it creates needs for construction materials.

Geographical factors have also played an influential role in the precast concrete industry.

The more densely populated a region, the more important and developed the precast concrete industry tends to be.

These regions have a higher demand for building, water and road construction and since precast concrete products are heavy, and costly to transport, production takes place near the centre of demand.

An example of this is the triangle made up of Belgium, the Netherlands and the Federal Republic of Germany compared with regions such as central France and Spain.

Climatic conditions also play an important role. In general, the further north a country is situated, the more developed its precast concrete industry.

Table 4
Precast concrete
Average wage costs per country, 1980-1990

(ECU)	1980	1985	1987	1988	1989	1990
Belgique/België (*)	10.0	13.0	14.4	14.7	15.0	16.0
Danmark (*)	6.3	8.5	10.1	11.0	11.0	12.0
France	5.5	8.4	9.1	9.3	8.2	N/A
BR Deutschland	8.4	11.8	13.2	14.2	15.0	15.3

(*) 1989, 1990 estimated
Source: BIBM

Table 5
Precast concrete - Intra-EC trade, 1980-90

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 ^(*)
Belgique/België											
Value (million ECU)	45.9	40.3	39.7	38.7	33.8	34.2	42.7	46.3	55.4	66.8	N/A
Quantity (thousand tonnes) ^(*)	870.0	772.0	754.0	738.0	714.0	735.0	783.0	782.0	953.0	1 003.0	N/A
BR Deutschland											
Value (million ECU)	53.2	49.1	47.3	65.7	63.0	50.7	47.8	51.0	55.0	57.0	56.0
Quantity (thousand tonnes)	576.0	514.0	473.0	614.0	560.0	496.0	447.0	433.0	467.0	488.0	479.0
France⁽¹⁾											
Value (million ECU)	21.6	24.4	29.5	32.1	44.0	51.6	62.4	69.7	84.9	100.3	N/A
Quantity (thousand tonnes) ⁽¹⁾	302.0	333.0	362.0	362.0	455.0	551.0	646.0	679.0	822.0	889.0	N/A
United Kingdom											
Value (million ECU)	N/A	N/A	N/A	N/A	N/A	N/A	130.0	160.0	240.0	N/A	N/A
Quantity (thousand tonnes)	N/A	N/A	N/A	N/A	N/A	N/A	483.0	613.0	934.0	N/A	N/A

(1) 1989 estimated
(*) Corrected figures
(*) 1990 estimated
Source: BIBM

Traditional building activity in northern countries often has to be suspended during the winter due to bad weather conditions, while with precast concrete products, building activity can go on uninterrupted. In some cases, cold weather is even preferable when using precast concrete products (no mud on building sites). The different development of the precast concrete industry in individual EC countries is illustrated in table 6, which shows the share of the precast concrete industry in total national cement consumption for each Member State. Technological evolution constitutes a further influential factor. Indeed, the technical realisation of new

types of beams or girders with, for instance, larger spans, would automatically create a higher demand for these structural elements. Tradition in the use of material has influenced the degree of development and strength of the precast concrete industry in the various countries. In the Netherlands for example, a boom began for precast concrete pavers when traditional clay pavers started to become too expensive. This secured the Dutch paving industry a strong position which allowed large-scale production at a favourable cost; as a result the transportation beyond national borders became possible. In contrast, the British precast concrete

flooring industry has great difficulty in breaking into the traditional timber floor market for low-rise housing, in spite of the obvious advantage of precast concrete floor elements over timber. The following general characteristics of the precast concrete industry can be highlighted:

- ❖ relatively low value-added content of the products;
- ❖ strong dependence upon the efficiency of the business, that is, the degree of mechanization of the production unit on the one hand, and the managerial skills of business managers on the other;
- ❖ small and often old family-owned businesses.

Table 6
Precast concrete - Percentage of cement consumption by country, 1982-90⁽¹⁾

(%)	1982	1983	1984	1985	1986	1987	1988	1989	1990 ^(*)
Belgique/België	18	17.4	18.7	17.4	18	18.6	21	21.5	22.6
Danmark	33	37	39	44	45	45	41	41	41
BR Deutschland	27	28	27	26	26	26	26	25	26
Hellas	N/A	N/A	N/A	3.4	N/A	1	1.9	N/A	N/A
España	N/A	N/A	N/A	N/A	11	16	N/A	N/A	N/A
France	19	19	18.5	18	17	17	17	17	N/A
Ireland	N/A	N/A	N/A	29	27	27	27	N/A	N/A
Italia	13.8	13.8	13.4	13.3	13.3	13.2	13.1	13.1	N/A
Luxembourg	N/A	N/A	N/A	12	14	16	19	N/A	N/A
Nederland	30.2	30.2	36	34	35	37	38	38	N/A
Portugal	5	5	N/A	11.1	10.5	10.8	10.7	N/A	N/A
United Kingdom	22	N/A	N/A	24.4	27.3	25	25	N/A	N/A

(1) Percentage of cement consumption by the precast concrete industry in the total national cement consumption.
(*) 1990 estimated
Source: BIBM

In recent years, there has been some degree of concentration in the industry.

This is due either to the fact that one or more small businesses were bought up by a major industrial group, often a large building company, a cement factory, or an aggregates supplier, or because various smaller precast concrete businesses have merged.

Despite these trends, small production units still dominate the industry.

The trend towards increased concentration varies in nature and intensity from country to country, and is probably largely due to anticipated market changes in view of 1992. These moves would either allow large building companies to control supplies in the foreign market they will enter, or create precast concrete companies big enough to deal with the large building companies on a recently internationalised market. Another consequence of the increase in demand and production and of anticipations with regard to the single market is the rise in gross fixed investment of about 30% from 1983 to 1989.

In Belgium for instance gross fixed investment has risen from 35 million ECU in 1988 to an estimated 45 million ECU in 1990, whereas in France for 1989 investment is estimated at 86 million ECU.

This upward trend is expected to be sustained in the near future.

Environmental protection

Except for noise, dust and to some extent water, environmental concerns pose no serious problems for the precast concrete industry. A noise problem may occur due to increasing urbanisation.

But the industry is working on reducing the noise and has already recorded some

success.

The same holds for those specific and exceptional production processes that may cause some degree of water pollution.

Raw material shortages might arise in some countries.

Indeed, the quarries supplying the precast concrete industry with sand and aggregates are either forbidden to extend further, or threatened with closure. Since about 80% of concrete is made up of sand and aggregates (or 1 m³ concrete requires two tonnes of these raw materials), this may cause serious short-term problems, not only for the precast concrete industry but also for the construction industry as a whole.

Consequently, important research programmes are being conducted with the aim of recycling concrete debris, crushed concrete and waste concrete as raw materials.

On the other hand various precast concrete products can help solve, in a very rational and economic way, some environmental problems, by creating sound barriers and other aesthetic products for urban landscaping, and pipes and ancillary products for cost-effective drainage and sewage installations.

The impact of 1992

The advent of 1992 and the coming into effect of the Building Products Directive (BPD) has emphasised the urgency of the work on harmonisation, standardisation and certification.

This implies that by the end of the century at least 50 standards covering precast concrete products will have to be drawn up.

To this end, a specific Technical Committee has been created within CEN:

CEN/TC 229 - Precast Concrete Products.

Furthermore, there is a growing trend toward cross-border concentration. Especially the Scandinavian extra-Community countries show particular interest in the market developments that may occur from now until 1992 and the years beyond.

They do not only closely monitor and often actively participate in the European harmonisation of the technical specifications for the precast concrete industry but also take extensive direct or indirect commercial interests in precast concrete plants in various EC countries.

Technological development

Some technological developments are expected to take place in the medium term, as the industry aims at increasing productivity and improving quality. Investments are rising and these involve not only replacement of older (and sometimes outdated) equipment and installations but also aim at higher capacity and output. Thus, plants can enhance their competitiveness in their region.

Outlook

After several difficult years, most countries have seen a relative growth in the last few years and this upward trend is currently still holding.

Apart from cross-country differences, there will also be differences between the various branches of the sector.

In road construction, street products and accessories, where activity depends almost exclusively on public authority policies, great efforts are nowadays being made with regard to highway maintenance, an aspect that had been neglected in many countries for budgetary reasons.

For the same reason, and probably as a result of growing environmental conscious-

ness, prospects are good for the improvement or renovation of drainage, sewage and water purification installations. As expected, the boom in the sub-sector of landscaping products continues. Again, this is probably due to growing environmental consciousness. Precast concrete solutions (concrete block paving, urban equipment) are widely used in urban landscaping projects. The non-residential building sector (for which the precast concrete industry of-

fers interesting solutions) is currently experiencing a boom, now that industry and businesses are going ahead with investments in equipment and building, which were put off during the years of the economic crisis. The expansion is expected to continue. Further evolution will largely depend on the way the industry reacts to possible future economic changes. Notwithstanding slight differences from country to country (e.g. due to the tradition in some regions of building one's own

home, a trend that may vary between 30% and 60%) residential building has been experiencing a relative boom in most countries in the last three years.

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Reviewed by: European Research Associates

Activity in the ready-mixed concrete industry is necessarily linked to that of the construction industry and to that of cement production and consumption. After a difficult period in the Community ready-mixed concrete industry at the beginning of the previous decade, production has somewhat recovered in parallel with the evolution in its client industries. In 1990, activity and prospects for non-residential and housing construction lead one to believe that this growth will continue, albeit following a trend of a slower rhythm.

Description of the sector

The ready-mixed concrete industry covers off-building site concrete production and its transport to the site where it is laid.

Current situation

The ready-mixed concrete industry is relatively new and has made a significant contribution to the modernisation and efficiency of the building industry. Today it is established in the majority of countries in the world. The main materials competing with concrete are wood, brick and steel. The recovery of the construction industry in Europe has brought about a recovery of the ready-mixed concrete industry; in 1989 the EC produced some 235 million cubic metres of ready-mixed concrete, as shown in table 2, an increase of some 9% in relation to the previous year (213 million in 1988). This level of production was worth 8.5 billion ECU, and represented more than 0.5 m³ per inhabitant. The ready-mixed concrete industry is, by definition, a local industry offering no potential for trade, even within the EC. In fact,

ready mixed-concrete can only be transported over short distances, over a few tens of kilometres.

Employment

According to certain estimates, employment levels in the five largest Community countries improved in 1989. Before that, only France enjoyed a positive growth rate in the second half of the 1980's. Whilst employment levels fell in 1988 in Germany, Italy and Spain, they recovered in 1989, due to increased demand in the sector. Spain and Italy experienced the highest increases (7.6%). As for the United Kingdom, it is still experiencing difficulties due to the crisis in the construction sector: after a fall of 7.5% in 1988, the number of employees fell again by 1% in 1989. In the five countries overall, employment reached almost 32,000 people in 1989, Italy and Germany being the largest employers.

Environment

In the European Community, legislation on pollution control - both of air and water - will probably involve the ready-mixed

Table 1
Ready mixed concrete
Production by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
EC (*)	N/A	N/A	N/A	N/A	N/A	N/A	6 719	5 941	7 805	8 454
Belgique/Belgie	N/A	N/A	N/A	N/A	N/A	N/A	199	230	259	274
BR Deutschland	2 094	1 898	1 906	2 206	2 307	2 072	2 072	1 988	2 248	2 386
Hellas	330	324	319	336	N/A	N/A	405	339	456	527
Espana	488	459	462	467	430	N/A	517	434	580	580
France	977	937	982	1 019	1 069	1 132	1 155	1 041	1 422	1 510
Ireland	N/A	N/A	N/A	78	71	85	86	87	97	114
Italia	885	964	1 050	1 168	1 125	1 350	1 256	1 064	1 437	1 724
Nederland	288	254	277	308	N/A	N/A	N/A	N/A	N/A	N/A
United Kingdom	877	783	865	1 005	1 064	1 122	1 029	958	1 309	1 339

(*) 1986-88 excluding Netherlands
Source: ERMCO

concrete industry.

Already Germany has extended its anti-emission laws to plants producing concrete. Following a proposal from the German association, cement producing sites, set up for more than six months in the same place and having an output of more than 10 cubic metres per hour can be considered as ready-mixed concrete plants within the framework of the anti-emission laws.

The German government intends changing the law on water resources. Further to these amendments, all waste water must be treated by the most advanced technological means. This will oblige the ready-mixed concrete industry to further filter waste water. At present, a working party is carrying out detailed surveys to determine the most appropriate advanced technological methods that can be applied by the ready-mixed concrete industry. In certain regions, legislation is already in place or is being drawn up. It requires that waste from certain installations, including ready-mixed concrete plants, be subject to official authorisation as soon as acceptable limits are exceeded.

Several EC countries are anticipating increased restrictions covering raw material

extraction by the cement industry. In the Netherlands for example, gravel extraction must cease within the next 25 years and delays in awarding new extraction permits both for gravel and cement could cause difficulties in the short term.

Technological developments

Considerable progress is at present being made with the aim of checking and improving product quality. As such, the United Kingdom has created an evaluation organisation for ready-mixed concrete producers, charged with checking product conformity. Furthermore, the British government has announced its wish to see test certificates obligatory for public tenders. In several other countries as well, analysis is continuing on concrete's durability (its resistance to freezing, for example), and on optimum specifications for specific applications based on the product's intrinsic qualities or the appropriate mix. Research is also being carried out in the United Kingdom on a computerised model for the ready-mixed supply process (notably between the point of production and the site) and daily demand management. This should enable production management improvements to be made as well as assist

with personnel training.

1992

The adoption of common standards and quality certification systems at community level is essential for the ready-mixed concrete industry. Within the CEN (European Standardisation Committee), several technical committees have been formed, notably, CEN/TC51, CEN/TC104, CEN/TC154 and CEN/TC224 dealing with concrete and its constituent elements. The British and German industries have made significant contributions to defining common standards for the sector. In future, this should facilitate community trade and reinforce competition amongst EC producers.

Outlook

Activity levels in the sectors linked to the ready-mixed concrete industry - construction and the cement industry - present, for 1990, favourable evolution in the majority of European countries, with the exception of the United Kingdom. Nevertheless, growth in ready-mixed concrete production will be probably lower than that of 1989 (about 9%). Despite the expected continuation of growth, mainly in the Southern European Member States, overall activity in the construction sector shows some signs of slowing down. Furthermore, the present

Table 2
Ready mixed concrete
Start up, production and consumption per head

	Start of production	Number of plants		Production (1)		Consumption (2)	
		1988	1989	1988	1989	1988	1989
Belgique/Belgie	1956	205	211	7.2	7.2	0.72	0.72
Danmark	1926	110	110	2.3	2.2	0.46	0.44
BR Deutschland	1903	1 920	1 814	42.5	45.8	0.70	0.75
Hellas	1968	218	220	9.7	10.5	0.97	1.05
Espania	1942	529	610	18.9	30.0	0.48	0.74
France	1933	1 400	1 470	30.5	33.0	0.54	0.58
Ireland	1961	141	141	1.9	2.1	0.53	0.6
Italia	1962	2 500	2 800	61.0	64.0	1.07	1.12
Nederland	1948	187	192	7.8	8.0	0.40	0.5
Portugal	1966	45	72	2.5	3.7	0.23	0.27
United Kingdom	1930	1 150	1 150	28.8	29.6	0.47	0.49
EC (3)		8 425	8 790	213.1	235.1	N/A	N/A
Japan	1950	5 354	4 900	185.0	162.9	1.58	1.85
USA	1913	10 000	10 000	140.0	140	0.62	0.62

(1) Million cubic metres
(2) Cubic metres per head
(3) Excluding Luxembourg
Source: ERMCO.

uncertainty over the price of oil could lead to a significant increase in the price of a barrel of oil, which could, given the sensitivity of general economic activity to this form of variable, lead to a sharper slow-down in ready-mixed concrete production. Given this reservation, and within the general context of the European economy, the annual growth rate, in the medium

term, of ready-mixed concrete should be in the order of 2% to 3% at the beginning of the 1990s.

ERMCO: European Ready-Mixed Concrete Organisation. Address: P.O. Box 19, Ashford, Middlesex, TW15 2XQ, United Kingdom; tel.: (44) 7842 40 730; telex: 935 547 RMC-G.

Revised by: DRI Europe

Activity in the mineral wool industry is tied to the building sector, and more especially to the insulation of new residential, commercial and industrial buildings, as well as to the renovation of existing buildings. Since 1986, growth in the production of mineral wool products has been accelerating, benefitting in most countries from the general economic upturn, particularly that in the building sector. Most of the manufacture of mineral wool products is concentrated in a few European firms with subsidiaries in a number of different countries. The geographical diversification of these companies can be largely explained by the voluminous nature of the product.

A sizable portion of the investment made in this industry is devoted to reducing the air pollution given off by furnaces during the blending of raw materials.

However, mineral wool is not the only insulating product on the market, its main competitor being plastic foam.

Description of the sector

Mineral wool products are mainly used in heat or sound insulation or protection against fire.

These man-made mineral fibres are manufactured from compositions of glass, basalt or slag, which are melted and transformed into mineral wool products.

They can be divided into three categories; glass wool, rock wool and slag wool. Mineral wool fibres are vitreous silicates (amorphous) transformed into fibres by blowing or centrifuging a stream of molten vitreous material.

Rock fibres are generally manufactured from basalt, diabase or blast furnace slag.

Glass wool fibres are made of compositions of silicate and aluminium borosilicate, boron calcium, sodium or other metal oxides.

Mineral wool products are used for residential, commercial and industrial insulation, generally in the form of rolls or panels.

Mineral wool is also used in the manufacture of acoustic ceiling (in the form of tiles or panels), air-conditioning ducts and an entire range of thermal and acoustic products.

In its granulated form, the product is also used to insulate cavity walls and to condition soil.

Table 1
Mineral wool industry
Main indicators

(million ECU)	1984	1985	1986	1987	1988	1989
Turnover	951.2	966.2	1 074.2	1 152.5	1 228.7	1 257.8 (*)
Production (thousand)	1 000.0	1 013.2	1 079.3	1 093.5	1 165.5	1190.0
Employment (thousands)	N/A	N/A	10.5	10.5	10.4	10.9

Source: Eurima
(*) Estimate

Current situation

Two factors have played an important role in the past few years, namely the upturn in the building sector and mounting concern over energy saving.

The mineral wool products industry carries relatively little weight in the building materials sector, accounting for 2% of the sector's production value and for 2.1% of employment.

Production

The producers of mineral wool products in Austria, Finland, Norway, Sweden, Switzerland and Turkey are also members of EURIMA; their combined turnover amounts to 30% of turnover for all EURIMA member companies. By volume, Community production accounts for two-thirds of European production.

Between 1985 and 1989, production of mineral wool by value rose by some 5.4% a year. The production of elements for thermal insulation, when measured solely in tonnes, grew by around 4% over the same period. The comparison of the general trend in mineral wool thermal insulating material, when measured, on the one hand, in tonnes and, on the other, in cubic metres, shows that there have been few changes in the reduction of the volume of these products, with average annual growth in m³ of 3.7% a year.

Employment

Around 11,000 persons worked in the mineral wool industry in 1989, a level which has remained relatively stable since 1986. Employment recorded in the EC industry in 1989 was concentrated in five Member

States of the Community - the Federal Republic of Germany, France, the United Kingdom, the Netherlands and Denmark.

However, Denmark's share of total employment in the Community is far larger in relation to its size, representing 14% of total employment in the EC mineral wool sector, compared to 2% of GDP total. This chiefly reflects the particular importance attached to thermal and acoustic insulation and energy savings in this country.

France also appears to have increased its involvement considerably in this sector, with employment having risen by 23% between 1988 and 1989. France's leading company, Saint Gobain, is in addition the world leader in this sector.

Consumption trends

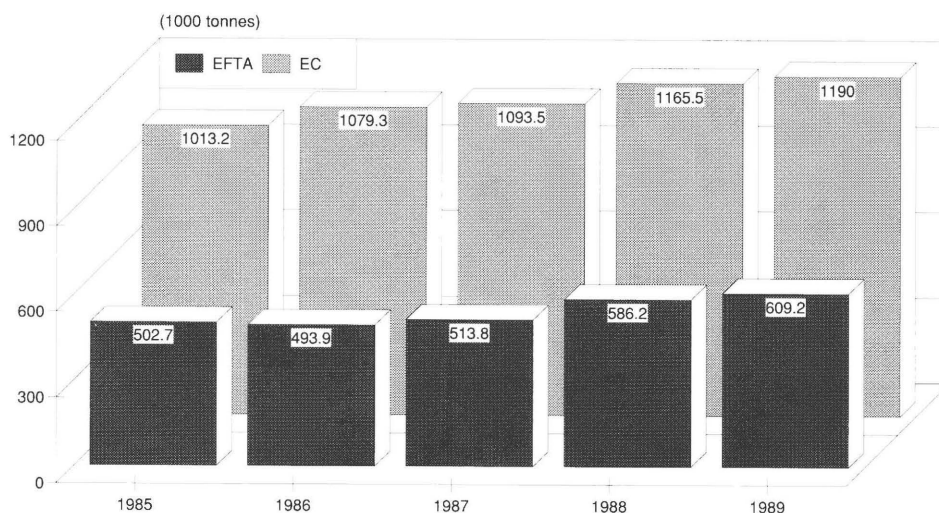
Although there are no figures on apparent consumption as far as the mineral wool sector is concerned, the evolution of turnover and, therefore, of total sales gives an idea of trends in consumption. Between 1985 and 1989, the latter grew on average by 7.5% a year. It was mainly from 1986 that growth increased, which chiefly reflects the increase in residential and non-residential investment and new building work in the Community during this period. Competition between insulating products is relatively important. Nevertheless, according to Saint Gobain (the French producer of mineral wool products), mineral wool has the dominant market share, while the market for insulating foam has levelled out at one-third of the market.

Trade

Given the absence of statistics on trade in mineral wool, it is difficult to assess the importance of trade flows between EC countries and their foreign trading partners.

However, the trade in mineral wool is

Figure 1
Mineral wool industry
Thermal isolation production



Source: Eurima

limited, for several reasons. The volume of the product means that storage and transport costs are high compared to its sales price. In addition, certain administrative and technical regulations, climatic conditions and building techniques differ from country to country, which makes for high segmentation in the Community market. This is why most large firms choose to approach the market in terms of geographical zones corresponding to national or regional production units. Their desire to have plants in a large number of countries shows the importance of having wide geographical market coverage.

As far as the 1992 Single Market is concerned, the evolution towards intensification of trade will be a slow one. However, standardisation of technical regulations and the fall in transport costs should have beneficial effects. The penetration of foreign markets via the setting up of subsidiaries is set to continue as the favoured medium-term strategy.

Structure of industry

On a world scale, the market leaders are Saint Gobain (France), Owens-Corning (United States), Pilkington (United Kingdom), Rockwool (Denmark), Manville (United States) and Partek (Finland).

Saint Gobain further strengthened its position in 1988 with its acquisition of Glasuld in Denmark, a firm specialising in the manufacture and processing of glass wool, and again, at the beginning of 1989, by acquiring Eurocoustic in France, a maker of acoustic ceilings of rock wool.

Two groups - Saint Gobain and Rockwool - are present on different levels in several EC Member States. Nevertheless, there are many independent companies to be

found, chiefly in the Federal Republic of Germany. The geographical diversity of the major transnational groups can be illustrated by the presence of the French company, Saint Gobain, in 24 countries. It is also worth noting that this same company's insulation division is turning increasingly towards innovation and research into new applications in the markets outside of insulation, enabling it to valorise its technology. Thus, it is developing the fibring of new materials and the use of mineral wool in new products. In their own market, Community producers remain the leaders in this sector. Nevertheless, the end of the 1980s saw the arrival in Europe of producers and technology from Japan. In Hungary, for example, a glass wool factory

was built using Japanese technology; the same plant is, it seems, also to be run by the Japanese.

Investment

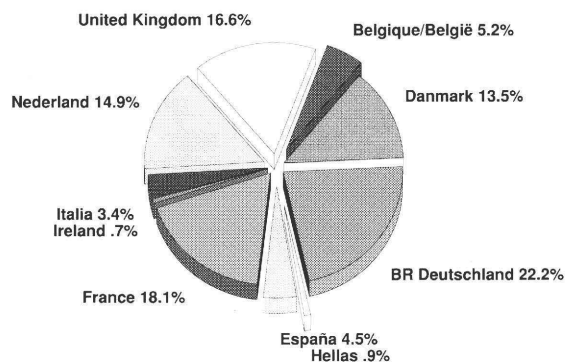
The mineral wool industry has invested heavily in controlling air pollution. EURIMA's own estimate is that 20% of all investment made in this sector involves equipment intended to reduce air pollution. This pollution is produced by the furnaces which blend the raw materials. The situation naturally varies from plant to plant, although anti-pollution equipment should be in operation by the beginning of the 1990s. Other investment has gone into research and development. On average, 6.7% of turnover is spent on research and develop-

Table 2
Mineral wool industry
Output of products for thermal insulation

	1985	1986	1987	1988	1989
1000 tonnes					
EC	1 013.2	1 079.3	1 093.5	1 165.5	1 190.0
EFTA	502.7	493.9	513.8	586.2	609.2
1000 m3					
EC	37 211	38 805	40 253	41 180	43 007
EFTA	14 622	14 328	14 718	15 995	16 637

Source: EURIMA

Figure 2
Mineral wool industry
Geographical structure of employment 1989
(Total: 10 873)



Source: Eurima

ment in the mineral wool sector, i.e.

nearly 80 million ECU.

In a study published by EURISOL Ltd ("Pollution reduction through energy conservation", J.R. Bowdidge, GD-Redbourn 1989), the important conclusion was that the pollution caused by the production of mineral wool was more than a thousand times less significant than the amount of pollution it can prevent through energy savings in the home (hypothesis: homes with a 50-year lifetime).

Environment

Thermal insulation and the reduction of emissions of pollutants from power stations and individual heating systems are closely linked. The heating sector is responsible for 60% of total energy consumption in our society.

Interest in energy savings in the housing sector, from both the economic and environmental protection points of view, is thus assuming its full importance. The fact that these can be obtained through thermal insulation by means of mineral wool or other substitutes, without sacrificing comfort in any way, explains the (current and potential) importance of the mineral wool sector in industrialised countries.

A recent study by EURIMA has shown that it is possible to cut CO₂ emissions from heating by 50% each year by using adequate insulation.

Although progress has been made in insulation since the oil crisis in the 1970s, much remains to be done, particularly in existing houses. In this period of economic growth, therefore, there is every reason to invest in energy savings so as to be prepared to face possible new increases in the price of energy. The European Community itself has stressed on numerous oc-

casions the importance of better thermal insulation allowing for a more rational use of energy. In its document entitled "New Community objectives in energy" (May 1985), the European Commission emphasised the need to increase energy yields by 25%. Such objectives can be reached via campaigns to awaken public opinion, by granting subsidies for insulation, or more simply by tightening up insulating standards in homes. However, the national authorities do not always act in accordance with these objectives. Nevertheless, in Denmark for example, the imposition of stricter insulating standards has made it possible to reduce consumption of heating oil from 1670 litres in 1972 to 1390 litres in 1986 (for a house of 120 m²), an improvement of 17%.

Outlook

In 1990, business in the mineral wool industry should keep to a sustained pattern, with building investment rising in most countries, with the exception of the United Kingdom.

In the future, various factors with contradictory effects are likely to influence business in the mineral wool sector on the one hand, the mounting interest sparked by energy savings and improvements in comfort should ensure that there is growth in demand for insulating products. This latter factor should gain in importance if oil prices were to rise appreciably. Similarly, a tougher environmental policy, copied for example from measures undertaken and results obtained in Denmark, might strengthen standards on thermal insulation and increase considerably the demand for thermal insulation products, chiefly mineral wool. It should not be excluded that invest-

ment could be subsidised by public authorities wishing to encourage a more rational use of energy. On the other hand, business in the building sector is showing signs of slowing down after several years of strong growth, which could turn into a sharper drop if an appreciable rise in the oil prices were to destabilise our economies. The result would be that some investment projects, chiefly building extensions, might be put off until a later juncture. Moreover, the successive mild winters create the risk of postponing decisions to invest in thermal insulation. The mineral wool sector is not expected to record growth levels as fast as those seen in the mid 1980s, even though the perspectives for this sector are good. Growth in production by volume of the order of 3% a year for the next three years, following the 4% annual growth between 1985 and 1989, can therefore be envisaged.

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Revised by: DRI Europe