**CPB Memorandum**

**CPB Netherlands Bureau for Economic Policy Analysis**

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# In focus: The chemical industry in the Netherlands 2001-2003[1]

After the boom in 2000 the chemical industry had to step back in 2001 due to the international economic slowdown. The exports of petrochemicals and primary plastics stagnated, but the international demand of final chemicals such as medicines and cosmetics flourished. In 2002 economic growth will recover only slightly. Despite the weak international demand, exports of basic chemicals may still increase since new and extended large-scale plants in Rotterdam and Terneuzen will start their production. The sales of final chemicals may grow less firmly due to lack of consumer confidence, particularly in the US. Oil prices and prices of raw materials decline, but large-scale capacity expansion and weak foreign demand keep much pressure on sales prices and price margins. In 2003 economic growth and foreign sales will pick up more forcefully because of a steep recovery in international demand. Domestic demand, mostly semi-manufactured products, will grow as well. Cash flow will revive from its downward glide in 2001 and 2002. Employment fades out to 73 thousand employees in 2003.

[1] The forecasts in this Focus are valid until CPB publishes new industrial forecasts.

## Account

### Why an "Industry in focus"?

This "Industry in focus" is related to the "Centraal Economisch Plan" (CEP), which yearly presents an economic forecast for the Dutch economy for the current year and the year to come. The CEP itself does not include an outlook for specific industries. Therefore these are published separately as an Industry-in-focus (in electronic form).

### Definition of the chemical industry

The statistical definition of the chemical industry in this "Industry in Focus" is in line with the CBS Standaard BedrijfsIndeling 1993 (SBI'93, for further information link www.cbs.nl, search 'Standaarden', next 'SBI-indeling'). The chemical industry will be further split up in basic chemicals and the final chemicals industry, with SBI-codes:

| Industry | SBI-code |
|---|---|
| Chemical industry | 24 |
| of which Basic chemicals | 241, 247 |
| Final chemicals | 242, 243, 244, 245, 246 |

### The main line of reasoning

The reasoning of the chemical industry's outlook is roughly as follows.

1. To the industry, its international and Dutch environment are given. The elaborated argumentation for changes in this environment is published in the April issue of CPB Report (link: www.cpb.nl/eng/cpbreport).
2. The response of the chemical industry to the changes in its environments is assumed to be the same as in the past. Additional information from e.g. newspapers is processed as autonomous changes. Starting point of the forecast are the amounts of the items on the industry's statement of income in the previous year. The model is recursive for each industry. Mutual relations between industries follow the process chain, and this chain determines the sequence of computation of the industries' prospects.

The precise argumentation is published in Dutch as a CPB Memorandum (nr. 34, April 2002): 'De industrie in 2002-2003: De economie achter het scenario' (link: www.cpb.nl/nl/pub/memorandum/34/).

### Gauging the value of the projections

This "Industry in focus" sounds more definite than is justified by the uncertainties in future projections. The reason is that this clarifies the text. The figures do not pretend to prove with certainty what future brings. They give rather an indication of how we think about future developments on the basis of our current knowledge and explicit reasoning. This means that the projections can be brought under discussion, and this exactly indicates their value. One who finds the arguments plausible, can anticipate with policy on the basis of the projections.

**Key figures for the chemical industry in the Netherlands [a]**

| | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|
| | in billion euros | | | | |
| **Nominal value** | | | | | |
| Sales | 28.4 | 35.4 | 35.6 | 35.6 | 37.7 |
| Cash flow | 3.9 | 5.0 | 4.8 | 4.7 | 4.8 |
| Investments | | 1.8 | 2.5 | 2.7 | 2.8 |
| | annual percentage changes | | | | |
| **In volume** | | | | | |
| Sales | 4.3 | 5.6 | 0.7 | 2¼ | 4¾ |
| **Prices** | | | | | |
| Sales | –0.7 | 18.2 | 0.0 | –2¼ | 1 |
| Unit operating costs | 1.3 | 17.6 | 0.8 | –2 | 1¼ |

[a] For an explanation of the used terms, see in the back of this 'Focus'.

## Outlook on the chemical industry's environment

The Dutch chemical industry is highly export-oriented, and thus strongly dependent on international economic development and the industrial production by foreign customers. In 2001 most countries over the world faced a sharp drop-back in economic growth, particularly after the assaults in the US. Still, the revival from the economic slowdown will probably start in North America and South-east Asia. The foreign demand of other European countries will only pick up next year (see CEP 2002).

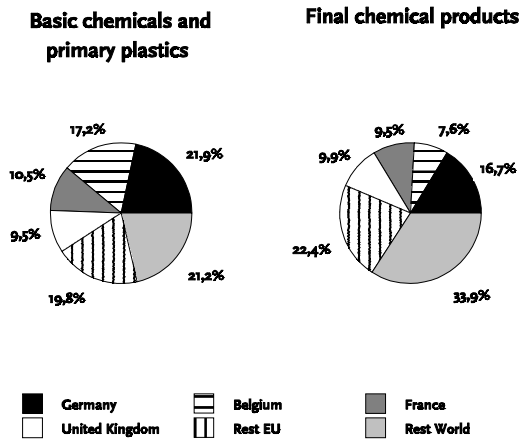
The slow revival of Europe may particularly affect the economic prospects for the Dutch basic chemicals industry. Actually, its foreign demand is mainly concentrated near home. The slow recovery of neighbour countries, particularly Germany, therefore provide poor prospects for the export of basic chemicals this year, but more promising prospects for the next year.

The final chemicals industry, however, may benefit from growth markets in the US and Asia since this industry exports a lot to these regions (see box next page). For example, AKZO-Nobel and Sanofi-Synthelabo have recently introduced a new bloodthinner on the US-market. However, exports of these products are much vulnerable to the lack of consumer confidence, particularly of US consumers.

The economic slowdown and the declining demand of raw materials in 2001 also had an impact on oil prices. The agreement of OPEC- and non-OPEC countries to reduce world wide oil

production has not been very successful so far. With forthcoming capacity-expansion, e.g. in Russia, the (Brent) oil price will decline further to $21 or $22 per barrel this and next year. Lower oil prices have, of course, a strong impact on prices in the chemical industry, especially for the upstream petrochemical industry. Actually, the decline in oil prices will be passed on to naphtha prices and subsequently prices of other derivatives like ethylenes and propylenes. However, are the benefits of lower oil prices sufficient to compensate losses due to poor demand and rising wages?

**The location and development of foreign demand**




The chemical industry is highly export oriented. Nearly 75% of its sales (both basic chemicals and final chemicals) is exported. However, foreign demand of each branch is concentrated in different areas. Petrochemicals and primary plastics (as the main export products of the total Dutch chemical industry) are particularly exported to neighbouring countries. Exports to more distant countries is less profitable due to high transportation costs.

In contrast, final chemical products such as pharmaceuticals and detergents, are more often exported to countries farther away in Europe and other continents.

Further, the revival of foreign demand seems to start at more distant area's. More precisely, the GDP-growth in neighbour countries, and thus probably their demand of Dutch products, stay behind the GDP-growth of the US and particularly Asian countries (see table below).

**GDP growth of other countries**

| | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|
| | annual percentage change | | | |
| Germany | 3.0 | 0.6 | 1 | 3 |
| Belgium | 4.0 | 1.0 | 1½ | 2¾ |
| European Union | 3.4 | 1.7 | 1¾ | 3 |
| Asia (excl. Japan) | 7.0 | 5.0 | 5¼ | 6¾ |
| Japan | 2.4 | –0.5 | –1 | 1¼ |
| US | 4.1 | 1.2 | 1½ | 3½ |

## Developments in the Dutch chemical industry

### Sales and cash flow in 2001

In 2001 the volume of total sales of the Dutch chemical industry could only grow by ¾%, largely due to stagnating world trade. The set back in world demand of 2001 is most perceptible in the basic chemicals industry, which had to face a small volume decline in the volume of exports. The volume of domestic demand of basic chemicals dropped even further. These type of sales generally concerns intermediate supplies of petrochemicals between plants.

In contrast, the final chemicals industry was not affected by the economic slowdown of 2001. Actually, the volume of total sales grew by 3¾% and it exports by 4%. The differences in growth with the basic chemicals industry reveal that regarding the business cycle the final chemicals industry still remains behind the basic chemicals industry.

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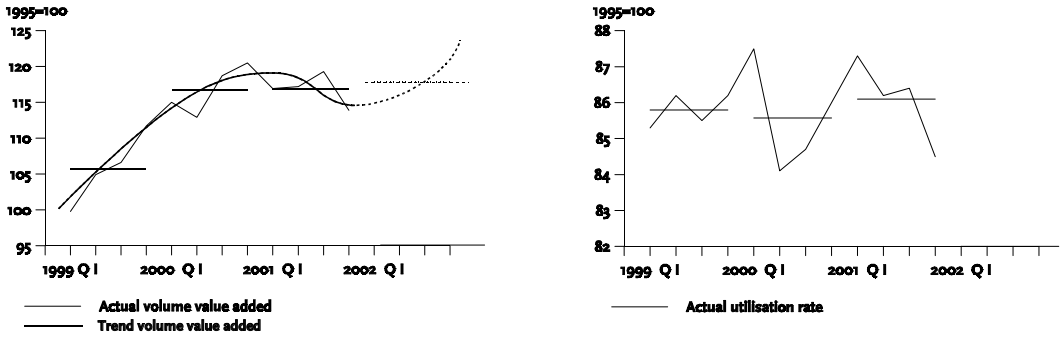
**Mask of short term fluctuations**

Annual growth figures sometimes mask short term fluctuations in the business cycle, particularly when the business cycle switches from a downturn to an upswing, and visa versa. In basic chemicals for example, annual figures suggest that the volume of value added (i.e. sales minus operating cost) grew substantially in 2000, stabilized in 2001 and slightly increases in 2002. Quarterly figures similarly suggest strong growth until the last quarter of 2000, but then point to a decline until the last quarter of 2001 and a steep recovery from the first quarter of 2002.

**Development of value added volume and utilisation rate in basic chemicals**




The utilisation rate reveals even higher differences between annual and quarterly figures. For example, the sudden decline of the rate in the second quarter of 2000 (by plunging sales or large scale capacity expansions) was followed by a steep increase (raised production and start up of new capacity). These two effects are almost perfectly levelled out in the annual average of the utilisation rate.

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Annual average of sales prices and unit operating costs of the whole industry hardly changed in 2001. However, appearances are deceiving. Monthly figures reveal that costs and prices in the basic chemicals industry plunged during 2001 after the steep increase during 2000. These price movements are strongly related to the up-and-down movement of oil prices in 2000 and 2001. In the final chemicals industry unit operating costs rose substantially, particularly because of higher prices of primary products and (temporary) inefficiency related to fast production expansion. Eventually, only poor sales of basic chemicals and high unit operating costs in final chemicals resulted in lower cash flows.

**Sales and cash flow in 2002 and 2003**

In 2002 the volume of total sales in will grow by 2¼%. The export volume of basic chemicals remain depressed because of the weak demand in neighbouring countries, but the domestic demand is expected to revive from its decline in 2001. The export volume of final chemicals may grow less forcefully due to persistent lack of consumer confidence after the worldwide collapse.

In 2003 total sales will pick up more forcefully. The revival of world trade in 2003 pulls up the exports of basic and final chemicals. Growing foreign and domestic demand result in a volume growth of total sales by 4¾%.

**Specialization in chemicals**

The Dutch chemical industry is active in most segments of the chemical value chain, but most companies focus their core business on a few segments. The largest segment is the petrochemical industry, producing basic chemicals like ethylene and propylene in cracking plants nearby the main ports. The segment which transforms the basic chemicals to primary products and plastics is somewhat smaller and experiences more competition from abroad. The inorganic chemicals- and fertilizer industries are only a fraction of the other two segments, but they still produce indispensable specific products for other (chemical) industries.

The final chemicals industry manufactures a variety of products, i.e. most consumer products like pharmaceuticals, cosmetics, detergents, paints and plastic products. However, major Dutch companies like AKZO Nobel and DSM try to fortify their competences in medicines, pharmaceutical base materials and nutrients, particularly because life sciences is considered as one of the most important growth-segments.

Cash flow of the chemical industry will, roughly speaking, stabilize at its level of 2001. Harsh international competition puts a strong burden on sales prices and price margins. This holds particularly for the basic chemicals industry which currently faces large scale capacity expansions (for example in Terneuzen and Rotterdam , see below). Companies may involve in price wars in order to sell sufficient production volume for covering their fixed costs.

The prices of naphtha and derivatives will decline in 2002 and make strong cuts in sales prices feasible, but they will rise again in 2003. Further, a growing part of cash flow will end up

in depreciation due to the huge expansions in physical capital. The declining cash flow in the final chemicals industry bottoms out in 2002. The tiny increases in mark-up, i.e. sales prices minus prices of raw materials, may go up to higher labour costs. But the steep increase in sales volume may somewhat restore the cash flow in 2003.

**Figure 1 Sales prices and Unit operating costs**

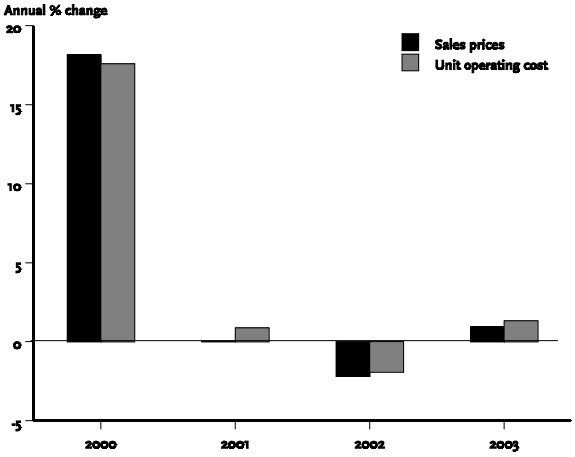
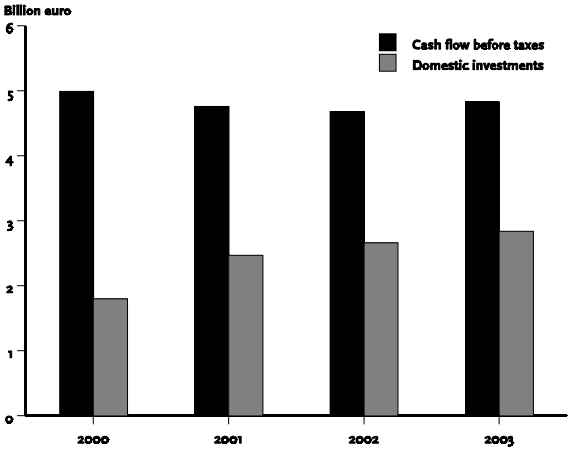



**Figure 2 Cashflow and Investments**




### Investments in 2002 and 2003

Three large-scale projects determine the high level of investments in 2001 to 2003. These projects concern the expansion of DOW Chemicals in Terneuzen and the new plants of Lyondell and Lyondell-Bayer in Rotterdam, each costing about 450 mln euros. These projects have been or will be completed in 2001, 2002 and 2003[2, 3]. However, new large projects in the Netherlands will be postponed or even abandoned due to weak demand on the European market, and thus threatening capacity surpluses and receding utilisation rates. Companies look more often for new local markets and opt for new projects in South-east Asia[4]. Indeed, the Asian market is growing rapidly but cannot be supplied by European plants due to high transportation costs. Other companies choose to focus on downstream segments, e.g. advanced plastics[5] or even pharmaceuticals and invest in (smaller scale) projects in these segments.

[2] Note that each investment project is booked as a whole at the moment of full completion.

[3] See Petrochem 12 December 2001, *Petroprojecten*

[4] See A. de Boer, *Schommelingen in conjunctuur verminderen*, Petrochem 12, December 2001, and Financieel Dagblad, 30th January 2002.

[5] Such as Shell's intention to raise production capacity of high-grade polymere polyones.

**Employment in 2002 and 2003**

Total employment is expected to diminish slightly in 2002 and 2003 due to weak demand and sales in 2001 and 2002. The tight labour market makes it difficult to offset persistent wage increases by reductions in employment. Companies may consider to preserve their staff for fear of losing skilled personnel and labour shortages in better times. But the steep wage increases in 2002 push up the labour share in income.

Labour productivity growth might offset the growing labour share in income. Productivity growth in basic chemicals industry may only be engendered by further economies of scale. The productivity in final chemicals industry may grow by product upgrading and shifts in business activities. However, such structural changes develop slowly.

**High labour productivity level restrains further productivity growth**

In terms of value added per worker, the Dutch basic chemicals industry is running in front of their foreign counterparts. The final chemicals industry is still lagging behind Japan and the United States. This lag can partly be explained by the fact that in the two latter countries employees are working relatively more hours a year, so that the Japanese and American labour productivity levels per worker are relatively high.

Future labour productivity growth in the chemical industry will be limited because of the currently high labour productivity levels. The basic chemicals industry may increase its labour productivity level a little by further increases in scale, e.g. by the new large-scaled and efficient cracking plants which will be put into use in 2001 to 2003. On the other hand, the industry will not immediately apply new drastic technological breakthroughs because of high technical risks. The Dutch basic chemicals industry will have to meet close competition from foreign companies which catch to up the Dutch productivity level.

However, persistent economic growth and the advent of pharmaceutics and life sciences can improve the labour productivity growth in the final chemicals industry. In these fields, the Dutch industry may learn a lot of the technical know how and commercial capabilities abilities of foreign companies, particularly those in the United States and Japan.

**Value added per worker in 1996 (Netherlands = 100) [a]**

| | Germany[b] | France[b] | Japan | United States |
|---|---|---|---|---|
| Chemical products | 49 | 55 | 54 | 79 |
| of which Basic chemicals | 39 | 54 | 54 | 75 |
| Final chemicals, a.o. drugs | 74 | 73 | 122 | 130 |
| Rubber and plastics | 66 | 72 | 57 | 92 |

[a] Source: OECD STAN database 1970-1997 (ISIC Rev.2). Underlying value added time series in 1987 prices. Comparative levels calculated with 1987 industry specific PPPs (Pilat, OECD, 1996).
[b] Data for 1995 instead of 1996.

## Key figures

**Table 1 Key figures of the environment** [a]

| | | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|
| | | annual percentage changes | | | | |
| **International environment** | | | | | | |
| **In volume** | | | | | | |
| Relevant world trade [b] | | 4.6 | 10.3 | 1.8 | 3 | 8¼ |
| **Foreign prices (euro)** | | | | | | |
| Import price of chemical products | | –2.4 | 8.9 | 0.7 | –2¼ | –¼ |
| Naphtha | 1995=100 | 134 | 248 | 218 | 185 | 190 |
| Ethylene | 1995=100 | 107 | 137 | 135 | 127 | 126 |
| HDPE | 1995=100 | 104 | 122 | 120 | 115 | 114 |
| PVC | 1995=100 | 89 | 107 | 106 | 103 | 103 |
| Propylene | 1995=100 | 89 | 126 | 126 | 119 | 118 |
| PP | 1995=100 | 77 | 96 | 97 | 98 | 99 |
| Oil price ($/barrel) | | 17.90 | 28.80 | 24.50 | 21 | 22 |
| Euro exchange rate ($/euro) | | 1.07 | 0.92 | 0.90 | 0.90 | 0.92 |
| **Dutch environment** | | | | | | |
| **In volume** | | | | | | |
| Gross domestic product | | 3.7 | 3.5 | 1.1 | 1½ | 2½ |
| **Prices** | | | | | | |
| Wage rate companies in the Netherlands | | 3.1 | 4.9 | 4.4 | 5¼ | 4½ |

[a] For an explanation of the used terms, see in the back of this 'Focus'.

[b] "Relevant" world trade: foreign demand for *all* Dutch manufacturing products at *all* geographical markets which are important to Dutch manufacturing *as a whole*.

**Table 2 Key figures for the Dutch chemical industry [a]**

| | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|
| | in billion euros | | | | |
| **Nominal value** | | | | | |
| Sales | 28.4 | 35.4 | 35.6 | 35.6 | 37.7 |
| Purchased goods and services | 21.0 | 26.7 | 27.0 | 26.9 | 28.7 |
| Wages | 3.5 | 3.7 | 3.9 | 4.0 | 4.2 |
| Cash flow | 3.9 | 5.0 | 4.8 | 4.7 | 4.8 |
| Investments | 0.0 | 1.8 | 2.5 | 2.7 | 2.8 |
| | annual percentage changes | | | | |
| **In volume** | | | | | |
| Sales | 4.3 | 5.6 | 0.7 | 2½ | 4¾ |
| of which in foreign markets | 5.0 | 8.5 | 1.1 | 2 | 5 |
| in the Dutch market | 2.3 | –1.8 | –0.5 | 2¾ | 4¼ |
| Value added | 7.8 | 6.9 | 0.4 | 1½ | 3 |
| **Prices** | | | | | |
| Sales | –0.7 | 18.2 | 0.0 | –2¼ | 1 |
| Unit operating costs | 1.3 | 17.6 | 0.8 | –2 | 1¼ |
| Purchased goods and services | 3.2 | 21.0 | 0.3 | –2¾ | 1 |
| Unit labour costs | –1.6 | –0.1 | 4.3 | 2 | –1 |
| Number of employees (level, thousand FTE) | 73.7 | 73.1 | 74.1 | 73.5 | 73.1 |
| Labour share in income (%) | 59.5 | 51.9 | 55.7 | 58¼ | 59 |

[a] For an explanation of the used terms, see in the back of this 'Focus'.

**Table 3 Key figures for chemical branches**

| | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|
| | annual percentage changes | | | | |
| **Sales volume** | | | | | |
| Basic chemicals | 3.2 | 7.4 | –0.7 | 1¾ | 5½ |
| Final chemicals | 6.1 | 2.6 | 3.8 | 3 | 3¾ |
| **Number of employees (*1000)** | | | | | |
| Basic chemicals | 35.1 | 34.3 | 34.9 | 34.5 | 34.2 |
| Final chemicals | 38.6 | 38.8 | 39.2 | 39.0 | 38.9 |
| **Sales prices** | | | | | |
| Basic chemicals | –0.6 | 26.2 | –0.6 | –3 | ¾ |
| Final chemicals | –1.0 | 3.9 | 1.4 | –¼ | 1¼ |
| **Unit operating costs** | | | | | |
| Basic chemicals | 2.6 | 23.9 | -0.2 | –3 | 1½ |
| Final chemicals | –0.7 | 6.0 | 3.0 | 0 | 1¼ |
| **Unit labour costs** | | | | | |
| Basic chemicals | –3.5 | –2.8 | 6.2 | 2¼ | –2 |
| Final chemicals | –0.0 | 4.1 | 0.8 | 1¾ | ½ |

## Explanation for used terms

**Macro-economic variables**

| | |
|---|---|
| Gross domestic production (GDP) | Gross domestic product at market prices (= domestic production at factor cost + indirect taxes – subsidies + depreciation) |
| Relevant world trade | Weighted average of volume changes of imports of agricultural goods, food and non-energy manufacturing products of customers countries, with Dutch export shares as weights |
| Wage rate | Wages, salaries and national security costs per employee in the Dutch market sector |

**Industry specific variables**

| | |
|---|---|
| Cash flow | Depreciation and income other than wages and net subsidies |
| Investments | Gross investments in fixed assets, tangible (a.o. company premises and machinery) and intangible (software packages and databases) |
| Labour share in income | Wages (including earnings self-employed) as share in the sum of wages and trading profit. Trading profit equals profits before taxation and before interest payments and including the earnings of self-employed |
| Purchased goods and services | Use of intermediates, raw materials and services in production |
| Sales | The industry's gross production at market prices |
| Unit labour costs | Compensation of employees per unit of real value added in manufacturing |
| Unit operating costs | Total costs of labour and purchased goods and services per unit of real value added in manufacturing |
| Value added | The value which labour and fixed capital add to the purchased goods and services. Accounting principle: gross domestic production at market prices less the costs of purchased goods and services |
| Upstream industry | An industry that produces semi-manufactured products for other companies in downstream industries, and particularly uses raw materials like oil, naphtha etc. |
| Downstream industry | An industry that particularly produces finished products for consumers, and uses mostly semi-manufactured products of upstream industries |