

## Refining and Petrochemicals

*Down sharply in 2002, refining margins showed a clear improvement in the first half-year of 2003. As a result, the earnings reported by oil companies for financial year 2002 were significantly lower than in 2001, but the prospects are brighter for 2003. In the petrochemicals sector, slow demand and higher feedstock prices eroded margins in 2002, especially in Europe and the United States. The financial results for the first part of 2003 seem to indicate that sector profitability will not improve before 2004.*

### Business Environment

After a slowdown in 2001, the global economy expanded by 3.0% in 2002, up 0.6% and the experts at IMF are expecting growth of 3.2% for 2003. However, growth was not evenly distributed in 2002. The euro-zone economy slowed substantially, down to 0.5%, the United States continued to progress with growth of 2.6%, while the developing or emerging countries continued to experience strong growth.

The world economy was adversely affected by several factors: oil prices returned to and persisted at high levels (about \$28/barrel), financial markets lost ground and the United States went ahead with its armed intervention in Iraq. Therefore, the world economy did not benefit in 2002 and early 2003 from the anticipated rebound, which would have enabled it to rally.

Table 1  
Growth of GDP in terms of volume  
(variations as a%)

	2000	2001	2002	2003 (e)	2004 (e)
World	4.6	2.4	3.0	3.2	4.1
United States	3.8	0.3	2.4	2.6	3.9
European Union	3.3	1.5	0.9	0.5	1.9
China	7.0	7.5	8.0	7.5	7.5

Source: IMF

(e): estimate

For 2004, world forecasts are more optimistic (+4.1%). Growth is expected to accelerate in the U.S. (3.9%) and rise in the euro-zone (1.9% versus 0.5%), while China maintains high growth (in the vicinity of 7.5%). Nevertheless, economic recovery could be inhibited by a number of uncertainties, including those surrounding the future of Iraq, geopolitical stability throughout the Middle East, the degree of exposure of emerging economies with a heavy debt load (especially in Latin America) and the large current account deficit posted by the United States.

### Refining

#### Overall Trends

In a moderated-growth economy, world demand for petroleum products gained only slightly in 2002 (+0.5%), with Asia accounting for three-quarters of growth.

World refining capacity rose 1.0% in 2002 to 83.9 Mbbl/day while, for refining units, the utilization rate slipped (-0.8%) compared to 2001. Capacity increased in all parts of the world except Eastern Europe.

#### Oil Supply and Demand

In 2003, it is expected that world demand will be 78.4 Mbbl/day, or 1.1 Mbbl/day higher than in 2002. This increase is mainly due to a cold winter in the Northern Hemisphere, Japanese nuclear power plant failures and a very substantial hike in the price of natural gas in the United States. In 2004, the progression in world demand should stay at the same level of 1.2 Mbbl/day (+1.4%).

Table 2  
Petroleum products: world demand, supply and stock variations  
(in Mbbl/day)

	2000	2001	2002	2003 (e)	2004 (e)
World demand	76.2	76.9	77.3	78.4	79.6
Variation [n - (n-1)]	+0.8	+0.7	+0.4	+1.1	+1.2
World supply	76.6	76.7	76.6	-	-
Variation [n - (n-1)]	+2.5	+0.1	-0.1	-	-
Stock variations	+0.4	-0.2	-0.7	-	-

Source: Oil Market Report (IEA)

(e): estimate

The year 2002 saw changes in the relative positions of producing countries within the world production breakdown, and this trend persisted in 2003. Between 2000 and 2002, the share of OPEC countries fell steadily (from 36% to 33%), the main beneficiaries being the ex-USSR countries. In the first half-year 2003, OPEC countries raised their oil production (+1.9 Mbbl/day) compared to the same period of 2002.

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According to forecasts for 2004, non-OPEC producing countries, especially the ex-USSR countries, should continue to boost their production.

## Crude and Petroleum Product Prices

The Brent price rose throughout 2002 and the first quarter of 2003, surging from \$20/bbl in January 2002 to over \$35/bbl by the end of March 2003. Since then, it has oscillated around \$28/bbl. The threat of armed intervention in Iraq and then the intervention itself, the strikes in Venezuela starting in December 2002, the events in Nigeria of early 2003 and fluctuating crude stock levels all helped promote the escalation of oil prices.

Although oil prices have since come down, they remain high, in the neighbourhood of \$28/bbl. For one thing, OPEC cut its production by 2 Mbbbl/day in June to harmonize quotas and production levels. Also, it is proving difficult to restore production in Iraq; output stood at about 1.0 Mbbbl/day at the end of August 2003 and is expected to reach 2.7 Mbbbl/day by year-end 2004, according to forecasts issued by the UN and World Bank.

## Refining Margins

In key geographic regions, refining margins started to drop in the second half of 2001 and kept falling in 2002, before marking a clear upturn for several reasons:

- Developed countries in the Northern Hemisphere had a bad winter, so demand rose.
- In the United States, natural gas prices were high due to problems of limited availability.
- Following the U.S. intervention in Iraq as well as the strikes in Venezuela and Nigeria, the fear of shortages led to a build-up in petroleum product stocks.

Table 3  
Complex refining margins  
(annual average in \$/bbl)

	95	96	97	98	99	2000	2001	2002	2003*
Brent (NW Europe)	1.15	1.51	1.41	1.34	0.30	1.93	0.30	-0.28	1.67
WTI (Gulf Coast, USA)	0.82	0.75	1.46	1.22	0.33	2.11	1.59	1.11	3.23
Dubai (Singapore)	2.35	3.09	2.30	1.04	0.94	3.27	1.94	1.67	3.59

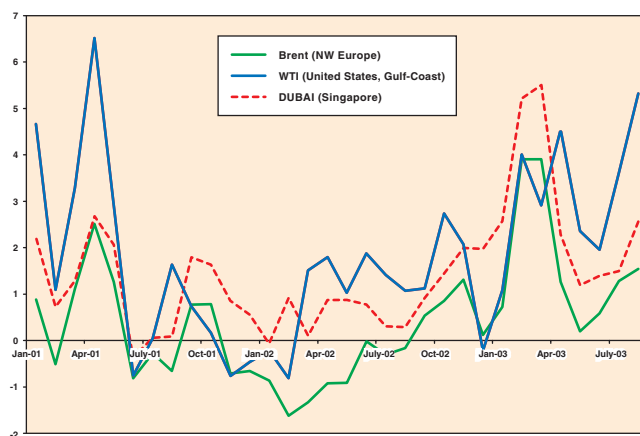
\* For the first eight months.

Source: Oil Market Report (IEA)

The upward pressure exerted on petroleum product prices helped improve refining margins, despite the high level of oil prices.

In March and April 2003, margins topped at about \$6/bbl in Asia and \$4/bbl in the U.S. With the end of the Iraqi conflict and the end of winter, petroleum product demand slackened and prices eased. Continued high oil prices also caused refining margins to shrink by \$2-3/bbl by the end of first-half 2003.

Fig. 1 Complex refining margins (in \$/bbl)



Source: Oil Market Report (IEA)

## Mergers and Corporate Earnings

After several years of intense merger and acquisition activity in the United States and Western Europe, the theater of operations shifted to Russia, with its very high potential for the development and production of oil and gas. As a matter of fact, Russia has become the biggest crude exporter after Saudi Arabia.

In 2003, Russia witnessed two major transactions that affected the structure of its oil industry: a fifty-fifty joint venture formed by BP and the Russian TNK, and a merger between the two Russian oil companies, Yukos and Sibneft, which has been stopped in the wake of the latest events affecting the management of Yukos. As well as refining capacity: ExxonMobil can refine 6.3 Mbbbl/day, Shell 3.2 Mbbbl/day and BP-TNK 3.7 Mbbbl/day.

With refining margins down substantially in 2002, the earnings of most oil companies remained in the black but were much lower than in 2001.

This being said, the results for the first half-year 2003 look considerably brighter for American and European majors, because margins had rallied in the meantime.

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Table 4  
Corporate earnings of refining-distribution companies  
(in millions of dollars)

		2001	2002	Variations
Total	(2)	2067	797	-61%
BP Amoco	(1)	5395	2208	-59%
ENI	(1)	882	308	-186%
Repsol-YPF	(1)	1259	805	-36%
Shell	(1)	3067	1618	-47%
Chevron-Texaco	(2)	1254	-367	-129%
Conoco/Phillips	(1)	397	143	-64%
ExxonMobil	(2)	4227	1300	-69%

(1) operating; (2) net.

Source: Annual reports

## Capital Spending in the Refining Industry

In 2002, the business environment was relatively unfavorable. Capital expenditure remained at the 2001 level and global refining capacity grew by only 1%. Expenditure was sustained by the market launch of various high-performance technological innovations (for instance in the field of catalysts) representing hopes of productivity gains. In addition, there was an increase in spending on catalysts (about \$3.0 billion) and chemicals (+3.5%) in 2002. The purpose of all of these expenses was to improve product quality and bring products in line with future fuels specifications whose main goal is to reduce their sulfur content.

Maintenance spending is a major item of refining industry expenditure. Once again in 2002, it grew substantially (+4.1%), proof that the industry needs to boost the competitiveness and reliability of production plant.

Table 5  
Capital spending in the refining industry worldwide  
(in billions of dollars)

	2000	2001	2002	2003 (e)
Capital expenditure	16.9	16.4	16.6	17.0
Maintenance*	16.5	17.0	17.7	18.5
Catalysts and chemicals	10.9	11.3	11.7	12.4
Total	44.3	44.7	46.0	47.9

\* 40% on equipment, 60% on labor and services.

Source: IFP based on data from HPI Market Data

(e) estimate

According to forecasts, capital investment will grow faster in 2003 than it did in 2002. Maintenance and catalysts/chemicals should register very satisfactory growth rates: +4.5% and +6.0%, respectively. In Europe and the United States, refineries must be modified in order to produce motor fuels to the new specifications, reduce polluting emissions and boost productivity. This should support the growth trend.

Furthermore, the European Commission may propose in 2004-2005 new motor fuel regulations (cetane, polyaromatics content, etc.), depending on which air quality targets are established.

## Standards and Greenhouse Gas Emissions

In Europe, the year 2003 did not bring any major modifications to Directive 98/70/EC relative to the quality of motor fuels, fuel oils and heating oils. The prime objective for the next few years is still the elimination of sulfur.

With respect to fuel oil, Directive 2001/80/EC limits atmospheric emissions by large-scale combustion facilities for certain pollutants. For instance, the limit value for SO<sub>2</sub> emissions has been set at 1700 mg/Nm<sup>3</sup> (with a linear decrease to 400 mg/Nm<sup>3</sup>, depending on the power rating of the particular facility). As a result, it will be necessary to install gas-scrubbing equipment or burn a fuel oil whose sulfur content does not exceed 1 weight %.

In addition, a European draft directive currently under discussion proposes to ban (effective July 2007) the use of marine motor fuels with a sulfur content of over 1.5%.

In the United States, the program to ban MTBE (methyl tert-butyl ether) is still underway. By July 2003, 17 states had introduced this type of program and others are expected to join them. In California, a pioneer in this area, 80% of all gasolines no longer contain MTBE, which has been replaced by ethanol. By 2006, the sulfur in motor fuels will have been reduced to an average of 30 ppm for gasoline and to 15 ppm for diesel.

The industry is also facing yet another challenge. Within the framework of the Kyoto Protocol, the European Union undertook to reduce its emissions of CO<sub>2</sub> and five other greenhouse gases by 8% over the period 2008-2012 (base year: 1990). In July 2003, the European Union approved a directive bearing on a negotiable CO<sub>2</sub> emissions permit system to be implemented in 2005, three years before the official launch of a global emissions trading system. Under the European Directive of 2005, a system of this type will be implemented at the national level and applicable to the producers of electricity, steel, glass, cement and paper, as well as to the refining industry. It will not apply to chemicals, aluminum and transport industries until 2006. In the medium term, all refiners will have to test and subsequently implement CO<sub>2</sub> emissions control mechanisms.

In the long run, a global system will be required to avoid distortions to competition and optimize appropriate technical solutions.

By way of an example, the greenhouse gas (GHG) emissions generated in 2001 by the refining industry in France

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Table 6  
Quality of products in Europe

Gasoline	1998	Jan. 00	Jan. 03	Jan. 05	Jan. 09
Sulfur (max.)	500 ppm	150 ppm	–	50 ppm*	10 ppm
Benzene (% vol.)	5% max.	1% max.	–	1% max.	**
Aromatics (% vol.)	–	42% max.	–	35% max.	**
Olefins (% vol.)	–	18% max.	–	18% max.	**
Oxygen (% m)	2.5-3.7 max.	2.7 max.	–	–	–

Diesel fuel	1998	Jan. 00	Jan. 03	Jan. 05	Jan. 09
Sulfur (max.)	500 ppm	350 ppm	–	50 ppm*	10 ppm
Cetane (min.)	49	51	–	51	**
Polyaromatics	–	11% max.	–	11% max.	**
Specific gravity (max.)	860	845	–	845	**

Heating Oil	1998	Jan. 00	Jan. 03	Jan. 05	Jan. 09
Sulfur (max.)	0.2%	–	–	–	0.1%

Fuel Oil	1998	Jan. 00	Jan. 03	Jan. 05	Jan. 09
Sulfur (max.)	–	–	1%	–	–

\* Motor fuels meeting the 10-ppm-sulfur limit must be available on the market.  
\*\* The Commission may set new values before 2006.

represented 14.8 million tons CO<sub>2</sub> equivalent, or 2.6% of total GHG emissions.

## Petrochemicals

### Business Environment

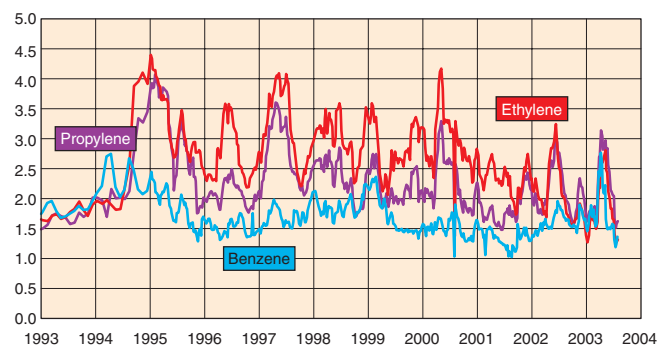
At year-end 2001, the financial results obtained by the petrochemicals and chemicals industries seemed to indicate that earnings would improve in 2002. However, the turnaround that had been awaited since 1998 did not occur in 2002. For most majors, the petrochemicals and heavy chemicals businesses yielded a return on assets of 4.2% versus 5.4% in 2001, thus keeping the industry at the bottom of its cycle.

The petrochemicals industry was adversely affected by poor business conditions. At a time when additional production capacity had just been brought onstream, demand for key products fell. This fueled market competition and brought down the price of products, especially olefins (see Fig. 2). Simultaneously, oil prices were on an upswing. The cost of the feedstocks and fuels needed by the petrochemicals industry went up, which led to even slimmer margins.

Judging by the financial results published early in the first quarter of 2003, one should not expect the situation to make any significant improvement this year. The petrochemicals

industry cannot boost its margins and emerge from the bottom of the cycle unless excess production capacity is completely absorbed and the economy rallies strongly.

Fig. 2 Variations in spot prices versus naphtha prices (NW Europe)



Source: European Chemical News

This being so, and given the nature of the business cycle in the petrochemicals industry, profitability should not improve before 2004.

### Financial Results

In the petrochemicals sector, financial performance also depended on corporate progress on projects undertaken in the

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mid-1990s to reorganize, cut fixed costs and/or refocus on core activities.

With margins standing at such low levels, petrochemicals companies (especially European firms) have postponed capital projects. Europe's share of world petrochemicals investment is slated to decrease sharply over the period 2003-2008.

Table 7  
Corporate earnings of petrochemicals companies  
(in millions of dollars)

		2001	2002	Variations
Total	(2)	603	374	-38%
Chevron-Texaco*	(2)	-128	86	+170%
Exxon-Mobil	(2)	882	830	-6%
Shell	(1)	257	519	+102%
BP	(1)	270	812	+200%
Dow	(2)	-385	-338	+12%
Dupont	(2)	4339	-1103	/
Akzo-Nobel	(2)	631	770	+22%
DSM**	(2)	1332	1118	-16%
BASF	(2)	5513	1415	-74%
Bayer	(2)	908	998	+10%

(1) operating; (2) net.

\* Chevron-Texaco formed a joint venture with Conoco-Phillips for the chemicals activities.

\*\* Petrochemicals operations have been sold to Sabc in July 2002.

Source: Annual reports

## Capital Spending in the Petrochemicals Industry Worldwide

After falling for three consecutive years, capital spending stabilized in 2002. However, the downtrend is expected to resume in 2003, mainly owing to the poor financial results of previous years and a business environment that is not conducive to new projects. On the other hand, maintenance expenses saw a steady increase, primarily due to better management and the reinforcement of maintenance programs designed to boost unit reliability, flexibility and profitability.

Hard hit by these unfavorable conditions, the petrochemicals industry will have to become more competitive, especially in Europe. In other words, it must reduce fixed costs (increase the average size of production units), optimize synergies with the refining sector and improve processes. The industry must also face the globalization of markets and greater competition, especially from the Middle East, which can count on low-cost feedstocks and high-capacity production plant to obtain better margins and give it a competitive edge. In addition, seeing that demand has been growing fast in

Asian countries, especially China, capital investment could shift away from the industrialised countries. This trend would mostly benefit Asia as well as the Middle East, for the reasons stated above. Handicapped by high natural gas prices, the United States is not expected to attract much capital investment in the petrochemicals sector.

Table 8  
Capital spending in the petrochemicals industry worldwide  
(in billions of dollars)

	2000	2001	2002	2003 (e)
Capital investment	15.8	15.3	15.3	14.9
Maintenance*	19.8	20.3	21.1	22.0
Catalysts and chemicals	20.9	21.3	21.6	21.9
Total	56.5	56.9	58.0	58.8

\* 40% on equipment, 60% on labor and services.

Source: IFP based on data from HPI Market Data

(e) estimate

## Conclusion

In an economy characterized by low growth with an uneven geographic distribution, world demand for petroleum products rose in 2002, but only slightly (+0.5%). In 2003 and 2004, demand should be more sustained (+1.4% a year). Although refining margins dropped considerably in 2002, they showed a clear improvement in the first half-year 2003. Consequently, the oil companies posted financial results for 2002 that were down considerably year-on-year, but the prospects look much brighter for 2003.

Although capital expenditure was curbed in 2002, spending on catalysts and maintenance continued to grow substantially in response to stiffer standards relative to petroleum product quality and emissions control, and also to improve refinery plant reliability and competitiveness. According to forecasts for 2003, capital investment will show a more significant increase while maintenance and catalysts/chemicals spending will continue to grow.

In 2002, an unfavorable business environment adversely affected the petrochemicals industry. Low product demand, surplus capacity and higher feedstock prices brought margins down, especially in Europe and the United States.

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