



# Market Statistics and Future Trends in Global Packaging



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## Foreword

It is with great satisfaction that the World Packaging Organisation together with Pira International Ltd is able to present this summary of global packaging market statistics and trends.

Looking into the future has always been a challenge but as has been said "the future belongs to those who plan" this summary of global market reflects some history as well as a view of the future. This information will prove to be a very useful tool in positioning those involved in packaging into the future.

The world economy has proved to be most fragile in recent times with growth in developed countries being rather pedestrian, resulting in the hope of new volumes being found in developing markets, this report will provide meaningful information on identifying prospective markets as well as guidance on how to capitalize on market trends. As packaging growth is tied to the world economy the information portrayed in this document serves as an important guide for success.

Global social changes are identified and the importance of sustainable development in the areas of social, economic and the environment depicted with the idea in mind of guiding serious thinkers to set standards and direction to capitalize on the information provided.

We wish the readers of this market report every success as you interpret this information for the benefit of your particular area of influence

Keith Pearson  
President WPO

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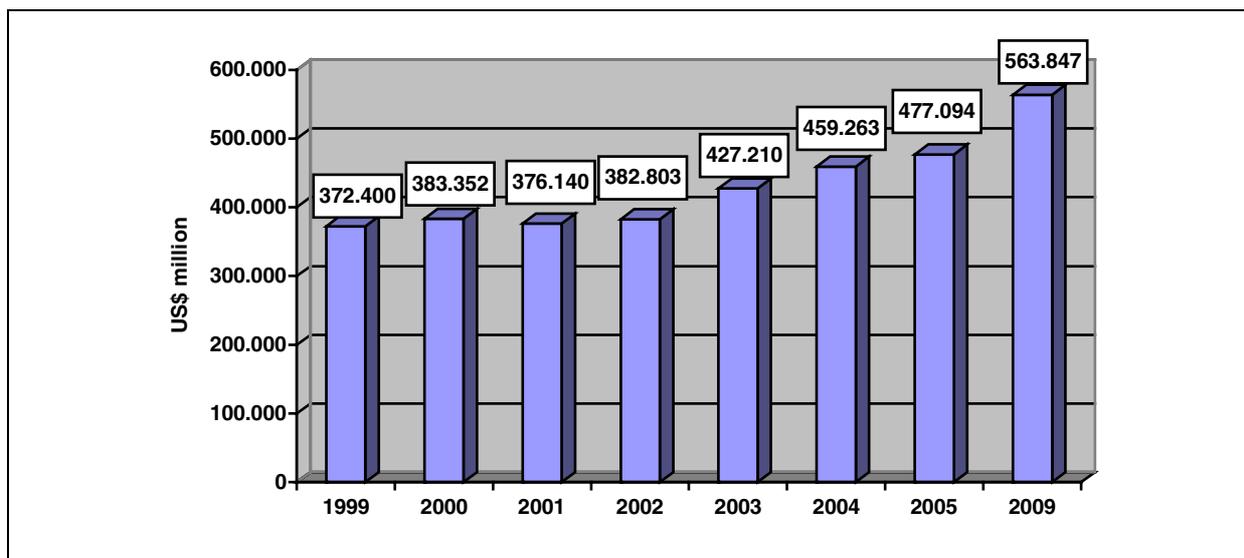
## ■ Introduction

Including packaging machinery, the global packaging industry turned over around \$485 billion in 2004 with packaging container sales of almost \$460 billion and machinery sales of around \$25 billion. Used in a wide range of industries across food and drink, healthcare, cosmetics and other consumer goods as well as a range of industrial sectors, packaging has become an essential everyday item, with its usage growing broadly in line with the global economy.

As such, the health of the packaging industry is linked to that of the world economy as a whole. However, reliant upon upstream industries for their raw materials, packaging converters have to cope with fluctuations in raw material prices, dependent upon levels of supply and demand. In a climate of low overall inflation, rising prices for raw materials (particularly plastic resin) have put something of a squeeze on converters. Downward pressure on prices is being exerted by brand owners and retailers alike – exacerbated by moves towards consolidation at all levels of the supply chain. In addition, moves towards central purchasing by packaging buyers have also impacted upon packaging margins. The growing use of e-commerce and reverse auctions has made the whole business of materials sourcing (especially in commodity areas) much simpler, promoting cost efficiency for users of consumables.

These pressures are very much to the fore in mature markets in western Europe, Japan and North America, and have led in some instances to near zero growth in packaging consumption in the developed world. However, even here there remain opportunities for growth driven by increasing consumption of packaged rather than unpackaged food as well as general growth across a range of consumer goods areas. At the same time, rapid growth in packaging usage in the fast-growing economies of Asia and also eastern Europe has presented new opportunities for packaging suppliers, although the inherent risks of a high degree of exposure to emerging markets must be taken into account, especially given the experience of markets in South America during recent years.

**FIGURE E.1 The global packaging market, 1999-2009**

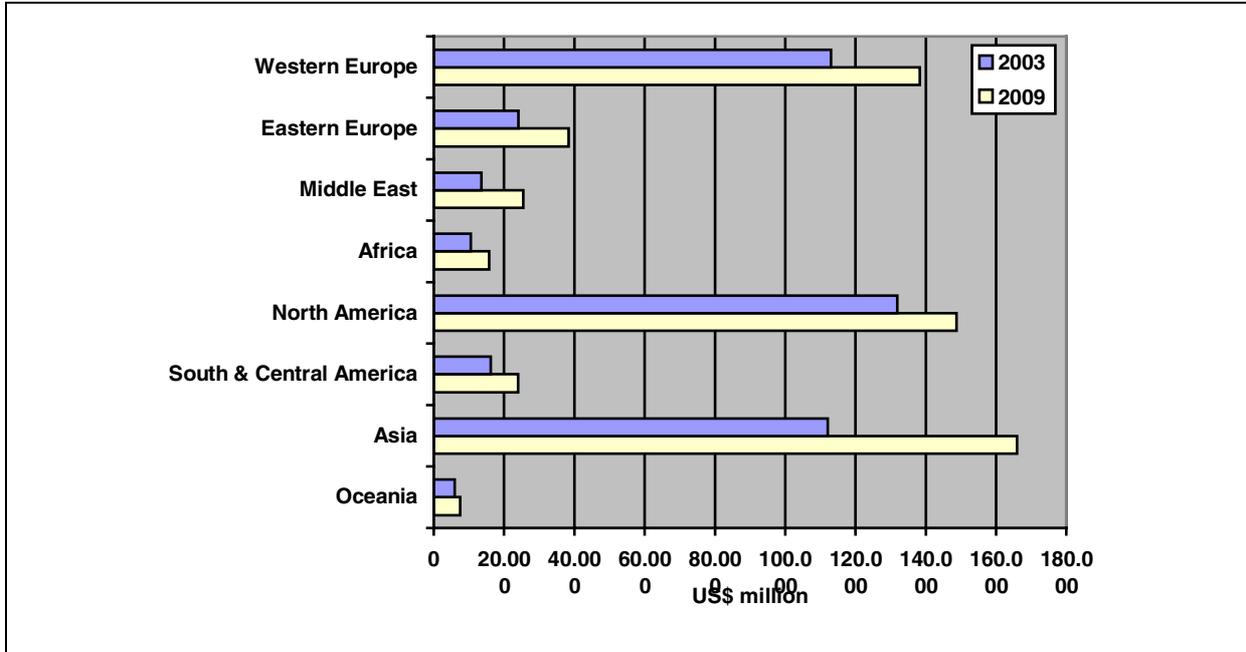


Note: constant 2004 prices from 2005 onwards

Source: Pira International Ltd

In 2003, North American markets, including the USA, Canada and Mexico, accounted for the largest share of global packaging at \$132 billion (32%), ahead of western Europe (26%) and Asia (26%). The largest single national packaging market during the same year was the USA with sales of \$113 billion. Japan ranked second with sales of \$49 billion, ahead of China at \$32 billion, Germany at \$21 billion and France at \$19 billion.

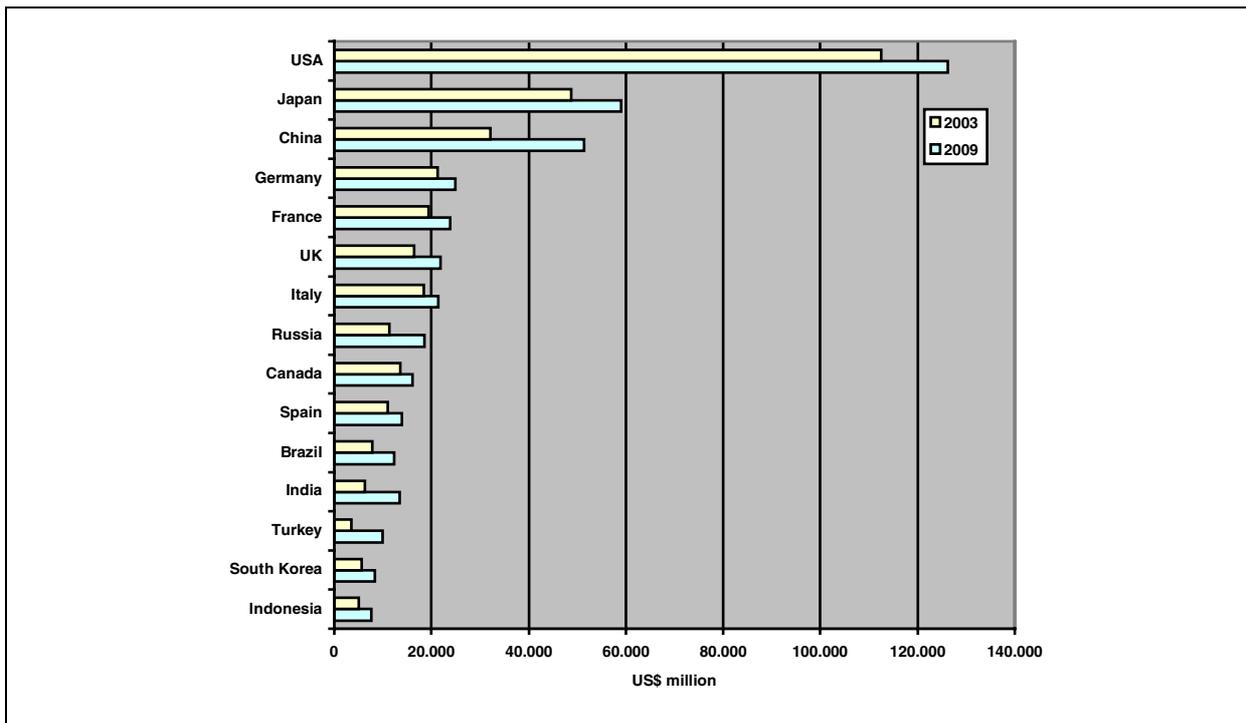
**FIGURE E.2 World packaging consumption by region, 2003-09**



Note: constant 2004 prices in 2009

Source: Pira International Ltd

**FIGURE E.3 Top 15 national packaging markets, 2003-09**



Note: constant 2004 prices in 2009

Source: Pira International Ltd

## ■ Key Drivers and Trends

The progression of packaging demand is influenced by a wide range of factors, from year to year and also factors with a much longer-term influence. While the economy plays a central role in influencing the size and growth of the market, there are a number of other factors which can be seen as having a direct or at least indirect influence on packaging demand or, at any rate, the nature of this demand, irrespective of the performance of the economy. These include:

- The ageing of the world population
- The trend towards smaller households
- The increasing requirement for convenience among consumers
- Rising health awareness among consumers
- The trend towards 'on-the-go' lifestyles among increasingly time-poor consumers
- Growing requirements for brand enhancement/ differentiation in an increasingly competitive environment
- New packaging material development
- The move towards smaller pack sizes as the incidence of families eating together at the dinner table become less common
- Increasing awareness of environmental issues, and the adoption of new regulatory requirements on packaging recycling

Out of all these factors, health awareness was regarded as the single most important driver to growth in the packaging industry in a Pira survey of the WPO membership. The ageing of the populations throughout the world was considered the least important driver to growth in the market, although even in this case, more than half of all respondents considered this to be important to some degree.

**TABLE E.1 Respondents' views on major drivers to growth in their respective national packaging industries over the next five years**

| %                                  | Critical | Very important | Fairly important | Relevant but not important | Not at all important | Rating* |
|------------------------------------|----------|----------------|------------------|----------------------------|----------------------|---------|
| Older population                   | 0.0      | 45.5           | 9.1              | 45.5                       | 0.0                  | 2.00    |
| Smaller households                 | 0.0      | 54.5           | 27.3             | 18.2                       | 0.0                  | 2.36    |
| Convenience                        | 27.3     | 54.5           | 18.2             | 0.0                        | 0.0                  | 3.09    |
| Health awareness                   | 27.3     | 63.6           | 9.1              | 0.0                        | 0.0                  | 3.18    |
| 'On-the-go' lifestyles             | 18.2     | 54.5           | 0.0              | 27.3                       | 0.0                  | 2.64    |
| Brand enhancement/ differentiation | 27.3     | 36.4           | 36.4             | 0.0                        | 0.0                  | 2.91    |
| New packaging material development | 18.2     | 45.5           | 36.4             | 0.0                        | 0.0                  | 2.82    |
| Smaller pack sizes                 | 0.0      | 54.5           | 27.3             | 18.2                       | 0.0                  | 2.36    |
| Recycling                          | 18.2     | 27.3           | 18.2             | 27.3                       | 9.1                  | 2.18    |

Note: \* averaged response whereby 4=critical; 3=very important; 2=fairly important; 1=relevant but not important; 0=not at all important

Source: Pira International Ltd survey of WPO member organisations

## Economic trends

The economy is the single most important influence on packaging consumption. The level of economic activity has a fairly direct influence on demand for bulk/ transport packaging in particular, and indirectly provides the right or wrong climate for investment into packaging material research and development.

In recent years, the progression of the world economy has been uneven, with rising oil prices, political uncertainty and other factors leading to a situation whereby the recovery has been in fits and starts. At the turn of 2004/5, the US economy was moving ahead strongly, but there was something of a slowdown in the fast-growing economies of eastern Asia and growth remained quite weak on the continent of Europe. Business confidence fell back at the turn of the year in developed economies, despite a relatively stable political climate and strong year of world trade. This was principally as a result of hikes in oil prices, which had a real impact upon incomes and consumer confidence. However, business investment did pick up as the year progressed and oil prices came down again, and with this in mind the OECD has forecast above-trend levels of growth for the full year 2005.

## Demographic trends

Much is said about the potential of China's one billion consumers, but demographic factors often have a much more complex effect on demand trends. In the packaging market, a great deal of attention has been devoted to ensuring that the offer responds to the demands of particular demographic segments, and takes into account the ageing of the world's population that is now occurring.

The population of the world currently stands at 6.47 billion, up from 4.07 billion people in 1975, and set to grow to around 9.08 billion by 2050 taking the average of UN forecasts. By the same measure, the population of Africa will more than double to 1.94 billion, while that of Asia will grow by around one third to 5.2 billion. The population of Europe, meanwhile, is forecast to decline, from 728 million to 653 million, with the population of the world's more developed regions set to rise only slightly, from 1.21 billion to 1.24 billion.

China is currently the world's most populous nation with a population of 1.32 billion, ahead of India at 1.1 billion and the USA at 298 million. India is set to overtake China by 2050, when its population will have risen to 1.59 billion versus China's 1.39 billion.

**TABLE E.2 Population of the world, major development groups and major areas, 1950, 1975, 2005 and 2050, by projection variants**

| Millions                       | 1950  | 1975  | 2005  | 2050  |        |        |          |
|--------------------------------|-------|-------|-------|-------|--------|--------|----------|
|                                |       |       |       | Low   | Medium | High   | Constant |
| World                          | 2,519 | 4,074 | 6,465 | 7,680 | 9,076  | 10,646 | 11,658   |
| More developed regions         | 813   | 1,047 | 1,211 | 1,057 | 1,236  | 1,440  | 1,195    |
| Less developed regions         | 1,707 | 3,027 | 5,253 | 6,622 | 7,840  | 9,206  | 10,463   |
| Least developed countries      | 201   | 356   | 759   | 1,497 | 1,735  | 1,994  | 2,744    |
| Other less developed countries | 1,506 | 2,671 | 4,494 | 5,126 | 6,104  | 7,213  | 7,719    |
| Africa                         | 224   | 416   | 906   | 1,666 | 1,937  | 2,228  | 3,100    |
| Asia                           | 1,396 | 2,395 | 3,905 | 4,388 | 5,217  | 6,161  | 6,487    |
| Europe                         | 547   | 676   | 728   | 557   | 653    | 764    | 606      |
| Latin America & Caribbean      | 167   | 322   | 561   | 653   | 783    | 930    | 957      |
| Northern America               | 172   | 243   | 331   | 375   | 438    | 509    | 454      |
| Oceania                        | 13    | 21    | 33    | 41    | 48     | 55     | 55       |

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2005); World Population Prospects: The 2004 Revision

## Older populations

The nature of population growth in the world today is causing governments a great deal of concern. Populations are ageing, and this is leading to fears of what will happen when the boomer generation retires, potentially using its political clout to demand better pensions, healthcare and general social provision – to the extent that creates too great a drain on the economy.

The ageing of the world's population is being caused by two factors: on the one hand, fertility decline or falling birth rate; and also increasing life expectancy due to advances in healthcare. In 1950, around 8% of the world's population was aged 60 years or over, since which time that figure has risen to 10% and is expected to reach 22% by 2050. The number of children aged 0-14, by contrast, is expected to remain pretty much static, rising from 1.82 billion in 2005 to 1.83 billion by 2050, with the share of under 15s falling from 28% to 20%.

## Lifestyle issues

It is difficult to ignore lifestyle trends that are today impacting upon consumer purchasing decisions. For the packaging industry, these trends are positive, encouraging innovation and expansion of chilled cabinet selections in supermarkets. Consumers are becoming increasingly demanding and short of time, seeking out convenience food solutions that represent an advance on more traditional processed foods. The expectations of food quality are rising and growing awareness of health and other issues present new challenges to retailers, packers and packaging suppliers alike.

## Smaller households and smaller pack sizes

Social change is indirectly leading to modifications in packaging design. The average size of households is declining in line with the rising number of single-parent households and single-person households, and as a

result there have been moves towards smaller pack sizes. This trend is being reinforced by the decline in the family meal, as more and more women enter into the workplace. As working hours become less standard, opportunities for the family to eat together are becoming fewer.

## Convenience

Rising sales of convenience foods and developments in convenience food packaging have been a major feature of packaging markets in recent times. Packaging technology has developed to the extent that the ready-meal offer has improved significantly, attracting a broader and also wealthier customer base than was previously possible as consumers are prepared to pay a premium for quality, pre-prepared meals.

## Health awareness

Health awareness was regarded by respondents to the Pira/ WPO survey as the most important packaging growth driver, with 27% viewing this as critical to market development and 64% viewing this as very important. Consumer health concerns are an increasing influence in many end-use markets for packaging. Examples include:

- Rising sales of bottled water, fruit juice and milk drink markets in many countries, to the detriment of spirits and, in some countries, carbonated soft drinks;
- Increasing demand for packaged fresh food products.

## 'On-the-go' lifestyles

'On-the-go' lifestyles have emerged as a result of several factors. Longer working hours, longer commuting times and the growing number of consumers left to fend for themselves when it comes to acquiring food, have all contributed to the notion of time-poor consumers. In addition, consumers are less inclined to spend what valuable time they have preparing and often consuming food. The main consequence of this has been an increased incidence of snacking during the day and rising out-of-home consumption as well as a greater reliance on ready-prepared foods in the evening.

## Brand issues

### Brand enhancement/ differentiation

Packaging is a major aspect of differentiation in most consumable goods; where differentiation competition is intense then prices are low, and packaging provides a marketing advantage at the point of sale. Packaging is also a major cost component in the majority of consumable products. For example, 48 cents out of every dollar (48%) of Coke's product cost is from packaging. Of the total market, 60% lies in the areas of primary containers and flexible packaging – the containers and wrappers that give immediate protection to the packaged product.

The power of the global brands continues to increase strongly, particularly in the carbonated soft drinks market, dominated worldwide by two brands, and the beer market, with 12 groups controlling more than 50% of the world market. Where markets are dominated by a small number of companies, the success or otherwise of a new packaging product can often be assured by its adoption by just one major global brand. Aside from quickly generating a high level of demand in its own right, this also tends to bring with it copycat switches by minor brands.

## Retail trends

The retail industry is increasing in power and diversity. Hypermarkets are usually sited outside the city centre, while discounters can be found everywhere and speciality stores are usually in the larger cities. Convenience stores continue to make headway, located in airports, train station and city centres. Various issues will affect future retail trends, including technology, service, quality and trust, lifestyle and emotions, store/ concept innovations and globalisation.

## New packaging material developments

High-performance packaging has been developed with strong barrier characteristics, and also in certain instances active and intelligent components too, respectively, adapt to changes in pack contents and environment and extend shelf life; or provide information on the pack and its contents to promote supply chain efficiencies.

New developments in packaging materials were rated as the fourth most important driver to growth out of those detailed in Table E.1, with 18% of respondents viewing this as critical, 46% as very important and 36% as fairly important. Key areas under consideration include:

- High barrier materials
- Active packaging
- Intelligent packaging
- Nanotechnology
- Digital print for packaging.

## Environmental issues

Environmental concerns have led to governments throughout western Europe taking steps to deal with the issue of packaging waste and recycling. Recent packaging directives from the European Commission, for example, have led to the imposition of challenging targets for recycling, and national governments are also examining new ways to discourage packaging waste. Landfill is becoming a major political issue, with landfill taxes being introduced by governments – in some cases before the necessary infrastructure is in place to provide alternatives to disposal.

Recycling was though regarded as only the eighth most important driver to packaging growth out of the nine drivers. Views were distinctly mixed among industry respondents, with 36% of respondents regarding recycling as being of no importance to the market. In the case of consumers are less often concerned about the effect of their consumption habits on the environment – rather, they are more concerned about the

effect of the external environment upon themselves. Consumers have begun to desire all things natural, unaffected by 'unnatural' processes, hence the suspicion of GM foods, etc. Nevertheless, the packaging industry has taken steps to address the environmental question, but this has been more of a function of cooperation with government rather than strictly a marketing issue, although some consumers will seek out environmentally-friendly packaging and products as a matter of course.

## Downgauging and lightweighting

One effect of the environmental legislation has been to encourage the packaging industry to reduce the amount of packaging used by lightweighting of materials, with examples across metal, glass, plastic and paper and board packaging. This has been made possible through the development of new technologies aimed at the strengthening of materials through new formulations and processes, factors which have also influenced other packaging materials areas.

The use of lighter corrugated containerboard is a significant trend in world paper and board packaging markets, particularly in developed countries. In Europe, there have been significant increases in the use of containerboards of 100 gsm or less, facilitated by recent new capacity for lighter materials. In North America, however, the trend towards lighter weights has been somewhat slower, and this is set to remain the case into the second half of the decade.

According to the ICCA, while substance weights across all regions will fall, average gsm for the world as a whole will increase as those regions using the heavier substance weights, such as China, are significantly increasing their share of the market.

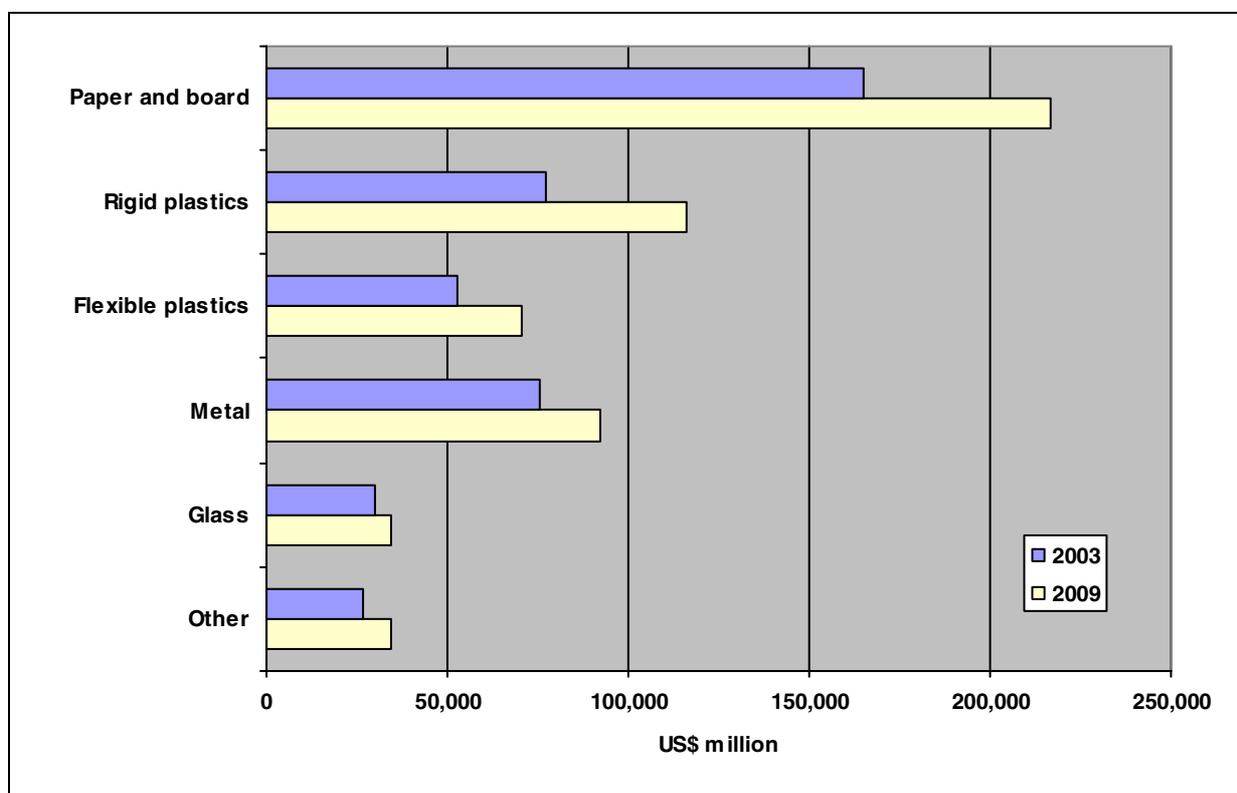
## ■ Materials

Packaging encompasses a wide range of material types across paper, board, plastic, metal, glass, wood and other materials. The largest share of global packaging is accounted for paper and board packaging with sales of \$165 billion in 2003, equating to 38% of the market. Paper and board will remain the single largest element of the market into 2009, growing at an annual rate of around 4% in real terms, driven on the one hand by rising demand in fast-growth national markets as well as steady growth in secondary/ bulk packaging across the globe.

Plastic packaging accounted for 30% of sales, with rigid plastics alone taking an 18% share of the market. Rigid plastics was the fastest growing sector of the market during the period 1999-2003 at an annual rate of 6.2% to \$77.2 billion. This was driven by several factors: rising demand for PET bottles in soft drink and bottled water markets; the consistent substitution of traditional metal, glass and sometimes paper-based materials in food and other markets; increasing incursions by packaging as a whole into food markets, particularly in the case of meat, fish and poultry products; and rising consumption of ready-meals and other convenience-oriented products. Rigid plastic packaging will continue to be the fastest growing sector of the market, with consumption forecast to progress at an annual average rate of 6.5% in the period to 2009 to reach \$116 billion, with consumption of flexible plastic packaging also set to grow at an above-average rate, driven by rising demand in fast-growth markets in Asia and other emerging regions.

Across other sectors, metal packaging, accounting for 18% of the market in 2003, is set to grow steadily, but will lose further share to plastics in beverage markets with food cans also losing share. Glass packaging, meanwhile, accounting for 7% of the market, will see only steady growth as further share is lost to plastics across food, beverage, healthcare and other key end-use sectors.

**FIGURE E.4 World packaging consumption by sector, 2003-09**



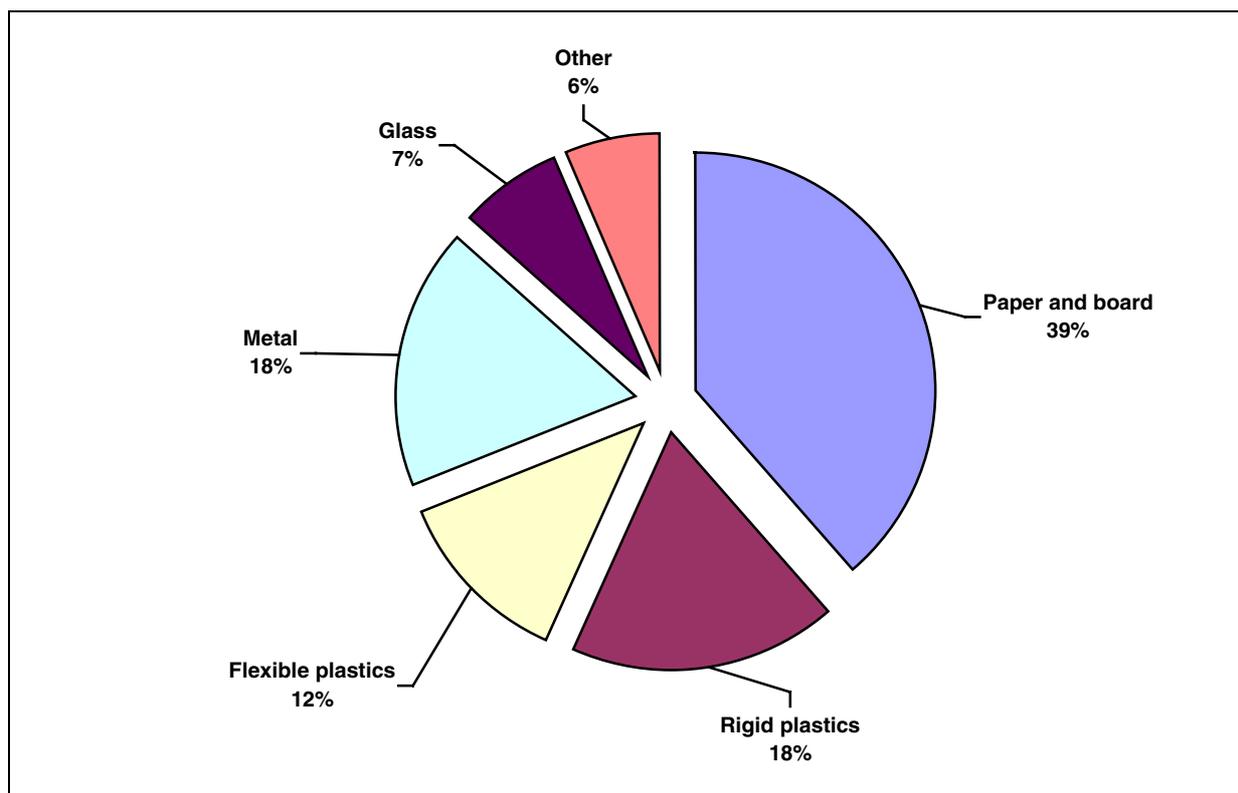
Note: constant 2004 prices in 2009

Source: Pira International Ltd

At \$165 billion, paper and board packaging accounted for the largest share of global packaging sales in 2003 with 39% of the total. Plastic packaging accounted for 30% of sales, with rigid plastics alone taking an 18% share of the market, with metal packaging accounting for 18% and glass packaging a further 7%. Other packaging products accounted for the remaining 6% of the market, principally attributable to wooden pallets and containers but also textiles and other materials.

The fastest growing sector of the market during the period 1999-2003 was rigid plastic packaging, with consumption growing at an annual rate of 6.2% to \$77.2 billion. A trend towards PET and other plastics and away from competing, more traditional materials, is ongoing. The market has also been driven by the growing usage of packaging across a range of food area, particularly in the case of meat, fish and poultry products, as well as rising consumption of ready-meals and other convenience-oriented products.

**FIGURE E.5 World packaging consumption by sector, 2003**



Source: Pira International Ltd

Paper and board packaging will remain the single largest element of the market into 2009, with a 38% share at \$216 billion – growing at an annual rate of 4.2% in real terms, driven on the one hand by rising demand in fast-growth national markets as well as steady growth in secondary/ bulk packaging in developed markets in line with overall industrial activity.

Rigid plastic packaging will continue to be the fastest growing sector of the market, with consumption forecast to progress at an annual average rate of 6.5% in the period to 2009 to reach \$116 billion. Flexible plastic packaging sales are set to grow at an annual rate of over 4%, driven by rising demand in major Asian markets such as India and China, as well as to an extent by the rising incidence of pack substitution in developed markets from cans, etc. to stand-up pouches.

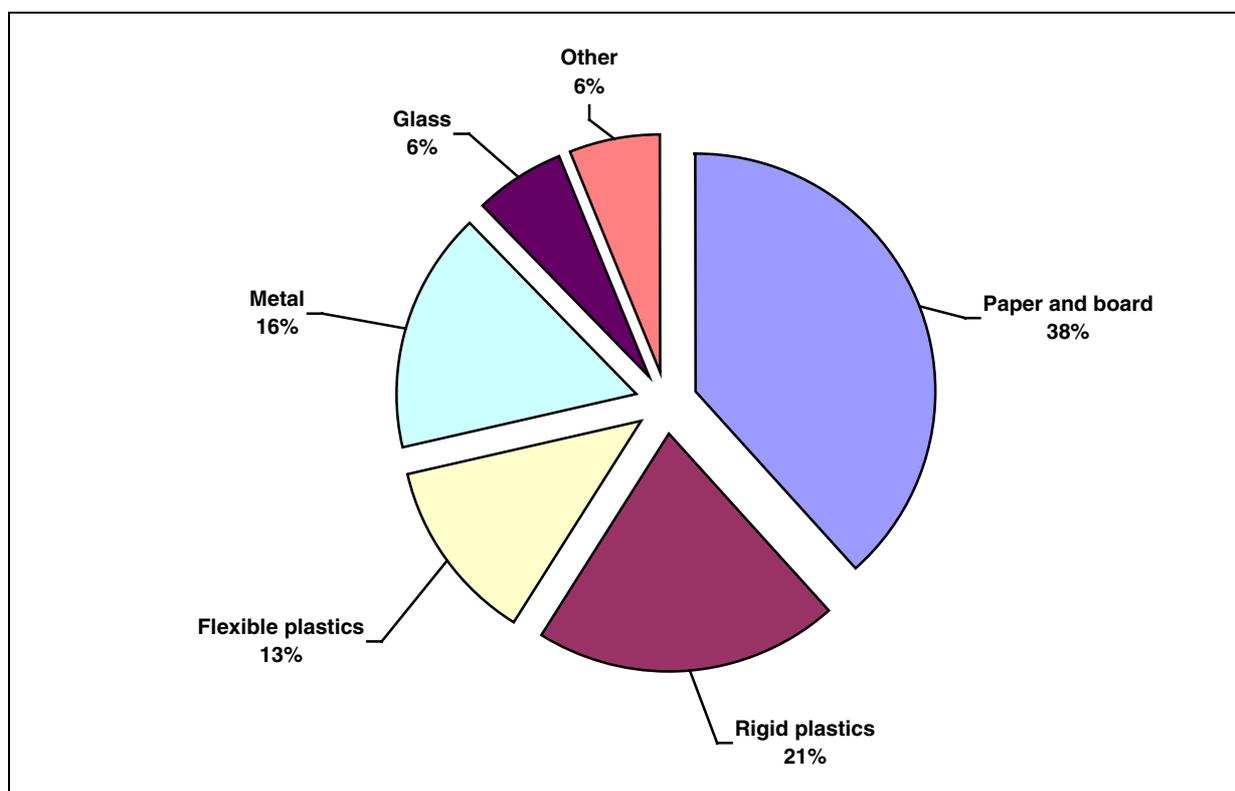
Across other sectors, metal packaging sales are set to grow steadily, but will lose further share to plastics in beverage markets. Food cans will also lose share, and container glass will lose share across food, beverage, healthcare and other key end-use sectors.

**TABLE E.3 Forecast world packaging consumption by sector, 2003-09 (\$ million)**

| \$ million        | 2003    | 2004    | % change 2003-04 | 2005    | % change 2004-05 | 2009    | CAGR (%) 2004-09 |
|-------------------|---------|---------|------------------|---------|------------------|---------|------------------|
| Paper and board   | 164,744 | 176,537 | 7.2              | 183,271 | 3.8              | 216,398 | 4.2              |
| Rigid plastics    | 77,232  | 84,797  | 9.8              | 90,058  | 6.2              | 115,932 | 6.5              |
| Flexible plastics | 52,750  | 57,228  | 8.5              | 59,615  | 4.2              | 70,791  | 4.3              |
| Metal             | 75,519  | 80,236  | 6.2              | 82,389  | 2.7              | 92,169  | 2.8              |
| Glass             | 30,211  | 31,446  | 4.1              | 31,762  | 1.0              | 34,389  | 1.8              |
| Other             | 26,754  | 29,018  | 8.5              | 29,999  | 3.4              | 34,167  | 3.3              |
| Total             | 427,210 | 459,263 | 7.5              | 477,094 | 3.9              | 563,847 | 4.2              |

Note: constant prices from 2005 onwards; totals may not add up due to rounding

Source: Pira International Ltd

**FIGURE E.6 Forecast world packaging consumption by sector, 2009**

Source: Pira International Ltd

## Paper and board

The world market for paper and board packaging was valued at \$164.7 billion in 2003, representing an increase of 10% on 2002 – principally as a result of the weakness of the dollar boosting non-US sales – with consumption growing at an annual average rate of 3% since 1999. North American markets accounted for 32% of sales at \$52.2 billion, growing at a rate of just 0.4% over the period as US demand fell back. Growth was of the order of just over 3% in Asia, depressed somewhat by weak Japanese demand where sales fell by almost 3% year-on-year.

The fastest growing markets for paper and board packaging between 1999-2003 were in eastern Europe, with investment in new capacity on the up as major players in this sector – as well as key customers – have shifted the balance of production away from high-cost locations in western Europe. In addition, there has been strong growth in Russian paper and board packaging demand, with consumption rising from \$1.2 billion in 1999 to almost \$3 billion in 2003.

On the whole, the paper and board packaging industry has experienced difficult trading conditions in developed markets in recent years, affected by downward pressure on prices from end-customers, exacerbated by overcapacity within the industry. With only very modest growth in shipment volumes and declining shipment values in some mature markets, there has been a greater focus on developing markets in Asia, Latin America and eastern Europe. While there was strong output growth in both Asia and eastern Europe in 2003, output fell back in South America with corrugated board volumes down by around 6% on 2002 levels.

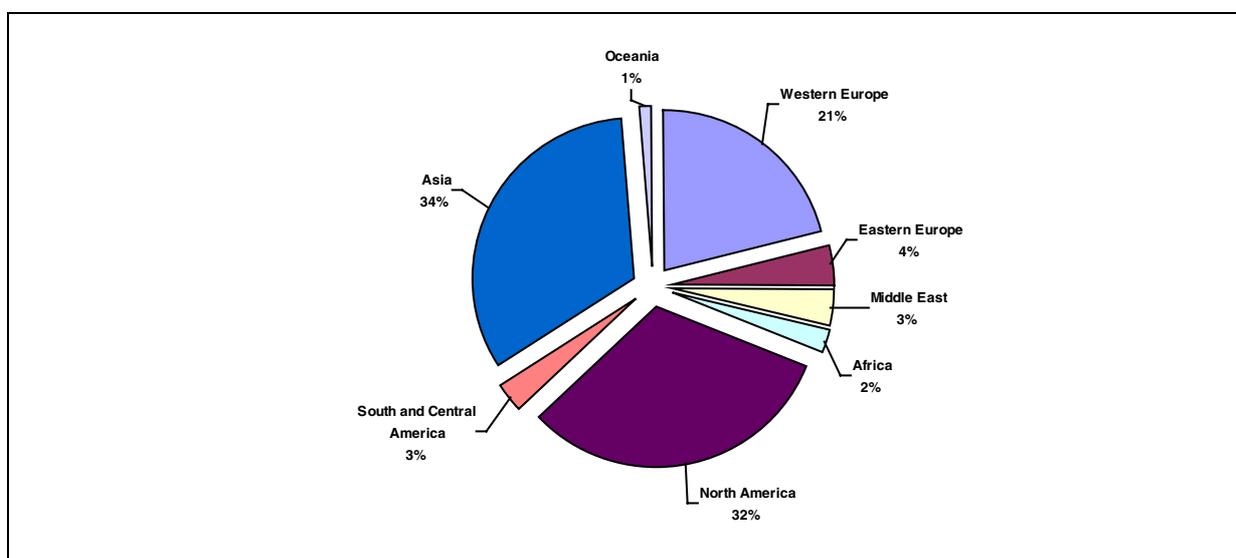
**TABLE E.4 Paper and board packaging consumption by region, 1999-2003 (\$million)**

| \$ million                | 1999    | 2000    | 2001    | 2002    | 2003    | CAGR (%) 1999-2003 |
|---------------------------|---------|---------|---------|---------|---------|--------------------|
| Western Europe            | 29,370  | 27,546  | 27,988  | 29,231  | 34,705  | 4.3                |
| Eastern Europe            | 4,115   | 4,671   | 4,719   | 5,578   | 6,966   | 14.1               |
| Middle East               | 3,994   | 4,179   | 4,209   | 4,728   | 5,715   | 9.4                |
| Africa                    | 2,629   | 2,665   | 2,666   | 2,694   | 3,759   | 9.3                |
| North America             | 51,389  | 56,168  | 54,161  | 51,734  | 52,190  | 0.4                |
| South and Central America | 5,794   | 5,850   | 5,711   | 4,778   | 5,332   | -2.1               |
| Asia                      | 47,205  | 50,460  | 47,860  | 49,235  | 54,088  | 3.3                |
| Oceania                   | 1,743   | 1,609   | 1,491   | 1,598   | 1,988   | 3.4                |
| World                     | 146,238 | 153,149 | 148,807 | 149,576 | 164,744 | 3.0                |

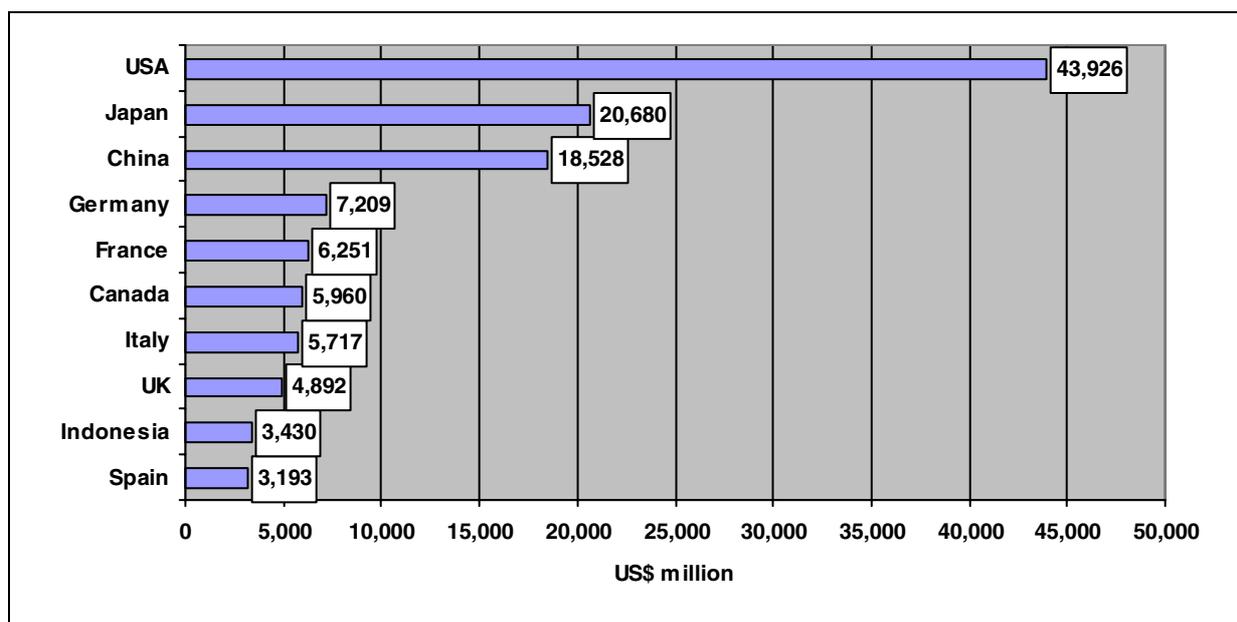
Note: totals may not add up due to rounding

Source: Pira International Ltd

**FIGURE E.7 World paper and board packaging consumption by region, 2003**



Source: Pira International Ltd

**FIGURE E.8 Top ten paper and board packaging markets, 2009**

Source: Pira International Ltd

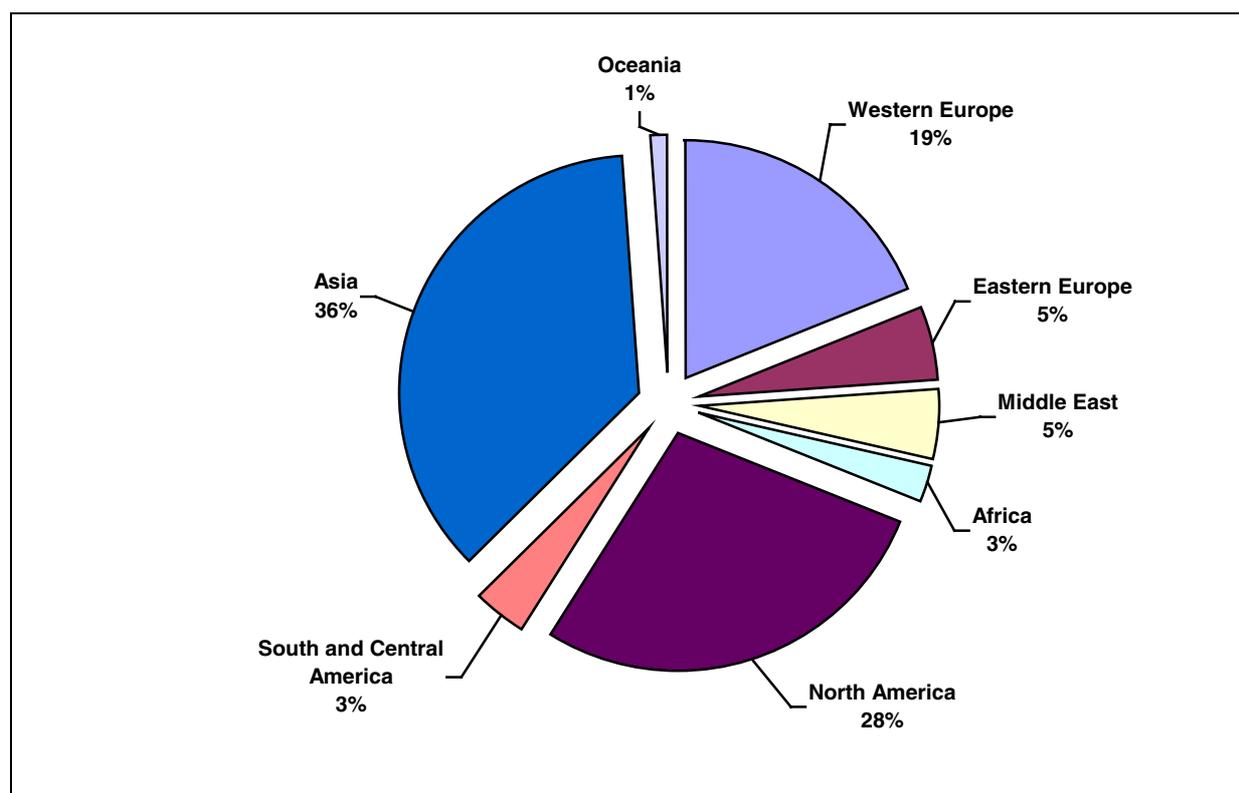
After growth of the order of 7% in 2004, the market for paper and board packaging is forecast to grow at an annual rate of 4.2% in the period 2004-09 to reach \$216 billion. Aside from the Middle East, the fastest growing regional markets will be found in eastern Europe, South America and Asia where annual growth of the order of 6% is anticipated. Asia's share of the market is set to rise from 34% to 36%, with strong growth in China – overtaking Japan to become the second largest market with sales of \$30 billion by 2009 – as well as Indonesia (growing at almost 10% annually to \$5.4 billion) and India (growing at an annual rate of 12% to reach almost \$4.5 billion).

**TABLE E.5 Forecast world paper and board packaging consumption by region, 2003-09 (\$ million)**

| \$ million                | 2003    | 2004    | % change 2003-04 | 2005    | % change 2004-05 | 2009    | CAGR (%) 2004-09 |
|---------------------------|---------|---------|------------------|---------|------------------|---------|------------------|
| Western Europe            | 34,705  | 38,092  | 9.8              | 38,615  | 1.4              | 40,820  | 1.4              |
| Eastern Europe            | 6,966   | 7,861   | 12.8             | 8,343   | 6.1              | 10,585  | 6.1              |
| Middle East               | 5,715   | 6,256   | 9.5              | 6,940   | 10.9             | 10,722  | 11.4             |
| Africa                    | 3,759   | 4,092   | 8.9              | 4,325   | 5.7              | 5,445   | 5.9              |
| North America             | 52,190  | 53,592  | 2.7              | 54,832  | 2.3              | 60,129  | 2.3              |
| South and Central America | 5,332   | 5,452   | 2.2              | 5,815   | 6.7              | 7,527   | 6.7              |
| Asia                      | 54,088  | 58,989  | 9.1              | 62,145  | 5.4              | 78,700  | 5.9              |
| Oceania                   | 1,988   | 2,203   | 10.8             | 2,256   | 2.4              | 2,470   | 2.3              |
| World                     | 164,744 | 176,537 | 7.2              | 183,271 | 3.8              | 216,398 | 4.2              |

Note: constant prices from 2005 onwards; totals may not add up due to rounding

Source: Pira International Ltd

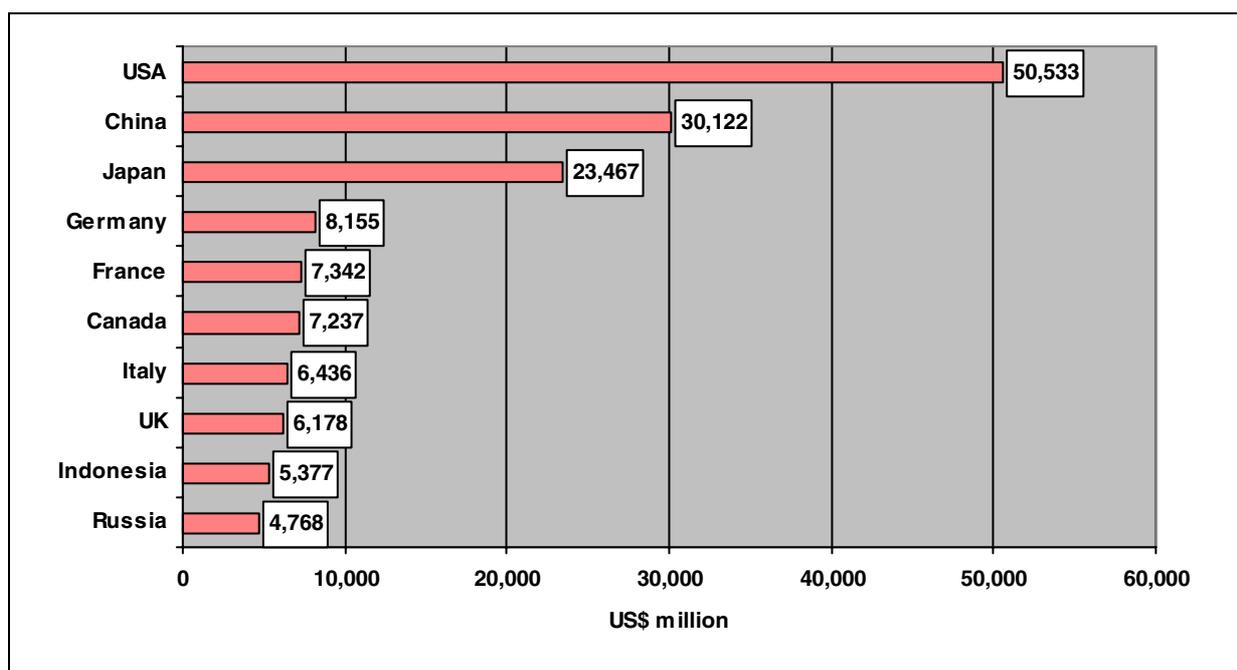
**FIGURE E.9 Forecast world paper and board packaging consumption by region, 2009**

Source: Pira International Ltd

**TABLE E.6 Top 25 paper and board packaging markets, 2003-09 (\$ million)**

| \$ million   | 2003   | 2004   | % change 2003-04 | 2005   | % change 2004-05 | 2009   | CAGR (%) 2004-09 |
|--------------|--------|--------|------------------|--------|------------------|--------|------------------|
| USA          | 43,926 | 44,972 | 2.4              | 46,059 | 2.4              | 50,533 | 2.4              |
| China        | 18,528 | 20,121 | 8.6              | 21,160 | 5.2              | 30,122 | 8.4              |
| Japan        | 20,680 | 23,035 | 11.4             | 23,839 | 3.5              | 23,467 | 0.4              |
| Germany      | 7,209  | 7,855  | 9.0              | 7,931  | 1.0              | 8,155  | 0.8              |
| France       | 6,251  | 6,850  | 9.6              | 6,951  | 1.5              | 7,342  | 1.4              |
| Canada       | 5,960  | 6,441  | 8.1              | 6,596  | 2.4              | 7,237  | 2.4              |
| Italy        | 5,717  | 6,203  | 8.5              | 6,258  | 0.9              | 6,436  | 0.7              |
| UK           | 4,892  | 5,562  | 13.7             | 5,659  | 1.8              | 6,178  | 2.1              |
| Indonesia    | 3,430  | 3,418  | -0.3             | 3,631  | 6.2              | 5,377  | 9.5              |
| Russia       | 2,976  | 3,476  | 16.8             | 3,724  | 7.2              | 4,768  | 6.5              |
| India        | 2,335  | 2,567  | 10.0             | 2,892  | 12.6             | 4,487  | 11.8             |
| Brazil       | 2,938  | 2,944  | 0.2              | 3,205  | 8.9              | 4,479  | 8.8              |
| Turkey       | 1,496  | 1,739  | 16.2             | 2,059  | 18.4             | 4,162  | 19.1             |
| Spain        | 3,193  | 3,503  | 9.7              | 3,571  | 2.0              | 3,901  | 2.2              |
| South Korea  | 2,613  | 2,889  | 10.6             | 2,987  | 3.4              | 3,639  | 4.7              |
| China Taiwan | 1,782  | 1,870  | 4.9              | 1,942  | 3.8              | 2,641  | 7.1              |
| Mexico       | 2,304  | 2,179  | -5.4             | 2,177  | -0.1             | 2,360  | 1.6              |
| Australia    | 1,722  | 1,902  | 10.5             | 1,947  | 2.4              | 2,118  | 2.2              |
| South Africa | 1,080  | 1,318  | 22.1             | 1,383  | 4.9              | 1,740  | 5.7              |
| Netherlands  | 1,421  | 1,539  | 8.3              | 1,550  | 0.7              | 1,650  | 1.4              |
| Poland       | 828    | 946    | 14.2             | 1,026  | 8.5              | 1,539  | 10.2             |
| Belgium      | 1,044  | 1,143  | 9.5              | 1,160  | 1.5              | 1,226  | 1.4              |
| Switzerland  | 988    | 1,084  | 9.7              | 1,097  | 1.2              | 1,116  | 0.6              |
| Sweden       | 817    | 896    | 9.6              | 911    | 1.7              | 986    | 1.9              |
| Hungary      | 663    | 752    | 13.5             | 784    | 4.3              | 899    | 3.6              |

Source: Pira International Ltd

**FIGURE E.10 Top ten paper and board packaging markets, 2009**

Source: Pira International Ltd

## Corrugated packaging

In area terms, corrugated packaging shipments grew by 3% in 2003 to reach 144.4 billion m<sup>2</sup>, rising at an annual rate of 1.8% according to data from the International Corrugated Case Association (ICCA). The ICCA anticipates an acceleration in output growth in the period to 2008, forecasting annual growth of the order of 3.8% to reach 173.4 billion m<sup>2</sup>, with growth rates rising in all regions with the exception of Oceania.

Asian output of corrugated grew at an annual rate of 5.7% between 2000 and 2003, and expected to accelerate to nearer 6% into the second half of the decade. Much of this growth will be attributable to China. Currently standing at around 13 million tonnes, output is forecast to grow by 7% year on year, driven in part by rising output across a range of consumer products. Elsewhere, Russian corrugated capacity is doubled between 1998 and 2003 to around 1.8 million tonnes, and is set to reach around 2.8 million tonnes by 2007. The industry remains principally in the hands of Russian investors, although a number of western companies have set up shop in the country.

North American corrugated output declined by 1.4% on average between 2000 and 2003. Into 2004, however, there were signs of a recovery in US demand, reported to have grown by around 5% by mid-year, with inventory levels falling back and many plants operating at full capacity.

**TABLE E.7 Global corrugated production trends and forecasts by region, 2000-08**

| Million m <sup>2</sup>    | 2000    | 2001    | 2002    | 2003    | CAGR (%) 2000-03 | 2004f   | 2005f   | 2008f   | CAGR (%) 2003-08 |
|---------------------------|---------|---------|---------|---------|------------------|---------|---------|---------|------------------|
| North America             | 46,974  | 44,877  | 45,048  | 45,067  | -1.4             | 46,548  | 47,737  | 50,332  | 2.2              |
| Europe                    | 37,270  | 37,514  | 38,479  | 39,153  | 1.7              | 40,122  | 41,135  | 44,419  | 2.6              |
| Asia                      | 41,220  | 42,828  | 45,065  | 48,638  | 5.7              | 52,296  | 55,702  | 64,895  | 5.9              |
| South and Central America | 7,493   | 7,529   | 7,783   | 7,438   | -0.2             | 8,086   | 8,465   | 9,558   | 5.1              |
| Africa                    | 1,638   | 1,644   | 1,644   | 1,660   | 0.4              | 1,656   | 1,685   | 1,776   | 1.4              |
| Oceania                   | 2,134   | 2,142   | 2,225   | 2,272   | 2.1              | 2,318   | 2,347   | 2,438   | 1.4              |
| Total                     | 136,729 | 135,535 | 140,244 | 144,428 | 1.8              | 151,026 | 157,071 | 173,419 | 3.8              |

Source: ICCA

## Cartonboard

Cartonboard volumes amounted to around 33 million tonnes in 2000, according to Jaakko Pöyry Consulting, forecast to rise to 46 million tonnes by 2015 with Asia's share to set rise from 32% to 37% over the period, while that of North America is forecast to decline from 29% to 22%. Chinese output of cartonboard is currently growing at around 5% annually with demand amounting to 4.7 million tonnes in 2003.

In folding carton markets, there have been mixed fortunes of late for converters in North America and Europe into 2004, with shipments rising by 4-5% in the USA during the year. In Europe, the European Carton Makers Association (ECMA) has downgraded original 2000 forecasts of annual growth of 9% in the period to 2005, to 2-3% annual growth.

## Plastic packaging

The world market for plastic packaging was valued at \$130 billion in 2003, with the market growing at an annual average rate of 5% from 1999 onwards. The fastest growing element of the market has been rigid plastic packaging, consumption of which has grown by 6.2% year on year, while flexible plastic packaging sales – principally including wrapping and lidding films, bags, sacks, pouches, etc. have grown at a slower rate of 3.9%.

**TABLE E.8 Global consumption of plastic packaging by sector, 1999-2003 (\$ million)**

| \$ million        | 1999    | 2000    | 2001    | 2002    | 2003    | CAGR (%) 1999-2003 |
|-------------------|---------|---------|---------|---------|---------|--------------------|
| Rigid plastics    | 60,765  | 63,556  | 66,719  | 67,866  | 77,232  | 6.2                |
| Flexible plastics | 45,348  | 46,264  | 44,341  | 45,681  | 52,750  | 3.9                |
| Total             | 106,113 | 109,820 | 111,060 | 113,547 | 129,982 | 5.2                |

Source: Pira International Ltd

The growth in overall consumption of plastic packaging has been translated into increased demand for plastics across the globe. In western Europe, packaging accounted for 37% of plastics demand in 2003 – unchanged on 2002 – out of overall plastic consumption of 39.7 million tonnes. Polyethylene (PE), polypropylene (PP), PVC, PET and polystyrene between them accounted for plastics consumption of 32.4 million tonnes during the year, with production of these plastics amounting to 31.7 million tonnes.

Standing at 7.8 million tonnes in 2003, the market for PET resin has been driven by strong demand from the food and particularly beverage packaging industries, with carbonated soft drinks and bottled water representing the largest single markets. PET is now also making incursions into beer, still drinks, milk and pharmaceuticals, but there is overcapacity within the industry in Europe, at a time when several new PET resin plants are set to come on stream. Anti-dumping duties have though implemented by the EU, reducing imports from China and Australia, although this has led to rising imports from other countries. PET recycling has been growing steadily in Europe, with Petcore estimating increases of 30% in both 2002 and 2003 in PET bottle collection in Europe, forecast to reach 700,000 tonnes by 2006.

In the USA, meanwhile, packaging accounted for 34% of plastics usage at 27.5 billion lbs in 2003, growing at an annual rate of 3.3% in the period 1999-2003 although down 1% on 2002 levels. Data from the Association of Plastics Manufacturers points to declining demand for all types of polyethylene in 2003, but a 2.4% increase in polypropylene demand.

In Japan, plastics output for container applications rose from 0.44 million tonnes in 1999 to 0.65 million tonnes in 2003. Although output rose by just 1.6% in 2003, in the first half of 2004 output was 3% up on the same period in 2003, driven by strong demand for blow-moulding containers. Demand for laminates, meanwhile, has been growing relatively strongly, while that for wrapping films has been in decline.

China is increasingly becoming one of the world's major producers and users of plastics. In 2003, plastics output amounted to 11.7 million tonnes in 2003, forecast to reach 18.7 billion tonnes by 2009.

**TABLE E.9 China: plastic resin production by type, 2002-09**

| Million tonnes           | 2002 | 2003  | 2004  | 2005  | 2009  |
|--------------------------|------|-------|-------|-------|-------|
| Total plastic, of which: | 9.64 | 11.65 | 12.83 | 14.00 | 18.69 |
| PVC                      | 2.44 | 3.04  | 3.65  | 4.38  | 9.08  |
| PE                       | 2.47 | 3.02  | 3.58  | 4.23  | 8.28  |
| PP                       | 2.65 | 3.10  | 3.55  | 4.07  | 7.01  |

Source: China Ministry of Light Industry Annual Statistics Report

## Rigid plastic packaging

The world market for rigid plastic packaging was valued at \$77.2 billion in 2003, with the market growing at an annual average rate of 6.2% between 1999 and 2003. The fastest growing sector of the market, growth has been driven by strong demand from the food and beverage packaging industries, as an ever-increasing share of food sold through grocery multiples is packaged, and as beverage producers opt for plastic ahead of glass and metal for reasons of cost efficiency.

Suppliers of rigid plastic packaging have benefited from current trends, but profitability levels have not in general grown alongside sales due to downward pressure on prices from retailers and brand owners at a time of hikes in raw material prices, with plastic resin prices rising during 2003 and into 2004. With the customer base increasingly consolidating, the industry has been affected by its lack of consolidation in most areas, although PET packaging in particular is more concentrated.

A number of deals have gone through in recent years that have, for the most part, seen packaging companies refine their interests to focus on core areas, e.g. Rexam's exit from flexible packaging, Owens' concentration on its container glass business at the expense of most of its plastic packaging interests. However, there are moves afoot by outside investors, i.e. private equity companies, to assist in the drive towards consolidation. Key acquisitions in recent years have included Amcor's purchase of Schmalbach-Lubeca's PET container business and also Alcoa's PET operations in Latin America; Rexam's acquisition of Risdon Pharma and divestment of its thin wall container operations to RPC; Graham Packaging's acquisition of the majority of Owens-Illinois' plastic container business (excluding healthcare packaging interests); Visy Plastics's acquisition of Owens' Australasian plastic container business; Montagu Private Equity Partners' acquisition of Linpac; and Goldman Sachs' acquisition of Berry Plastics in 2002 alongside JP Morgan, which has also been expanding its portfolio in the flexibles arena (Pliant, Klockner Pentaplast). Berry subsequently acquired Landis Plastics into 2003, taking its annual sales to \$700 million. Leading players in rigid plastics include Amcor, Alpla-Werke, Rexam, Graham Packaging, Yoshino Kogyosho and also Constar, the PET container business spun off by Crown Holdings in 2003.

North America represents the largest single market for rigid plastic packaging, with the market valued at \$23.1 billion in 2003, recovering into 2003 after a downturn in US demand during 2002 despite poor summer weather conditions impacting upon plastic bottle demand. The fastest growing regional market, however, has been eastern Europe, where there has been a significant shift towards plastic packaging in fast-growth beverage markets, particularly soft drinks but also beer in the CIS, Baltics and other countries where PET's share is now 10-15%. Russia is now the tenth largest market for rigid plastic packaging worldwide at \$2.0 billion in 2003. The USA ranks one at \$19.1 billion, ahead of Japan (\$8.5 billion), Germany (\$5.0 billion), France (\$4.2 billion) and the UK (\$3.5 billion).

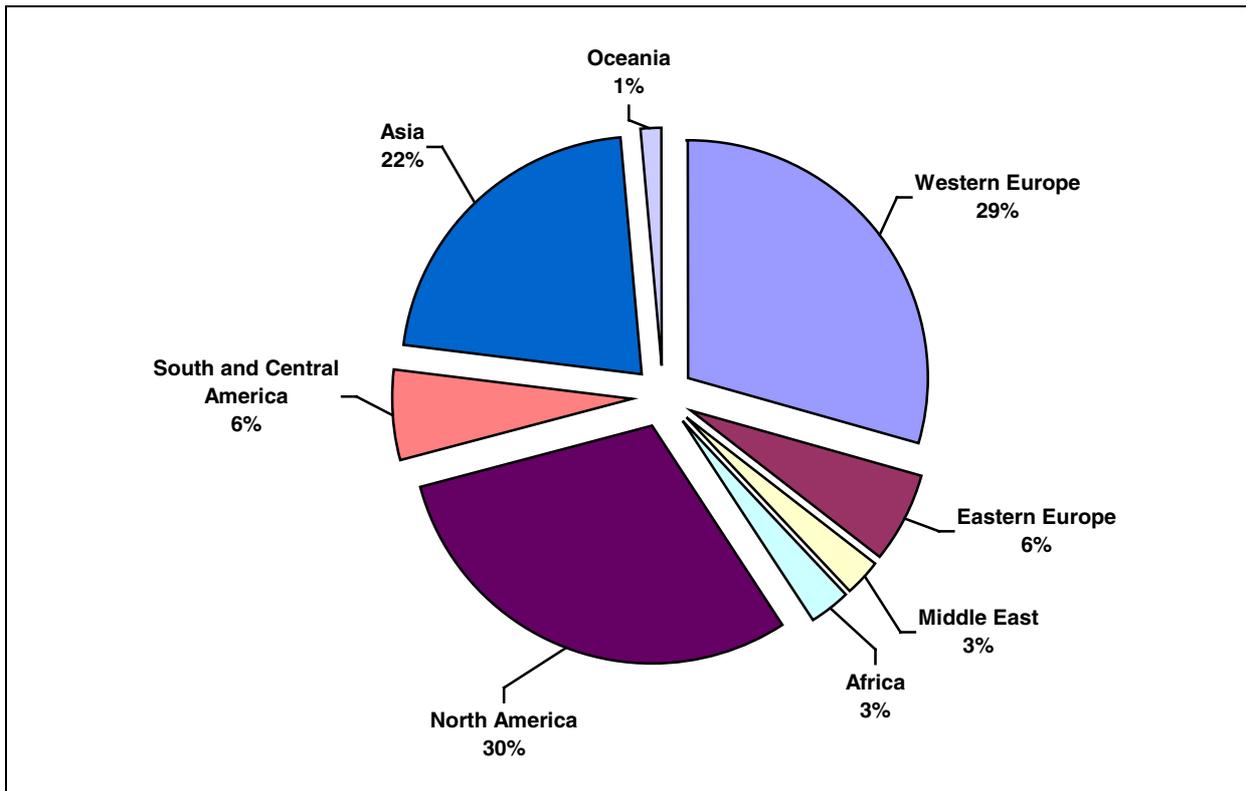
**TABLE E.10 Rigid plastic packaging consumption by region, 1999-2003 (\$ million)**

| \$ million                | 1999   | 2000   | 2001   | 2002   | 2003   | CAGR (%)<br>1999-2003 |
|---------------------------|--------|--------|--------|--------|--------|-----------------------|
| Western Europe            | 16,460 | 15,887 | 17,371 | 18,592 | 22,662 | 8.3                   |
| Eastern Europe            | 2,138  | 2,191  | 2,573  | 3,309  | 4,696  | 21.7                  |
| Middle East               | 1,140  | 1,244  | 1,698  | 1,796  | 2,067  | 16                    |
| Africa                    | 1,500  | 1,514  | 1,418  | 1,377  | 2,131  | 9.2                   |
| North America             | 20,377 | 21,938 | 22,610 | 22,235 | 23,052 | 3.1                   |
| South and Central America | 6,163  | 6,556  | 5,948  | 4,585  | 4,835  | -5.9                  |
| Asia                      | 12,179 | 13,424 | 14,319 | 15,109 | 16,704 | 8.2                   |
| Oceania                   | 808    | 803    | 781    | 863    | 1,085  | 7.7                   |
| World                     | 60,765 | 63,556 | 66,719 | 67,866 | 77,232 | 6.2                   |

Note: totals may not add up due to rounding

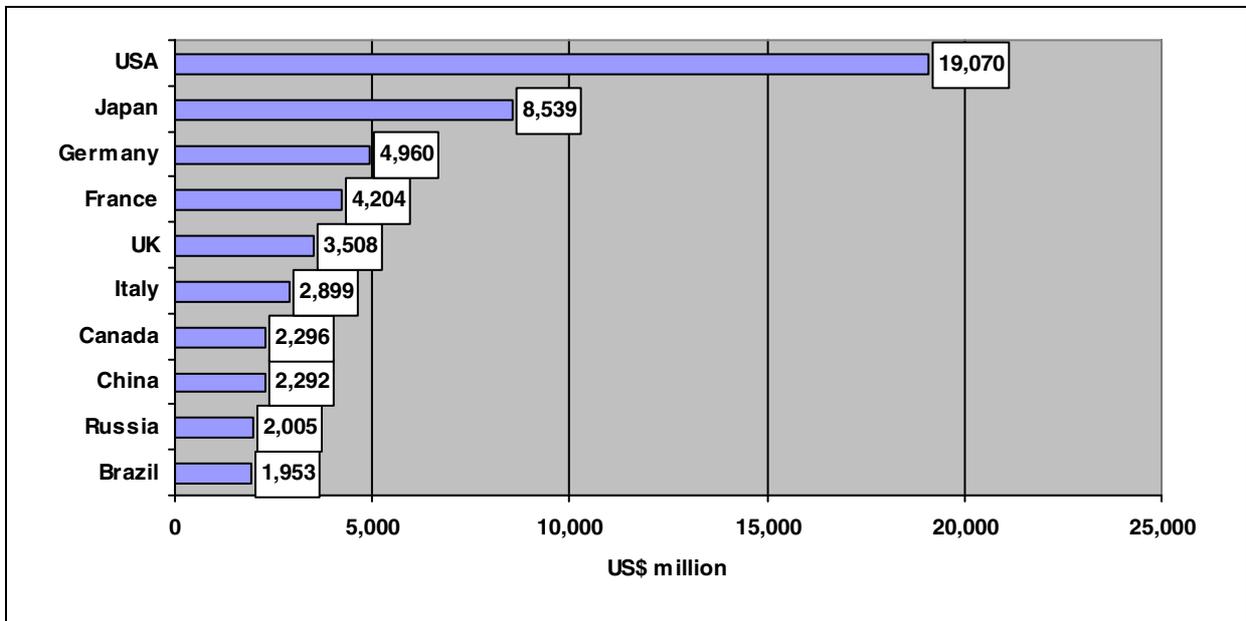
Source: Pira International Ltd

**FIGURE E.11 Rigid plastic packaging consumption by region, 2003**



Source: Pira International Ltd

**FIGURE E.12 Top ten rigid plastic packaging markets, 2003**



Source: Pira International Ltd

Continued growth is anticipated in rigid plastics demand, as further incursions are made by plastics into food markets and new opportunities emerge in beverages and also healthcare markets. Consumption is forecast to grow at an annual rate of 6.5% in real terms from 2004 onwards, with solid growth in more mature markets in western Europe and North America, and near double-digit growth rates in emerging and

transitional markets. China will become the sixth largest market for rigid plastics at \$5.1 billion by the end of the period, with the USA continuing to head the rankings at \$22.3 billion.

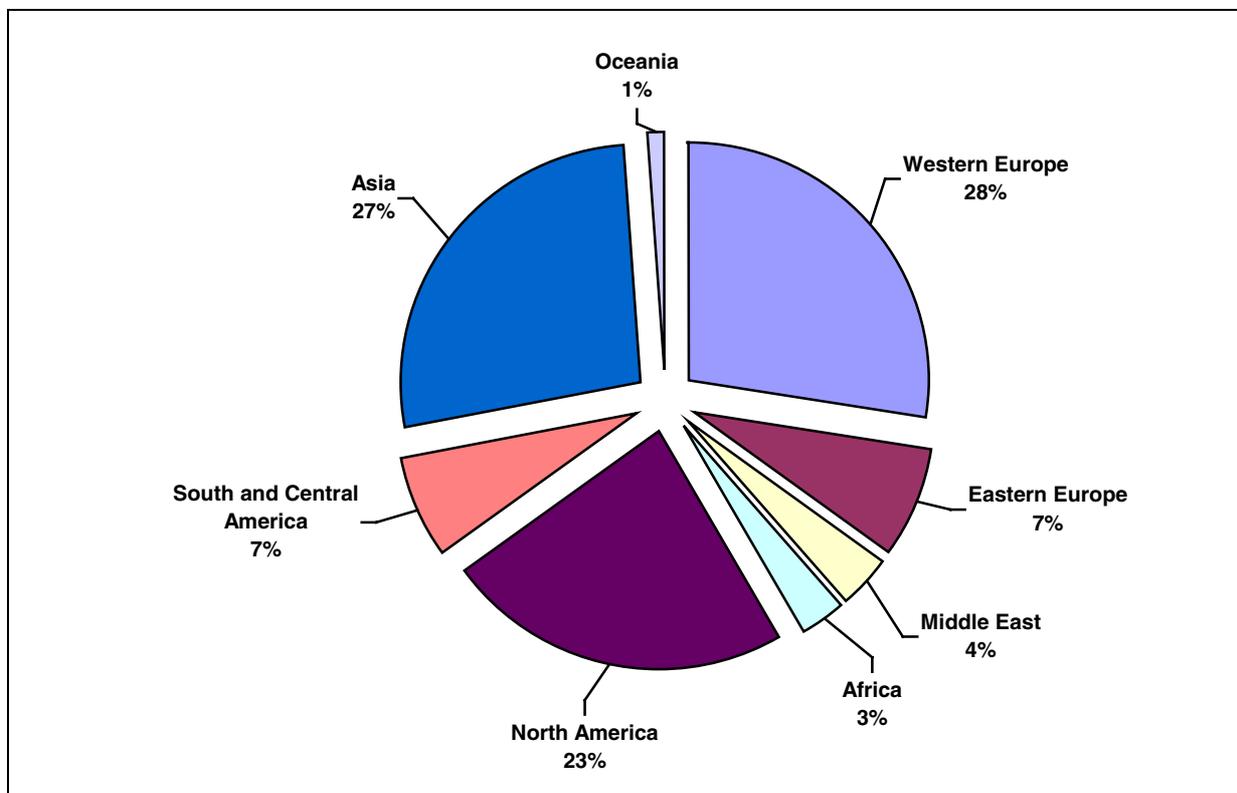
**TABLE E.11 Forecast rigid plastic packaging consumption by region, 2003-09 (\$ million)**

| \$ million                | 2003   | 2004   | % change 2003-04 | 2005   | % change 2004-05 | 2009    | CAGR (%) 2004-09 |
|---------------------------|--------|--------|------------------|--------|------------------|---------|------------------|
| Western Europe            | 22,662 | 25,661 | 13.2             | 26,779 | 4.4              | 31,849  | 4.4              |
| Eastern Europe            | 4,696  | 5,472  | 16.5             | 5,975  | 9.2              | 8,662   | 9.6              |
| Middle East               | 2,067  | 2,266  | 9.6              | 2,513  | 10.9             | 4,121   | 12.7             |
| Africa                    | 2,131  | 2,449  | 14.9             | 2,702  | 10.3             | 3,679   | 8.5              |
| North America             | 23,052 | 23,704 | 2.8              | 24,347 | 2.7              | 27,101  | 2.7              |
| South and Central America | 4,835  | 5,009  | 3.6              | 5,475  | 9.3              | 7,849   | 9.4              |
| Asia                      | 16,704 | 19,029 | 13.9             | 21,015 | 10.4             | 31,267  | 10.4             |
| Oceania                   | 1,085  | 1,208  | 11.3             | 1,252  | 3.7              | 1,404   | 3.1              |
| World                     | 77,232 | 84,797 | 9.8              | 90,058 | 6.2              | 115,932 | 6.5              |

Note: constant prices from 2005 onwards; totals may not add up due to rounding

Source: Pira International Ltd

**FIGURE E.13 Forecast rigid plastic packaging consumption by region, 2009**



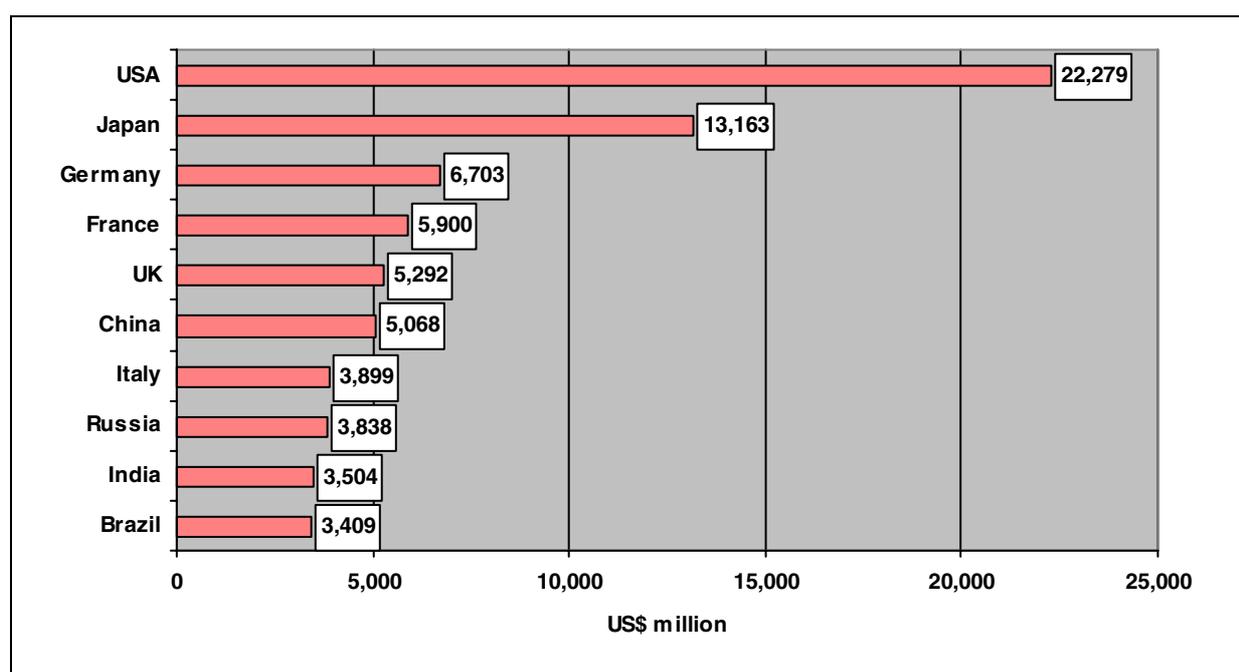
Source: Pira International Ltd

**TABLE E.12 Top 25 rigid plastic packaging markets, 2003-09 (\$ million)**

| \$ million   | 2003   | 2004   | % change<br>2003-04 | 2005   | % change<br>2004-05 | 2009   | CAGR (%)<br>2004-09 |
|--------------|--------|--------|---------------------|--------|---------------------|--------|---------------------|
| USA          | 19,070 | 19,601 | 2.8                 | 20,136 | 2.7                 | 22,279 | 2.6                 |
| Japan        | 8,539  | 9,887  | 15.8                | 10,796 | 9.2                 | 13,163 | 5.9                 |
| Germany      | 4,960  | 5,578  | 12.5                | 5,789  | 3.8                 | 6,703  | 3.7                 |
| France       | 4,204  | 4,757  | 13.1                | 4,960  | 4.3                 | 5,900  | 4.4                 |
| UK           | 3,508  | 4,129  | 17.7                | 4,305  | 4.3                 | 5,292  | 5.1                 |
| China        | 2,292  | 2,587  | 12.9                | 2,852  | 10.3                | 5,068  | 14.4                |
| Italy        | 2,899  | 3,227  | 11.3                | 3,367  | 4.3                 | 3,899  | 3.9                 |
| Russia       | 2,005  | 2,418  | 20.6                | 2,662  | 10.1                | 3,838  | 9.7                 |
| India        | 1,193  | 1,364  | 14.3                | 1,680  | 23.2                | 3,504  | 20.8                |
| Brazil       | 1,953  | 1,977  | 1.2                 | 2,208  | 11.7                | 3,409  | 11.5                |
| Canada       | 2,296  | 2,490  | 8.5                 | 2,558  | 2.7                 | 2,831  | 2.6                 |
| Spain        | 1,791  | 2,022  | 12.9                | 2,126  | 5.1                 | 2,615  | 5.3                 |
| China Taiwan | 1,050  | 1,145  | 9.1                 | 1,226  | 7.1                 | 2,065  | 12.5                |
| South Korea  | 1,056  | 1,214  | 14.9                | 1,321  | 8.8                 | 1,993  | 10.4                |
| Mexico       | 1,686  | 1,612  | -4.4                | 1,653  | 2.5                 | 1,992  | 4.3                 |
| Switzerland  | 1,410  | 1,590  | 12.7                | 1,662  | 4.5                 | 1,904  | 3.7                 |
| Poland       | 664    | 783    | 18.0                | 873    | 11.5                | 1,514  | 14.1                |
| South Africa | 720    | 934    | 29.7                | 1,042  | 11.5                | 1,424  | 8.8                 |
| Turkey       | 537    | 569    | 6.0                 | 614    | 8.0                 | 1,348  | 18.8                |
| Argentina    | 838    | 837    | -0.1                | 894    | 6.8                 | 1,302  | 9.2                 |
| Australia    | 921    | 1,021  | 10.8                | 1,055  | 3.4                 | 1,166  | 2.7                 |
| Netherlands  | 762    | 844    | 10.8                | 881    | 4.4                 | 1,056  | 4.6                 |
| Belgium      | 740    | 836    | 13.0                | 872    | 4.3                 | 1,037  | 4.4                 |
| Chile        | 494    | 575    | 16.4                | 644    | 12.1                | 821    | 7.4                 |
| Austria      | 416    | 464    | 11.4                | 487    | 5.0                 | 576    | 4.4                 |

Note: constant prices from 2005 onwards

Source: Pira International Ltd

**FIGURE E.14 Top ten rigid plastic packaging markets, 2009**

Source: Pira International Ltd

## Flexible plastic packaging

Flexible plastic packaging sales grew at an annual rate of 4% during the period 1999-2003 to reach \$53 billion. In applications such as MAP, consumption of flexible films has been growing strongly, but in lower-priced, commodity areas, value sales have been growing at a relatively slow rate. This is in part due to overcapacity in many markets and consequent intense downward price competition.

Eastern European markets have witnessed the fastest growth rates in recent years, growing at an annual rate of 14% to reach \$3.2 billion. The Russian market has been the fastest growing of all markets reviewed, up from \$429 million in 1999 to \$1.44 billion. The USA though remains the world's largest market, valued at \$17.7 billion in 2003, ahead of Japan (\$4.2 billion), Italy (\$3.3 billion) and the UK (\$3.2 billion).

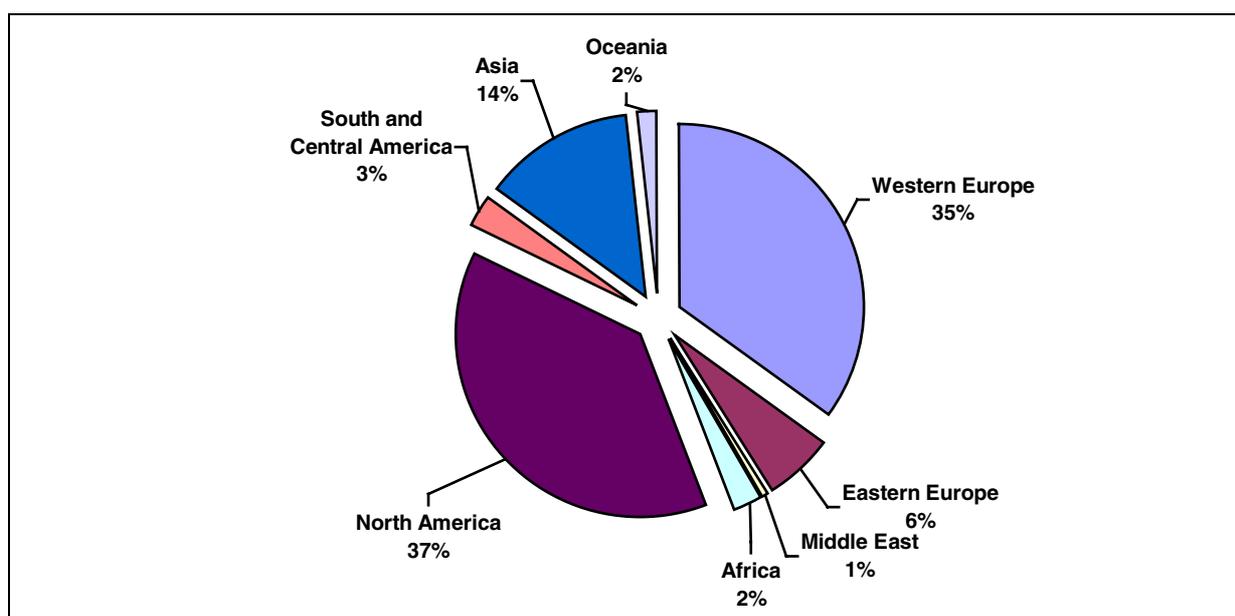
**TABLE E.13 Flexible plastic packaging consumption by region, 1999-2003 (\$ million)**

| \$ million                | 1999   | 2000   | 2001   | 2002   | 2003   | CAGR (%)<br>1999-2003 |
|---------------------------|--------|--------|--------|--------|--------|-----------------------|
| Western Europe            | 14,257 | 13,926 | 13,219 | 14,981 | 18,494 | 6.7                   |
| Eastern Europe            | 1,935  | 1,701  | 1,927  | 2,439  | 3,222  | 13.6                  |
| Middle East               | 247    | 319    | 344    | 268    | 290    | 4.1                   |
| Africa                    | 946    | 929    | 850    | 803    | 1,222  | 6.6                   |
| North America             | 17,663 | 18,524 | 18,671 | 18,446 | 20,085 | 3.3                   |
| South and Central America | 1,991  | 2,211  | 1,945  | 1,416  | 1,504  | -6.8                  |
| Asia                      | 7,615  | 7,989  | 6,764  | 6,670  | 7,123  | -1.7                  |
| Oceania                   | 694    | 666    | 620    | 657    | 810    | 4.0                   |
| World                     | 45,348 | 46,264 | 44,341 | 45,681 | 52,750 | 3.9                   |

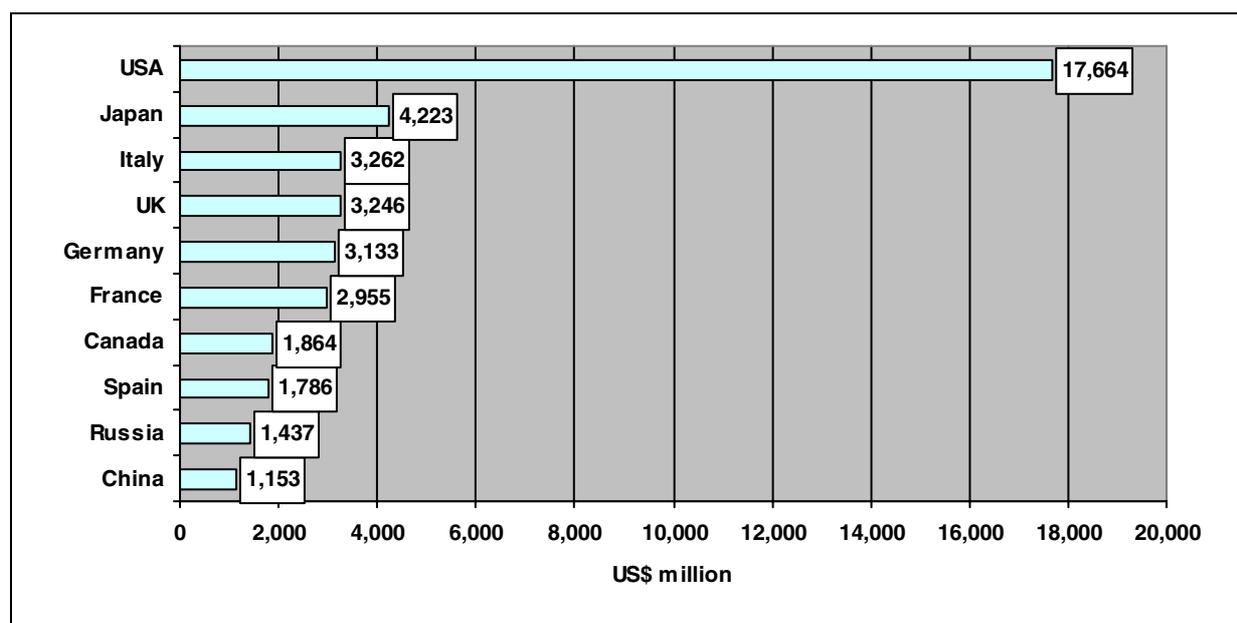
Note: totals may not add up due to rounding

Source: Pira International Ltd

**FIGURE E.15 Flexible plastic packaging consumption by region, 2003**



Source: Pira International Ltd

**FIGURE E.16 Top ten flexible plastic packaging markets, 2003**

Source: Pira International Ltd

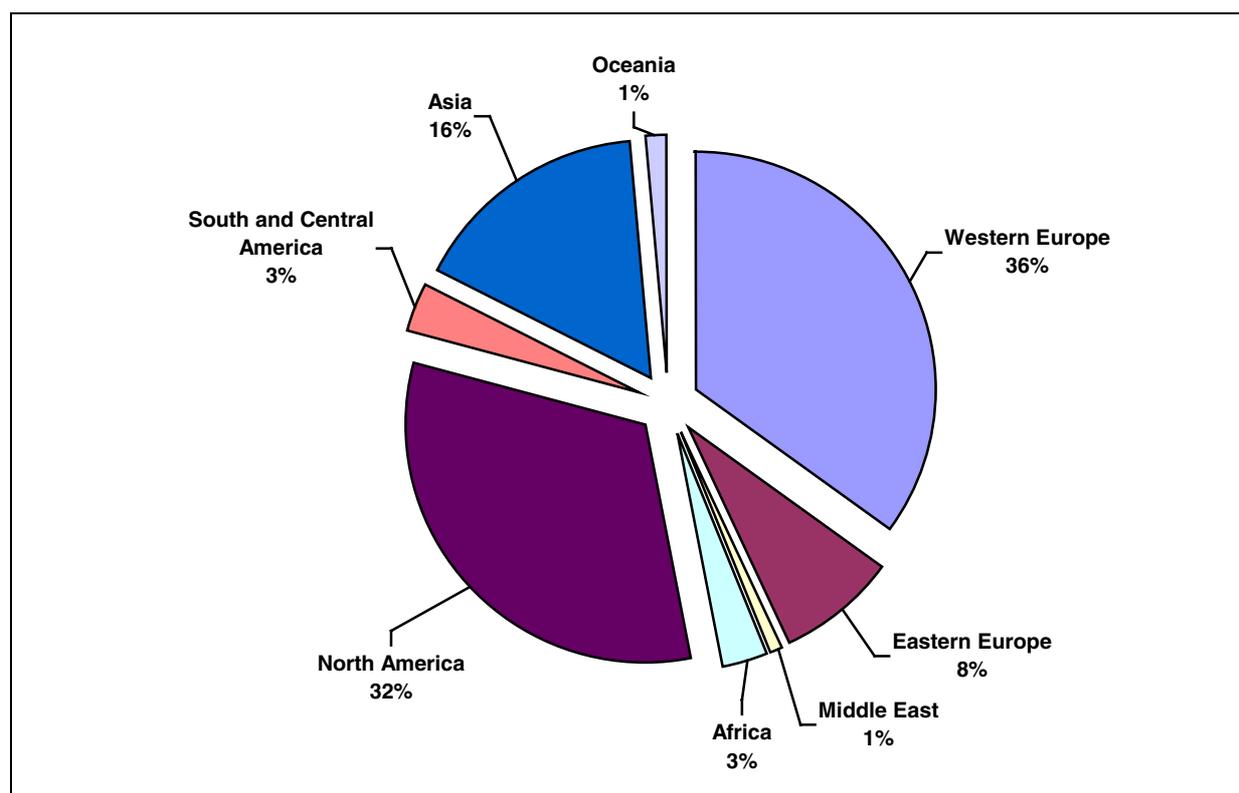
The market for flexible plastic packaging is set to gain momentum into the latter half of the decade, driven by strong growth in emerging markets and a return to trend growth levels in more mature western markets. After growth of 8.5% in 2004, the market is forecast to grow at an annual rate of 4.3% in the period to 2009 to reach \$70.8 billion.

**TABLE E.14 Forecast flexible plastic packaging consumption by region, 2003-09 (\$ million)**

| \$ million                | 2003   | 2004   | % change<br>2003-04 | 2005   | % change<br>2004-05 | 2009   | CAGR (%)<br>2004-09 |
|---------------------------|--------|--------|---------------------|--------|---------------------|--------|---------------------|
| Western Europe            | 18,494 | 20,777 | 12.3                | 21,528 | 3.6                 | 24,851 | 3.6                 |
| Eastern Europe            | 3,222  | 3,727  | 15.7                | 4,046  | 8.6                 | 5,704  | 8.9                 |
| Middle East               | 290    | 323    | 11.5                | 363    | 12.4                | 558    | 11.5                |
| Africa                    | 1,222  | 1,394  | 14.1                | 1,522  | 9.2                 | 2,060  | 8.1                 |
| North America             | 20,085 | 20,666 | 2.9                 | 21,195 | 2.6                 | 22,968 | 2.1                 |
| South and Central America | 1,504  | 1,573  | 4.6                 | 1,682  | 6.9                 | 2,251  | 7.4                 |
| Asia                      | 7,123  | 7,852  | 10.2                | 8,333  | 6.1                 | 11,373 | 7.7                 |
| Oceania                   | 810    | 916    | 13                  | 945    | 3.2                 | 1,026  | 2.3                 |
| World                     | 52,750 | 57,228 | 8.5                 | 59,615 | 4.2                 | 70,791 | 4.3                 |

Note: constant prices from 2005 onwards; totals may not add up due to rounding

Source: Pira International Ltd

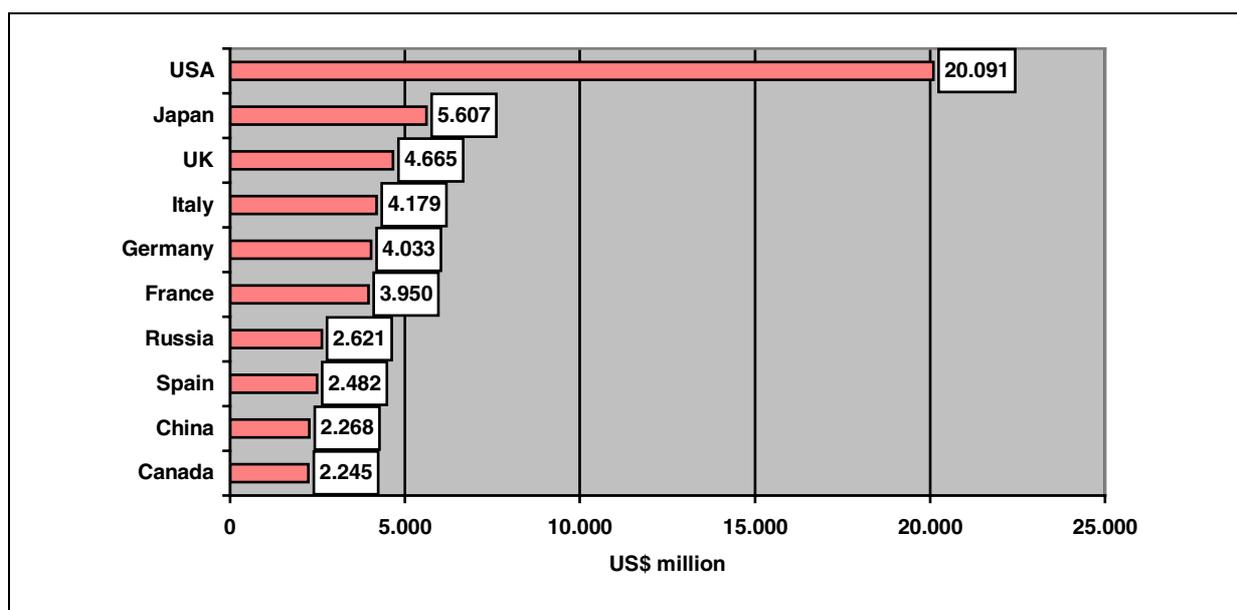
**FIGURE E.17 Forecast flexible plastic packaging consumption by region, 2009**

Source: Pira International Ltd

**TABLE E.15 Top 25 flexible plastic packaging markets, 2003-09 (\$ million)**

| \$ million   | 2003   | 2004   | % change<br>2003-04 | 2005   | % change<br>2004-05 | 2009   | CAGR (%)<br>2004-09 |
|--------------|--------|--------|---------------------|--------|---------------------|--------|---------------------|
| USA          | 17,664 | 18,109 | 2.5                 | 18,585 | 2.6                 | 20,091 | 2.1                 |
| Japan        | 4,223  | 4,648  | 10.1                | 4,856  | 4.5                 | 5,607  | 3.8                 |
| UK           | 3,246  | 3,786  | 16.6                | 3,923  | 3.6                 | 4,665  | 4.3                 |
| Italy        | 3,262  | 3,607  | 10.6                | 3,730  | 3.4                 | 4,179  | 3.0                 |
| Germany      | 3,133  | 3,494  | 11.5                | 3,600  | 3.0                 | 4,033  | 2.9                 |
| France       | 2,955  | 3,315  | 12.2                | 3,433  | 3.5                 | 3,950  | 3.6                 |
| Russia       | 1,437  | 1,719  | 19.6                | 1,879  | 9.3                 | 2,621  | 8.8                 |
| Spain        | 1,786  | 2,000  | 12.0                | 2,086  | 4.3                 | 2,482  | 4.4                 |
| China        | 1,153  | 1,302  | 13.0                | 1,336  | 2.6                 | 2,268  | 11.7                |
| Canada       | 1,864  | 2,020  | 8.4                 | 2,064  | 2.2                 | 2,245  | 2.1                 |
| India        | 499    | 571    | 14.5                | 670    | 17.3                | 1,271  | 17.3                |
| Poland       | 481    | 563    | 17.0                | 623    | 10.7                | 1,039  | 13.0                |
| Brazil       | 616    | 629    | 2.2                 | 687    | 9.2                 | 1,003  | 9.8                 |
| Netherlands  | 753    | 829    | 10.1                | 857    | 3.4                 | 994    | 3.7                 |
| Australia    | 695    | 786    | 13.1                | 812    | 3.3                 | 872    | 2.1                 |
| China Taiwan | 472    | 516    | 9.3                 | 539    | 4.5                 | 832    | 10.0                |
| South Africa | 427    | 541    | 26.9                | 591    | 9.1                 | 803    | 8.2                 |
| Belgium      | 569    | 637    | 12.0                | 660    | 3.6                 | 759    | 3.6                 |
| South Korea  | 483    | 531    | 9.9                 | 556    | 4.9                 | 735    | 6.7                 |
| Switzerland  | 498    | 557    | 11.9                | 577    | 3.7                 | 640    | 2.8                 |
| Mexico       | 557    | 538    | -3.4                | 546    | 1.6                 | 631    | 3.2                 |
| Austria      | 406    | 450    | 10.7                | 468    | 4.0                 | 536    | 3.6                 |
| Denmark      | 349    | 388    | 11.0                | 403    | 3.9                 | 464    | 3.7                 |
| Sweden       | 335    | 376    | 12.3                | 390    | 3.7                 | 460    | 4.1                 |
| Ireland      | 286    | 328    | 14.4                | 348    | 6.4                 | 456    | 6.9                 |

Source: Pira International Ltd

**FIGURE E.18 Top ten flexible plastic packaging markets, 2009**

Source: Pira International Ltd

## Metal

The world market for metal packaging was valued at \$76 billion in 2003, growing at an annual rate of 1.7% between 1999 and 2003. North America accounts for the largest share of the market at \$25 billion, equating to 33% of the total ahead of western Europe (28%) and Asia (22%). In recent years, the fastest growing sectors of the market have been in the Middle East, Africa and eastern Europe, where demand for beverage cans in particular remains strong. In more mature markets, however, metal packaging has lost share to plastics in food packaging sectors as canned food sales have been either static or falling, and is seeing its share eroded in pet food by flexible pouches and in beverages by PET bottles. At the same time, demand for metal containers in industrial/ bulk packaging markets has been solid in the USA and other key national markets.

The USA ranks one worldwide in metal packaging with sales of \$21.7 billion, ahead of Japan (\$9.1 billion), France (\$3.4 billion) and the UK (\$3.2 billion). France is notable for its strong food can market while the UK is notable for its position as Europe's largest beverage can market.

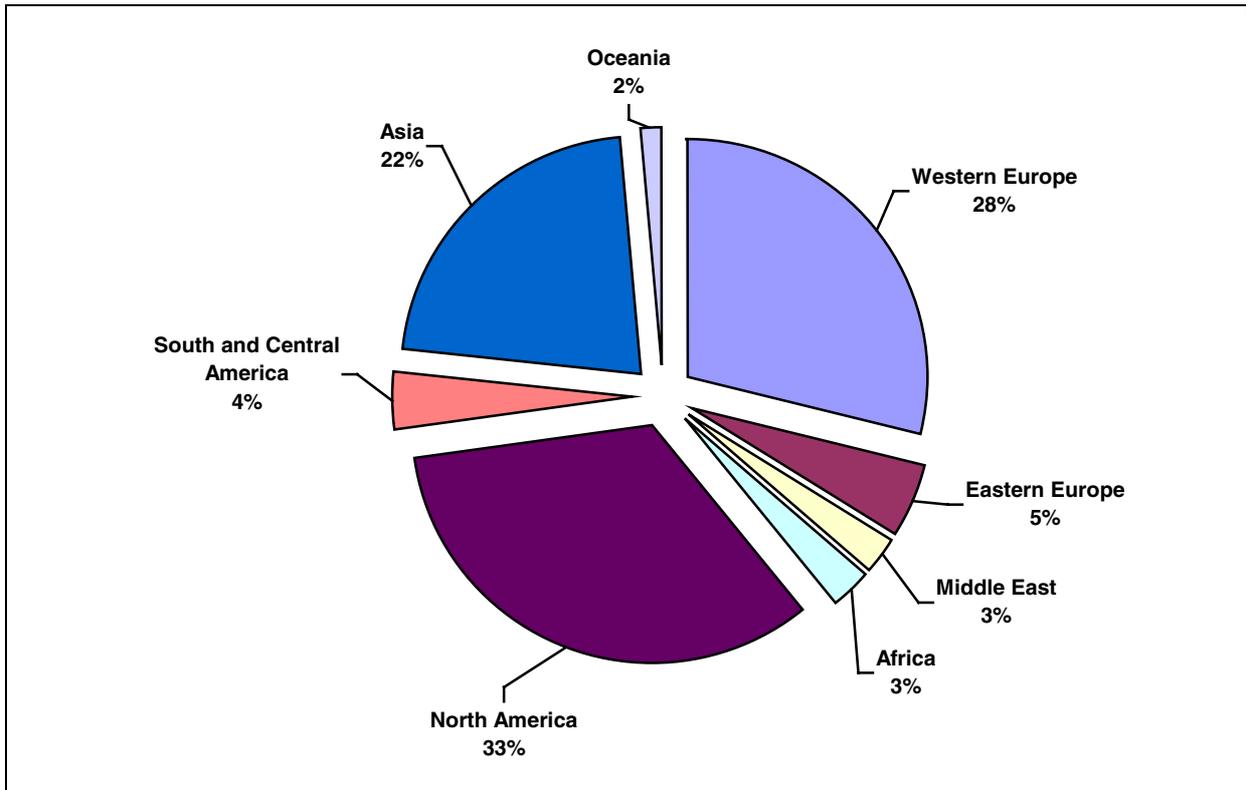
**TABLE E.16 Metal packaging consumption by region, 1999-2003 (\$ million)**

| \$ million                | 1999   | 2000   | 2001   | 2002   | 2003   | CAGR (%) 1999-2003 |
|---------------------------|--------|--------|--------|--------|--------|--------------------|
| Western Europe            | 19,371 | 17,678 | 17,282 | 18,737 | 21,799 | 3.0                |
| Eastern Europe            | 2,968  | 2,562  | 2,395  | 2,873  | 3,748  | 6.0                |
| Middle East               | 1,158  | 1,206  | 1,193  | 1,358  | 1,935  | 13.7               |
| Africa                    | 1,122  | 1,235  | 1,298  | 1,475  | 2,056  | 16.3               |
| North America             | 24,855 | 24,278 | 23,838 | 24,815 | 25,425 | 0.6                |
| South and Central America | 3,145  | 3,405  | 3,434  | 2,820  | 2,994  | -1.2               |
| Asia                      | 17,058 | 17,863 | 16,078 | 15,598 | 16,411 | -1.0               |
| Oceania                   | 916    | 864    | 789    | 885    | 1,152  | 5.9                |
| World                     | 70,593 | 69,091 | 66,307 | 68,561 | 75,519 | 1.7                |

Note: totals may not add up due to rounding

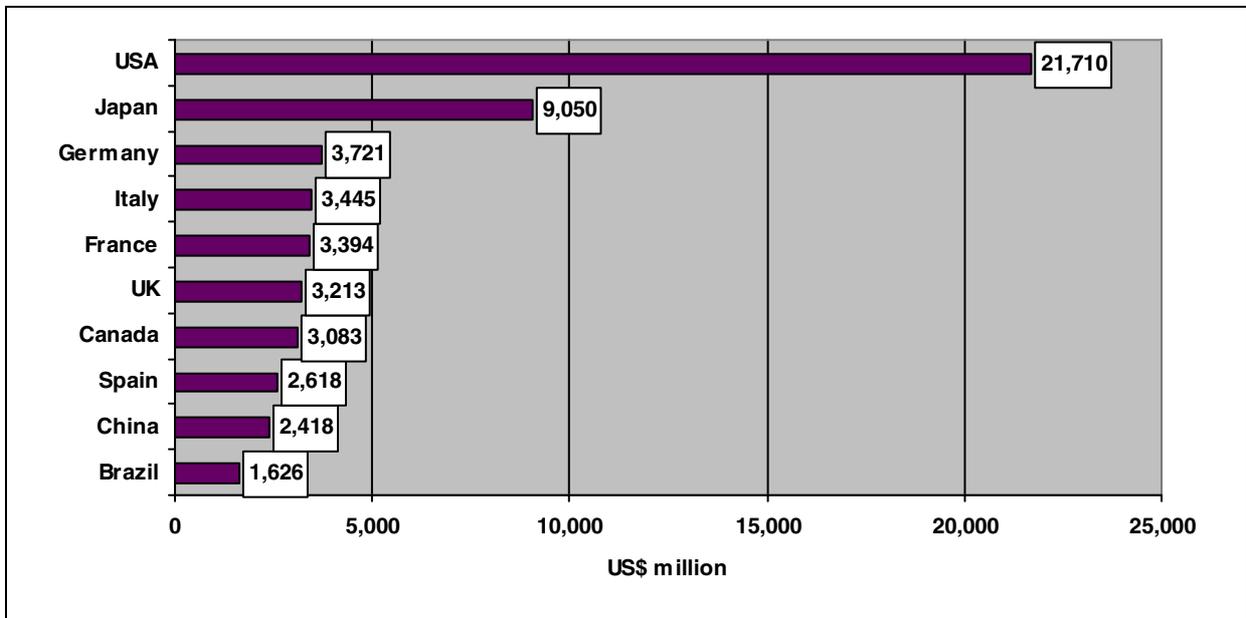
Source: Pira International Ltd

**FIGURE E.19 Metal packaging consumption by region, 2003**



Source: Pira International Ltd

**FIGURE E.20 Top ten metal packaging markets, 2003**



Source: Pira International Ltd

Global sales of metal packaging are forecast to grow at a rate of just under 3% in real terms in the period 2004-09, with strong growth in emerging and transitional markets and low growth of the order of 1% in

mature western markets. China is set to overtake the UK and France to become the third largest market in the world with sales of \$4 billion by 2009.

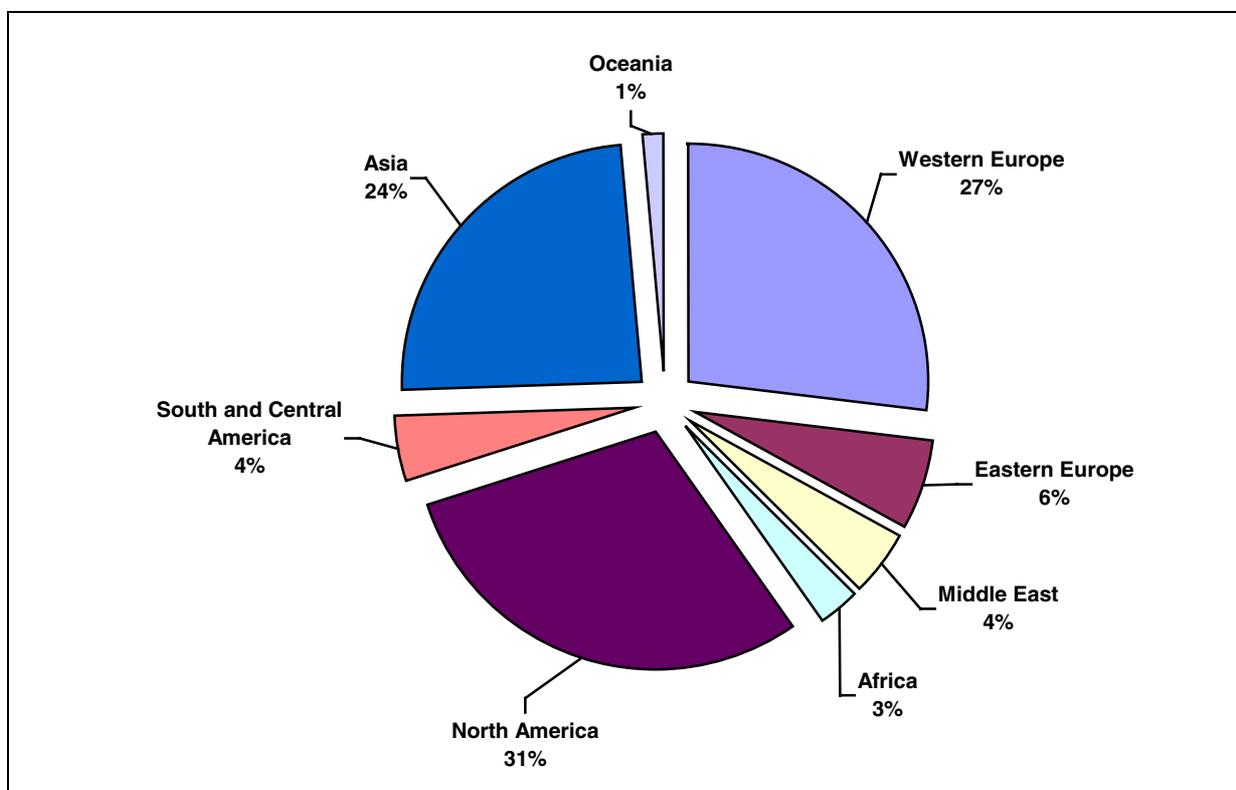
**TABLE E.17 Forecast metal packaging consumption by region, 2003-09 (\$ million)**

| \$ million                | 2003   | 2004   | % change 2003-04 | 2005   | % change 2004-05 | 2009   | CAGR (%) 2004-09 |
|---------------------------|--------|--------|------------------|--------|------------------|--------|------------------|
| Western Europe            | 21,799 | 23,641 | 8.5              | 23,870 | 1.0              | 24,869 | 1.0              |
| Eastern Europe            | 3,748  | 4,186  | 11.7             | 4,422  | 5.6              | 5,606  | 6.0              |
| Middle East               | 1,935  | 2,200  | 13.7             | 2,571  | 16.9             | 3,961  | 12.5             |
| Africa                    | 2,056  | 2,208  | 7.4              | 2,302  | 4.3              | 2,801  | 4.9              |
| North America             | 25,425 | 25,843 | 1.6              | 26,135 | 1.1              | 27,351 | 1.1              |
| South and Central America | 2,994  | 3,059  | 2.2              | 3,242  | 6.0              | 4,082  | 5.9              |
| Asia                      | 16,411 | 17,838 | 8.7              | 18,572 | 4.1              | 22,165 | 4.4              |
| Oceania                   | 1,152  | 1,261  | 9.5              | 1,275  | 1.1              | 1,334  | 1.1              |
| World                     | 75,519 | 80,236 | 6.2              | 82,389 | 2.7              | 92,169 | 2.8              |

Note: constant prices from 2005 onwards; totals may not add up due to rounding

Source: Pira International Ltd

**FIGURE E.21 Forecast metal packaging consumption by region, 2009**



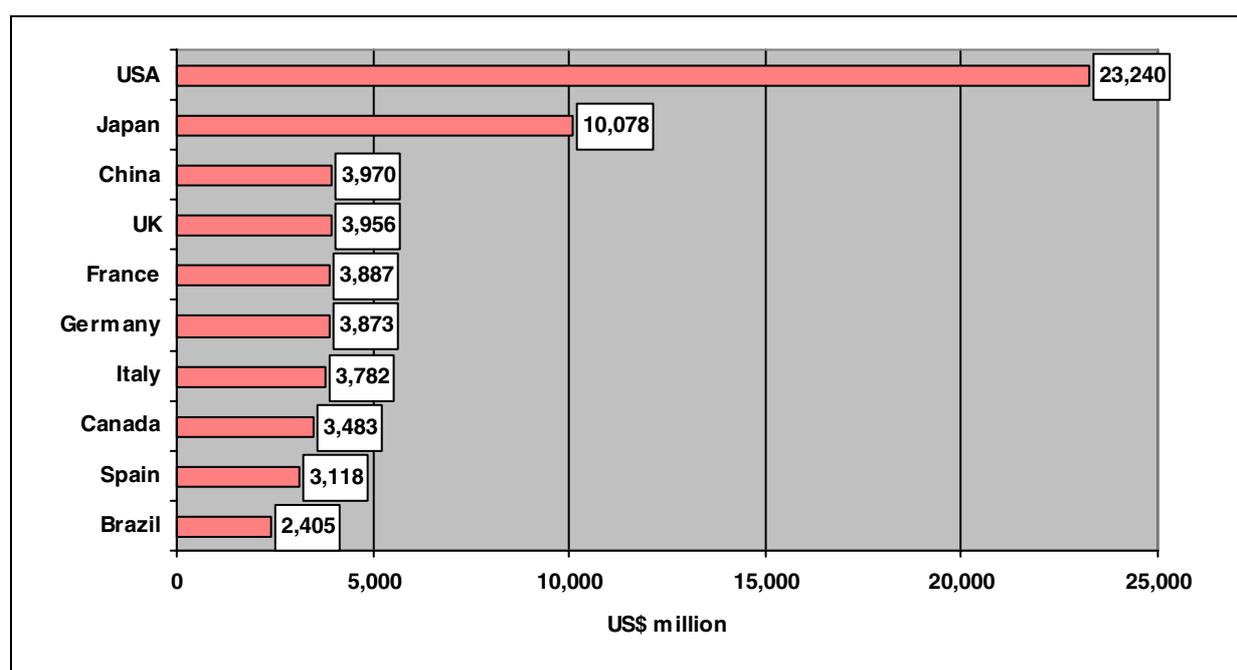
Source: Pira International Ltd

**TABLE E.18 Top 25 metal packaging markets, 2003-09 (\$ million)**

| \$ million   | 2003   | 2004   | % change<br>2003-04 | 2005   | % change<br>2004-05 | 2009   | CAGR (%)<br>2004-09 |
|--------------|--------|--------|---------------------|--------|---------------------|--------|---------------------|
| USA          | 21,710 | 21,956 | 1.1                 | 22,213 | 1.2                 | 23,240 | 1.1                 |
| Japan        | 9,050  | 9,974  | 10.2                | 10,135 | 1.6                 | 10,078 | 0.2                 |
| China        | 2,418  | 2,599  | 7.4                 | 2,761  | 6.3                 | 3,970  | 8.8                 |
| UK           | 3,213  | 3,634  | 13.1                | 3,684  | 1.4                 | 3,956  | 1.7                 |
| France       | 3,394  | 3,702  | 9.1                 | 3,742  | 1.1                 | 3,887  | 1.0                 |
| Germany      | 3,721  | 3,839  | 3.2                 | 3,860  | 0.6                 | 3,873  | 0.2                 |
| Italy        | 3,445  | 3,725  | 8.1                 | 3,739  | 0.4                 | 3,782  | 0.3                 |
| Canada       | 3,083  | 3,291  | 6.7                 | 3,329  | 1.2                 | 3,483  | 1.1                 |
| Spain        | 2,618  | 2,860  | 9.2                 | 2,903  | 1.5                 | 3,118  | 1.7                 |
| Brazil       | 1,626  | 1,625  | -0.1                | 1,758  | 8.2                 | 2,405  | 8.2                 |
| India        | 1,163  | 1,265  | 8.8                 | 1,459  | 15.3                | 2,250  | 12.2                |
| Turkey       | 493    | 679    | 37.7                | 953    | 40.3                | 1,863  | 22.4                |
| Russia       | 1,063  | 1,236  | 16.2                | 1,319  | 6.7                 | 1,661  | 6.1                 |
| South Korea  | 1,175  | 1,285  | 9.4                 | 1,301  | 1.2                 | 1,601  | 4.5                 |
| Poland       | 809    | 920    | 13.7                | 994    | 8.1                 | 1,461  | 9.7                 |
| Netherlands  | 1,084  | 1,170  | 7.9                 | 1,172  | 0.2                 | 1,228  | 1.0                 |
| Australia    | 992    | 1,083  | 9.2                 | 1,079  | -0.4                | 1,121  | 0.7                 |
| China Taiwan | 755    | 784    | 3.8                 | 802    | 2.3                 | 1,101  | 7.0                 |
| Belgium      | 797    | 869    | 9.0                 | 878    | 1.0                 | 912    | 1.0                 |
| South Africa | 589    | 710    | 20.6                | 737    | 3.7                 | 896    | 4.8                 |
| Austria      | 676    | 733    | 8.4                 | 739    | 0.8                 | 764    | 0.8                 |
| Mexico       | 633    | 597    | -5.6                | 593    | -0.7                | 628    | 1.0                 |
| Denmark      | 523    | 567    | 8.4                 | 573    | 1.1                 | 596    | 1.0                 |
| Switzerland  | 520    | 568    | 9.3                 | 573    | 0.7                 | 573    | 0.2                 |
| Indonesia    | 332    | 322    | -3.1                | 346    | 7.4                 | 517    | 9.9                 |

Note: constant prices from 2005 onwards

Source: Pira International Ltd

**FIGURE E.22 Top ten metal packaging markets, 2009**

Source: Pira International Ltd

## Beverage cans

According to Beverage Can Makers Europe (BCME), the world market for beverage cans stood at some 220 billion units in 2002, with North America accounting for almost half the total at 108 billion units ahead of Asia (40 billion) and Europe (38 billion).

Rexam is the global leader in beverage cans, strengthening its position with the acquisition of number one Brazilian producer Latasa to bring its share of the South American market to 64%, ahead of Crown Holdings (17%) and the Ball Corporation (15%). In the USA, Rexam holds a 23% share of the market, ahead of Crown (17%) but behind Ball (34%) and Anheuser-Busch's Metal Containers (26%). In Europe, meanwhile, Rexam predominates with a 43% share ahead of Ball (27%) and Crown (20%).

**TABLE E.19 World beverage can market by region, 2003**

| <b>Region</b> | <b>Billion cans</b> |
|---------------|---------------------|
| North America | 108                 |
| South America | 17                  |
| Europe        | 38                  |
| Africa        | 5                   |
| Middle East   | 5                   |
| Asia          | 40                  |
| Australasia   | 10                  |
| Total         | 220                 |

Source: BCME

## Aerosols

The USA is the world's largest producer of aerosol cans at 3.55 billion units in 2003, ahead of the UK (1.35 billion), Germany (970 million), China (727 million) and Japan (577 million). In recent years, output has grown steadily in Europe and has been on a general upward trend in most markets – except highly saturated ones such as the UK. The fastest growing markets now include Russia, more than doubling from 82 million to 182 million units in the period 1999-2003; and China, with output ahead 39% over the same period to 727 million units.

**TABLE E.20 Leading aerosol producers, 1999-2003**

| <b>Million units</b>   | <b>1999</b> | <b>2000</b> | <b>2001</b> | <b>2002</b> | <b>2003</b> |
|------------------------|-------------|-------------|-------------|-------------|-------------|
| UK                     | 1,362.6     | 1,366.9     | 1,390.2     | 1,411.3     | 1,346.4     |
| Germany                | 848.0       | 875.0       | 955.0       | 973.0       | 970.0       |
| France                 | 525.0       | 565.0       | 523.4       | 536.0       | 551.0       |
| Italy                  | 387.8       | 400.0       | 405.8       | 435.0       | 469.9       |
| Netherlands            | 333.8       | 341.3       | 365.0       | 349.7       | 389.3       |
| Spain                  | 206.4       | 204.2       | 211.9       | 220.8       | 245.8       |
| Belgium and Luxembourg | 279.0       | 290.4       | 280.9       | 233.7       | 240.3       |
| Russia                 | 81.9        | 83.6        | 149.2       | 167.6       | 181.4       |
| Other Europe           | 374.4       | 362.1       | 394.5       | 409.6       | 435.6       |
| Total Europe           | 4,399.0     | 4,488.0     | 4,676.0     | 4,736.6     | 4,829.6     |

|              |         |         |         |          |          |
|--------------|---------|---------|---------|----------|----------|
|              |         |         |         |          |          |
| Argentina    | 370.0   | 367.1   | 384.0   | 325.8    | 420.0    |
| Australia    | 180.4   | 182.6   | 196.2   | 194.1    | 195.0*   |
| Brazil       | 184.6   | 193.3   | 202.9   | 217.5    | 207.0    |
| China        | 523.0   | 560.0   | 581.0   | 635.6    | 726.5    |
| Japan        | 634.0   | 613.3   | 591.8   | 574.2    | 576.9    |
| South Africa | 141.9   | 150.5   | 158.2   | 170.6    | 174.8    |
| USA          | 3,202.3 | 3,198.0 | 3,093.7 | 3,518.0  | 3,551.0  |
|              |         |         |         |          |          |
| Grand total  | 9,635.2 | 9,752.8 | 9,883.8 | 10,372.4 | 10,680.8 |

Source: FEA; \*Pira International Ltd estimate

## Glass

The world market for container glass was valued at \$30.2 billion in 2003, with the market growing at an annual average rate of 2.2% in the period 1999-2003. The fastest growth markets have been in eastern Europe, driven by very strong beer sales growth in markets like Poland and the CIS, as well as in the Middle East, Africa and certain emerging Asian markets such as China. China is in fact the world's largest market for container glass, valued at \$6.02 billion in 2003, ahead of the USA (\$4.8 billion) and the world's leading wine producers France (container glass sales of \$1.67 billion) and Italy (\$1.41 billion).

In recent years, container glass has lost share to plastics in food markets, but while glass has lost share to PET in soft drinks markets it has succeeded in shoring up its position in beer packaging. Glass beer bottles remain popular among consumers in western markets, although in eastern Europe consumer perceptions of glass bottles are rather different. They are considered the cheap option in comparison to beverage cans and also PET bottles.

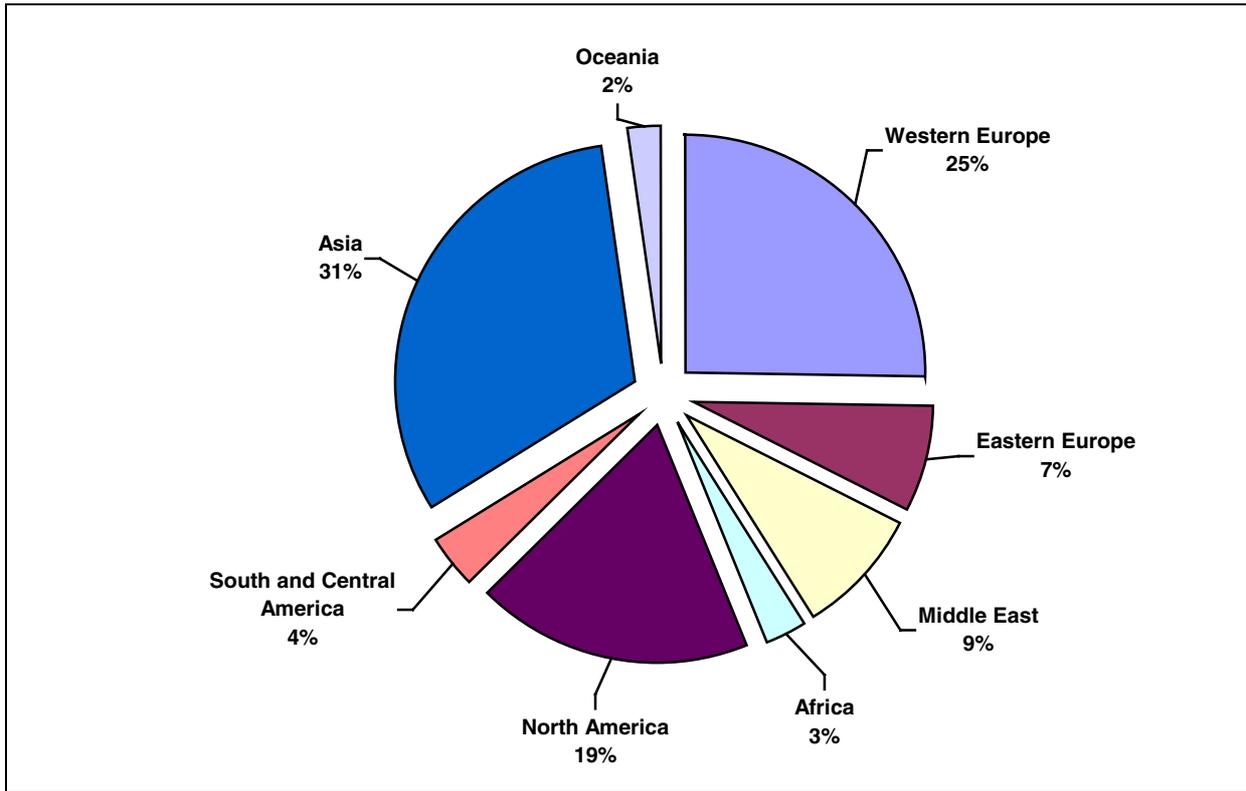
**TABLE E.21 Glass packaging consumption by region, 1999-2003 (\$ million)**

| \$ million                | 1999   | 2000   | 2001   | 2002   | 2003   | CAGR (%)<br>1999-2003 |
|---------------------------|--------|--------|--------|--------|--------|-----------------------|
| Western Europe            | 6,966  | 6,114  | 6,387  | 6,443  | 7,614  | 2.2                   |
| Eastern Europe            | 1,121  | 1,299  | 1,405  | 1,475  | 2,206  | 18.4                  |
| Middle East               | 1,528  | 1,697  | 1,985  | 2,443  | 2,594  | 14.1                  |
| Africa                    | 542    | 552    | 587    | 575    | 816    | 10.7                  |
| North America             | 5,312  | 5,310  | 5,321  | 5,661  | 5,661  | 1.6                   |
| South and Central America | 1,359  | 2,279  | 1,541  | 1,194  | 1,087  | -5.4                  |
| Asia                      | 8,632  | 8,788  | 8,641  | 9,079  | 9,548  | 2.6                   |
| Oceania                   | 574    | 549    | 516    | 557    | 685    | 4.5                   |
| World                     | 26,034 | 26,588 | 26,383 | 27,425 | 30,211 | 3.8                   |

Note: totals may not add up due to rounding

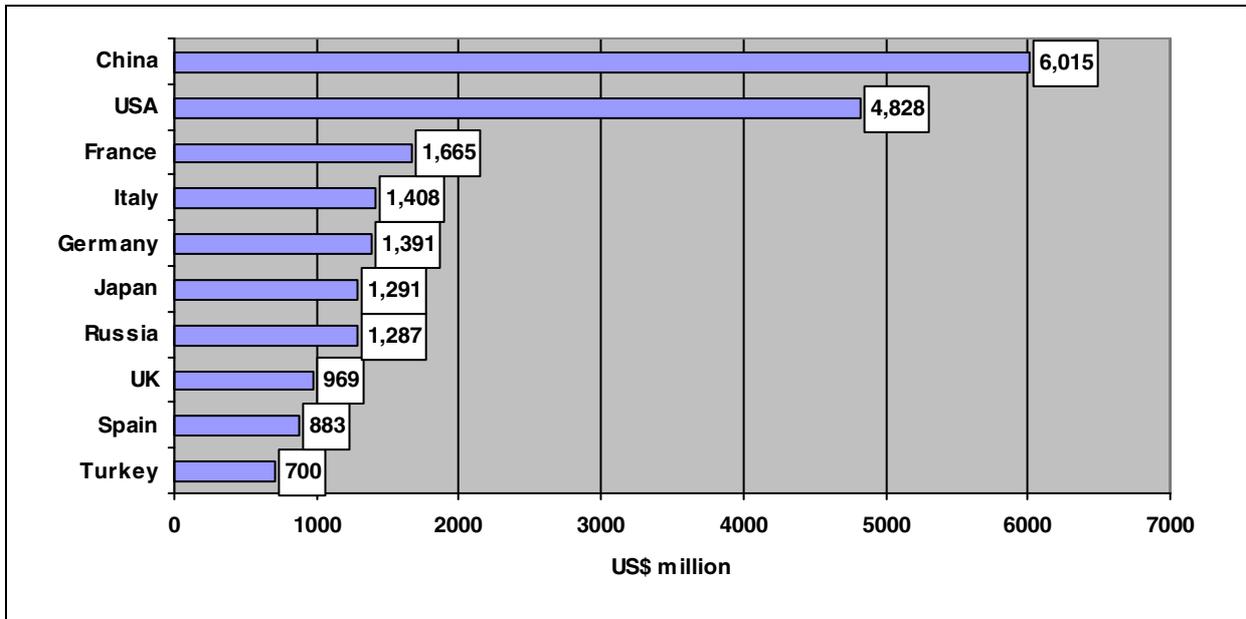
Source: Pira International Ltd

**FIGURE E.23 Glass packaging consumption by region, 2003**



Source: Pira International Ltd

**FIGURE E.24 Top ten glass packaging markets, 2003**



Source: Pira International Ltd

Container glass is the single most concentrated packaging sector. Two companies predominate, namely Owens-Illinois with sales of \$5.37 billion in 2004, and Saint-Gobain (\$4.38 billion). Owens overtook Saint Gobain in 2004 following its acquisition of BSN Glasspack in June 2004, acquired from CVC Capital Partners for 1.16 billion, giving the company a 40% share in the European market. Other key moves in European container glass have included a series of acquisitions undertaken by Rexam in northern Europe and Poland; the sale of Ardagh Glass by Ardagh plc as ownership of the company changed hands and moved to Jersey from Ireland; the acquisition of Gerresheimer Glas by a corporation owned by private equity funds advised by the Blackstone Group Deutschland from Investcorp and JP Morgan Partners; and moves by St Gobain to build up its operations in eastern Europe, including a new plant in Romania.

In North America, meanwhile, the most significant event in recent years was the bankruptcy of Canada-based Consumers Packaging, eventually splitting up into two with its Canadian plants going to Owens-Illinois and US plants now controlled by the new Anchor Glass business, part-owned by Cerberus Capital Management.

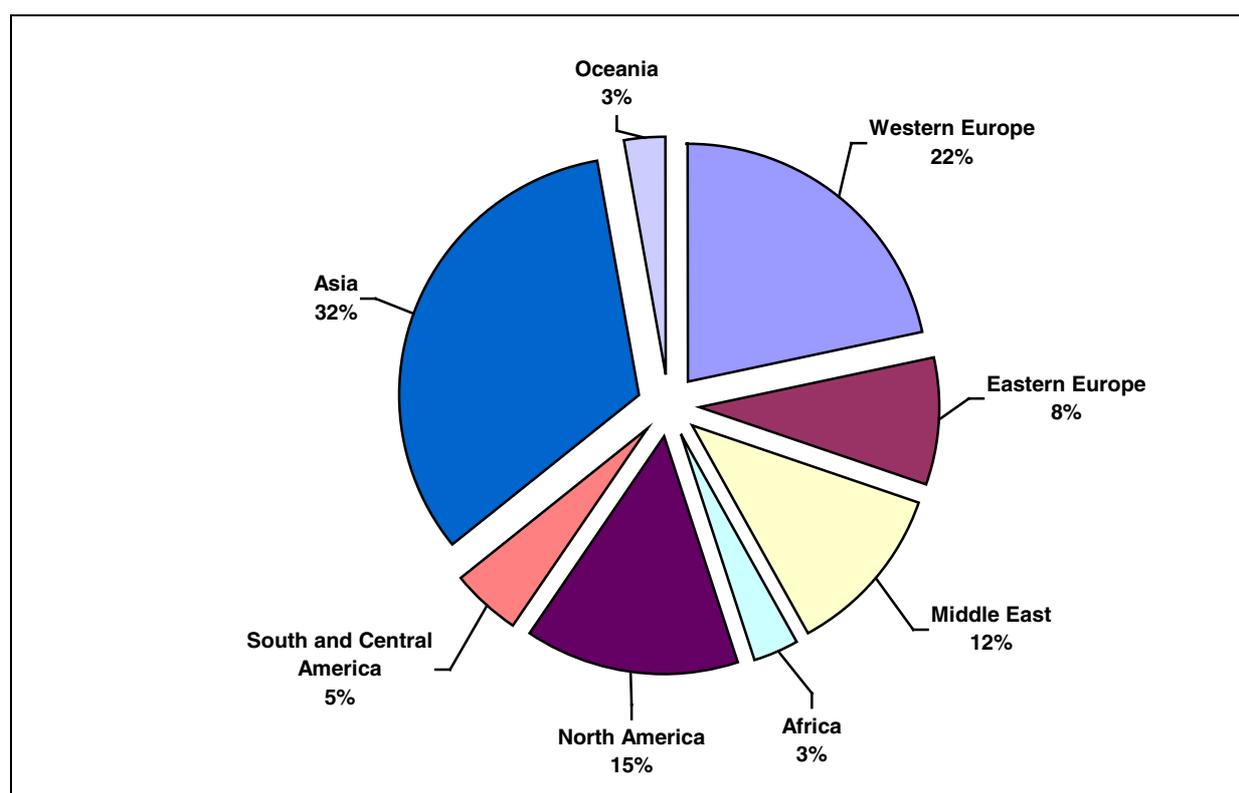
The effect of consolidation moves appears to have been to shore up container prices to an extent in an era of broadly static overall volumes in mature markets. In the next five years, however, it is likely that consumption of container glass will decline in real terms in western Europe and North America, with leading players possibly seeking a foothold in the major Chinese market. Container glass demand will also grow in Oceania, due to strong demand from the respective wine industries of New Zealand and Australia.

**TABLE E.22 Forecast glass packaging consumption by region, 2003-09 (\$ million)**

| \$ million                | 2003   | 2004   | % change<br>2003-04 | 2005   | % change<br>2004-05 | 2009   | CAGR (%)<br>2004-09 |
|---------------------------|--------|--------|---------------------|--------|---------------------|--------|---------------------|
| Western Europe            | 7,614  | 8,108  | 6.5                 | 7,968  | -1.7                | 7,460  | -1.7                |
| Eastern Europe            | 2,206  | 2,442  | 10.7                | 2,535  | 3.8                 | 2,906  | 3.5                 |
| Middle East               | 2,594  | 2,694  | 3.8                 | 2,830  | 5.1                 | 4,031  | 8.4                 |
| Africa                    | 816    | 880    | 7.8                 | 923    | 4.9                 | 1,084  | 4.3                 |
| North America             | 5,661  | 5,527  | -2.4                | 5,416  | -2.0                | 4,996  | -2.0                |
| South and Central America | 1,087  | 1,124  | 3.3                 | 1,210  | 7.7                 | 1,627  | 7.7                 |
| Asia                      | 9,548  | 9,891  | 3.6                 | 10,056 | 1.7                 | 11,345 | 2.8                 |
| Oceania                   | 685    | 781    | 14.0                | 824    | 5.5                 | 940    | 3.8                 |
| World                     | 30,211 | 31,446 | 4.1                 | 31,762 | 1.0                 | 34,389 | 1.8                 |

Note: constant prices from 2005 onwards; totals may not add up due to rounding

Source: Pira International Ltd

**FIGURE E.25 Forecast glass packaging consumption by region, 2009**

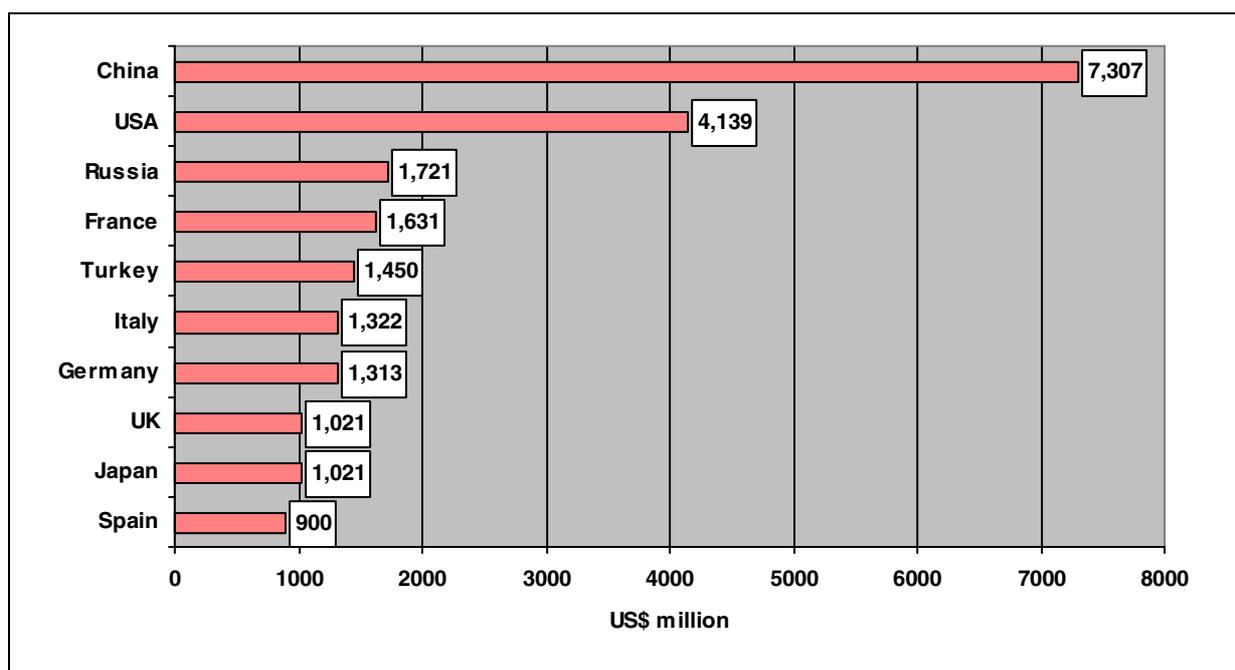
Source: Pira International Ltd

**TABLE E.23 Top 25 glass packaging markets, 2003-09 (\$ million)**

| \$ million   | 2003  | 2004  | % change<br>2003-04 | 2005  | % change<br>2004-05 | 2009  | CAGR (%)<br>2004-09 |
|--------------|-------|-------|---------------------|-------|---------------------|-------|---------------------|
| China        | 6,015 | 6,257 | 4.0                 | 6,400 | 2.3                 | 7,307 | 3.2                 |
| USA          | 4,828 | 4,714 | -2.3                | 4,604 | -2.3                | 4,139 | -2.6                |
| Russia       | 1,287 | 1,456 | 13.1                | 1,516 | 4.1                 | 1,721 | 3.4                 |
| France       | 1,665 | 1,767 | 6.2                 | 1,742 | -1.4                | 1,631 | -1.6                |
| Turkey       | 700   | 727   | 3.9                 | 770   | 5.9                 | 1,450 | 14.8                |
| Italy        | 1,408 | 1,490 | 5.8                 | 1,450 | -2.6                | 1,322 | -2.4                |
| Germany      | 1,391 | 1,469 | 5.6                 | 1,440 | -1.9                | 1,313 | -2.2                |
| UK           | 969   | 1,064 | 9.8                 | 1,055 | -0.9                | 1,021 | -0.8                |
| Japan        | 1,291 | 1,378 | 6.7                 | 1,293 | -6.2                | 1,021 | -5.8                |
| Spain        | 883   | 942   | 6.6                 | 929   | -1.3                | 900   | -0.9                |
| Brazil       | 499   | 500   | 0.3                 | 548   | 9.7                 | 803   | 9.9                 |
| Indonesia    | 688   | 633   | -8.0                | 633   | 0.0                 | 767   | 3.9                 |
| Australia    | 530   | 606   | 14.3                | 641   | 5.7                 | 728   | 3.7                 |
| Mexico       | 576   | 548   | -5.0                | 553   | 0.9                 | 625   | 2.7                 |
| India        | 390   | 411   | 5.3                 | 448   | 9.0                 | 596   | 7.8                 |
| Poland       | 326   | 361   | 10.6                | 380   | 5.5                 | 491   | 6.4                 |
| South Africa | 229   | 291   | 27.1                | 317   | 9.2                 | 372   | 5.1                 |
| Netherlands  | 282   | 298   | 5.9                 | 289   | -3.1                | 273   | -1.8                |
| Canada       | 257   | 265   | 3.1                 | 259   | -2.3                | 233   | -2.6                |
| Chile        | 145   | 167   | 15.3                | 184   | 10.0                | 222   | 5.9                 |
| New Zealand  | 141   | 160   | 14.0                | 167   | 4.4                 | 192   | 3.7                 |
| China Taiwan | 159   | 160   | 0.5                 | 154   | -3.7                | 168   | 1.0                 |
| Belgium      | 172   | 182   | 6.1                 | 179   | -1.5                | 168   | -1.6                |
| Portugal     | 180   | 191   | 6.1                 | 186   | -2.6                | 167   | -2.6                |
| South Korea  | 166   | 176   | 5.9                 | 170   | -3.3                | 155   | -2.5                |

Note: constant prices from 2005 onwards

Source: Pira International Ltd

**FIGURE E.26 Top ten glass packaging markets, 2009**

Source: Pira International Ltd

## Others (B)

For the purposes of this report, other packaging principally includes wooden containers and pallets, as well as jute/ other textile sacks and other packaging products. While the use of wood and other packaging materials has pretty much stabilised in western markets, such packaging materials are now being substituted in fast-growth Asian markets.

**TABLE E.24 Wood/other packaging consumption by region, 1999-2003 (\$ million)**

| \$ million                | 1999   | 2000   | 2001   | 2002   | 2003   | CAGR (%) 1999-2003 |
|---------------------------|--------|--------|--------|--------|--------|--------------------|
| Western Europe            | 6,100  | 6,172  | 6,091  | 6,459  | 7,661  | 5.9                |
| Eastern Europe            | 1,264  | 1,472  | 1,804  | 2,085  | 3,274  | 26.9               |
| Middle East               | 855    | 842    | 928    | 708    | 991    | 3.8                |
| Africa                    | 297    | 330    | 374    | 424    | 499    | 13.9               |
| North America             | 5,737  | 5,846  | 5,433  | 5,598  | 5,465  | -1.2               |
| South and Central America | 580    | 547    | 517    | 379    | 434    | -7.0               |
| Asia                      | 8,403  | 9,324  | 8,277  | 7,871  | 8,218  | -0.6               |
| Oceania                   | 185    | 171    | 158    | 171    | 213    | 3.6                |
| World                     | 23,421 | 24,703 | 23,582 | 23,694 | 26,754 | 3.4                |

Note: totals may not add up due to rounding

Source: Pira International Ltd

In the period to 2004, demand for wood/other packaging is expected to grow at a rate below that of the packaging market as a whole, by just over 3% year on year to reach \$34 billion in 2009. There will be a definite threat to wood packaging in the form of cork stoppers used in wine bottles as Australian wine producers increasingly shift to screw caps and plastic corks.

The trend towards synthetic corks will impact the Portuguese cork industry. Turning over some \$1.3 billion each year (just under 1% of GDP), wine corks account for around one third of industry sales and 85% of exports. The threat to the Portuguese cork industry and the cork forests has led the industry and government to launch a \$6.5 million campaign against synthetic corks.

**TABLE E.25 Forecast wood/other packaging consumption by region, 2003-09 (\$ million)**

| \$ million                   | 2003   | 2004   | % change<br>2003-04 | 2005   | % change<br>2004-05 | 2009   | CAGR (%)<br>2004-09 |
|------------------------------|--------|--------|---------------------|--------|---------------------|--------|---------------------|
| Western Europe               | 7,661  | 8,315  | 8.5                 | 8,341  | 0.3                 | 8,424  | 0.3                 |
| Eastern Europe               | 3,274  | 3,735  | 14.1                | 3,960  | 6.0                 | 4,875  | 5.5                 |
| Middle East                  | 991    | 1,136  | 14.6                | 1,333  | 17.3                | 2,135  | 13.5                |
| Africa                       | 499    | 522    | 4.6                 | 556    | 6.6                 | 720    | 6.6                 |
| North America                | 5,465  | 5,569  | 1.9                 | 5,675  | 1.9                 | 6,120  | 1.9                 |
| South and<br>Central America | 434    | 452    | 4.0                 | 479    | 6.0                 | 603    | 5.9                 |
| Asia                         | 8,218  | 9,055  | 10.2                | 9,416  | 4.0                 | 11,033 | 4.0                 |
| Oceania                      | 213    | 234    | 10.2                | 238    | 1.7                 | 257    | 1.8                 |
| World                        | 26,754 | 29,018 | 8.5                 | 29,999 | 3.4                 | 34,167 | 3.3                 |

Note: constant prices from 2005 onwards; totals may not add up due to rounding

Source: Pira International Ltd

## ■ End-use sectors

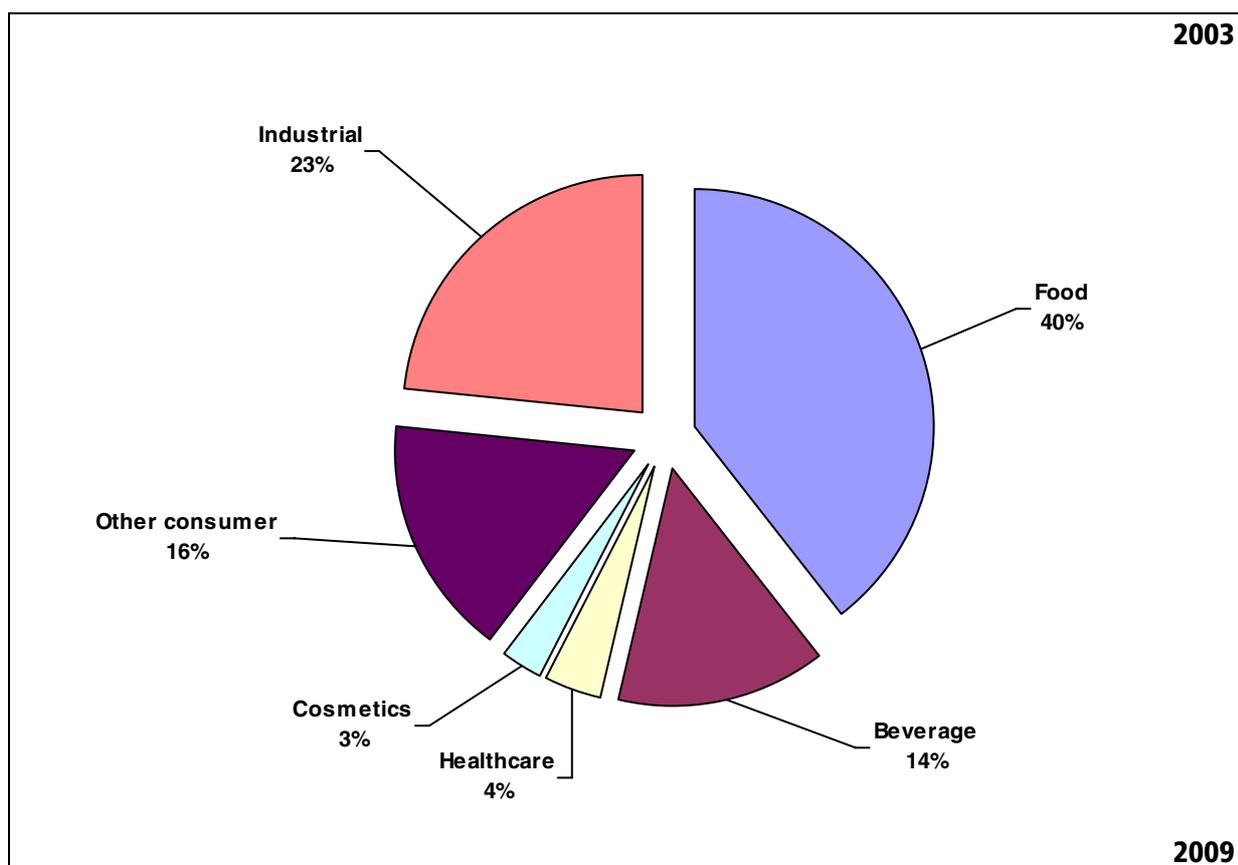
Within consumer packaging, food packaging represents the single largest element, valued at \$168 billion in 2003. Demand for food packaging has been growing throughout the world, with few markets reaching saturation points as opportunities still exist for packaging in areas such as fresh produce and ready meals, and strong growth being registered in emerging markets for food packaging. Food packaging sales are forecast to grow at an annual rate of around 4.6% from 2004 onwards, as compared with just 4% for beverage packaging. This is understandable, given that any prepared beverage requires packaging and penetration is already global, but opportunities still exist for suppliers in the context of rising beer and mineral water consumption in many countries.

**TABLE E.26 Forecast packaging consumption by end-use market, 2003-09 (\$ million)**

| \$ million                    | 2003    | 2004    | % change<br>2003-04 | 2005    | % change<br>2004-05 | 2009    | CAGR<br>(%)<br>2004-09 |
|-------------------------------|---------|---------|---------------------|---------|---------------------|---------|------------------------|
| Food                          | 167,960 | 181,722 | 8.2                 | 189,900 | 4.5                 | 227,938 | 4.6                    |
| Beverage                      | 61,310  | 65,469  | 6.8                 | 67,451  | 3.0                 | 79,613  | 4.0                    |
| Healthcare                    | 16,417  | 18,143  | 10.5                | 19,450  | 7.2                 | 25,588  | 7.1                    |
| Cosmetics                     | 12,386  | 13,599  | 9.8                 | 14,507  | 6.7                 | 18,515  | 6.4                    |
| Other consumer                | 69,420  | 75,334  | 8.5                 | 79,007  | 4.9                 | 94,547  | 4.6                    |
| Industrial/<br>bulk packaging | 99,717  | 104,995 | 5.3                 | 106,780 | 1.7                 | 117,645 | 2.3                    |
| Total                         | 427,210 | 459,263 | 7.5                 | 477,094 | 3.9                 | 563,847 | 4.2                    |

Note: constant prices from 2005 onwards; totals may not add up due to rounding

Source: Pira International Ltd

**FIGURE E.27 Forecast packaging consumption by end-use market, 2003-09**

Source: Pira International Ltd

## Food

The world market for food packaging was valued at \$168 billion in 2003, and grew by around 8% into 2004 to reach \$182 billion, driven by strong sales in fast-growth markets in eastern Europe, Asia and other emerging economies. North America represents the largest regional market, accounting for around 31% of sales ahead of western Europe (27%) and Asia (26%), and Asia's share is set to reach 29% by the year 2009, by which time the value of the food packaging market is forecast to hit \$228 billion, growing at an annual rate of 4.6% in real terms.

A number of drivers to growth in food packaging consumption are apparent. First and foremost of these is the growing usage of packaged food as grocery multiples take share away from specialist butchers and fruit/vegetable shops, and increasingly shift to central packaging operations to reduce waste and control stocks more effectively. Beyond that, there has been rising demand for ready-prepared foods, including microwave meals for time-poor consumers – including some who were unlikely to eat frozen processed foods in the past. Other key trends include the rise in smaller households, leading to increasing units of smaller pack sizes, as well as the shift from metal, glass and other packaging to plastic packaging in areas such as soups, sauces, pet food and other products.

**TABLE E.27 Forecast food packaging consumption by region, 2003-09 (\$ million)**

| \$ million                | 2003    | 2004    | % change<br>2003-04 | 2005    | % change<br>2004-05 | 2009    | CAGR (%)<br>2004-09 |
|---------------------------|---------|---------|---------------------|---------|---------------------|---------|---------------------|
| Western Europe            | 44,401  | 49,300  | 11.0                | 50,591  | 2.6                 | 55,898  | 2.5                 |
| Eastern Europe            | 9,480   | 10,850  | 14.5                | 11,655  | 7.4                 | 15,498  | 7.4                 |
| Middle East               | 5,344   | 5,886   | 10.1                | 6,588   | 11.9                | 10,320  | 11.9                |
| Africa                    | 4,121   | 4,568   | 10.8                | 4,908   | 7.4                 | 6,383   | 6.9                 |
| North America             | 51,849  | 53,378  | 2.9                 | 54,770  | 2.6                 | 60,099  | 2.4                 |
| South and Central America | 6,364   | 6,596   | 3.6                 | 7,126   | 8.0                 | 9,677   | 8.0                 |
| Asia                      | 44,069  | 48,532  | 10.1                | 51,560  | 6.2                 | 67,059  | 6.7                 |
| Oceania                   | 2,333   | 2,613   | 12.0                | 2,703   | 3.5                 | 3,004   | 2.8                 |
| World                     | 167,960 | 181,722 | 8.2                 | 189,900 | 4.5                 | 227,938 | 4.6                 |

Note: constant prices from 2005 onwards; totals may not add up due to rounding

Source: Pira International Ltd

## Beverages

Global beverage packaging sales were valued at \$65 billion in 2004, representing an increase of 7% on 2003 levels, boosted by rising demand in markets in eastern Europe, the Middle East and Asia. North America represents the largest regional market, accounting for around 31% of sales ahead of western Europe (27%) and Asia (26%), and with Asia set to overtake North America as the largest regional market by the year 2009 with a 29% share, by which time the value of the beverage packaging market will reach around \$80 billion, growing at an annual rate of 4% in real terms.

Currently, beverage consumption stands at approximately 1.35 trillion litres worldwide, equating to around 215 litres per person. Tea is the most regularly consumed drink, but bottled water represents the fastest growing sector of the market with strong growth in both emerging markets and developed economies driving PET bottle volumes. Soft drink volumes, by comparison, have been static in western markets but growing strongly elsewhere. Across alcoholic drinks markets, there has been a general trend whereby wine consumption has been falling in the traditional wine-producing nations such as France and Italy, losing share to beer, while the reverse is true in the UK and other such markets where beer is the traditional choice and wine is almost always imported. On the whole, consumer preferences are converging, although there are instances where consumption has grown in traditional markets, such as vodka sales in Russia (principally due to pent-up demand from supply shortages in the past) and beer sales in the Czech Republic. Russia and the Czech Republic rank one worldwide in per capita consumption of spirits and beer respectively.

**TABLE E.28 Forecast beverage packaging consumption by region, 2003-09 (\$ million)**

| \$ million                | 2003   | 2004   | % change<br>2003-04 | 2005   | % change<br>2004-05 | 2009   | CAGR (%)<br>2004-09 |
|---------------------------|--------|--------|---------------------|--------|---------------------|--------|---------------------|
| Western Europe            | 16,208 | 17,761 | 9.6                 | 17,969 | 1.2                 | 19,524 | 1.9                 |
| Eastern Europe            | 3,460  | 3,909  | 13.0                | 4,140  | 5.9                 | 5,413  | 6.7                 |
| Middle East               | 1,951  | 2,120  | 8.7                 | 2,340  | 10.3                | 3,604  | 11.2                |
| Africa                    | 1,504  | 1,646  | 9.4                 | 1,743  | 5.9                 | 2,229  | 6.3                 |
| North America             | 18,926 | 19,230 | 1.6                 | 19,454 | 1.2                 | 20,991 | 1.8                 |
| South and Central America | 2,323  | 2,376  | 2.3                 | 2,531  | 6.5                 | 3,380  | 7.3                 |
| Asia                      | 16,087 | 17,485 | 8.7                 | 18,314 | 4.7                 | 23,422 | 6.0                 |
| Oceania                   | 852    | 941    | 10.5                | 960    | 2.0                 | 1,049  | 2.2                 |
| World                     | 61,310 | 65,469 | 6.8                 | 67,451 | 3.0                 | 79,613 | 4.0                 |

Note: constant prices from 2005 onwards; totals may not add up due to rounding

Source: Pira International Ltd

## Healthcare

Healthcare packaging sales amounted to around \$18 billion in 2004, with the market growing by 11% on 2003 levels. Accounting for approximately 31% of sales, North America represents the largest regional market ahead of western Europe (27%) and Asia (26%), with North America's share falling to 27% by the year 2009. Between 2004 and 2009, healthcare packaging sales are forecast to grow at an annual rate of 7% to reach \$26 billion by the end of the period – the fastest growing of all end-use sectors.

The healthcare packaging sector has been the focus of great interest by packaging suppliers, and it was significant that Owens-Illinois chose to hold onto its activities in healthcare packaging when it sold off the rest of its rigid plastics business.

**TABLE E.29 Forecast healthcare packaging consumption by region, 2003-09 (\$ million)**

| \$ million                | 2003   | 2004   | % change<br>2003-04 | 2005   | % change<br>2004-05 | 2009   | CAGR (%)<br>2004-09 |
|---------------------------|--------|--------|---------------------|--------|---------------------|--------|---------------------|
| Western Europe            | 4,340  | 4,922  | 13.4                | 5,182  | 5.3                 | 6,275  | 5.0                 |
| Eastern Europe            | 927    | 1,083  | 16.9                | 1,194  | 10.2                | 1,740  | 9.9                 |
| Middle East               | 522    | 588    | 12.5                | 675    | 14.8                | 1,158  | 14.5                |
| Africa                    | 403    | 456    | 13.2                | 503    | 10.2                | 717    | 9.5                 |
| North America             | 5,068  | 5,329  | 5.2                 | 5,610  | 5.3                 | 6,747  | 4.8                 |
| South and Central America | 622    | 659    | 5.9                 | 730    | 10.8                | 1,086  | 10.5                |
| Asia                      | 4,307  | 4,846  | 12.5                | 5,281  | 9.0                 | 7,528  | 9.2                 |
| Oceania                   | 228    | 261    | 14.4                | 277    | 6.1                 | 337    | 5.3                 |
| World                     | 16,417 | 18,143 | 10.5                | 19,450 | 7.2                 | 25,588 | 7.1                 |

Note: constant prices from 2005 onwards; totals may not add up due to rounding

Source: Pira International Ltd

## Cosmetics and toiletries

Within this definition including cosmetics, fragrances and toiletries, cosmetics has been one of the fastest growing areas of consumer goods in recent years, with solid growth in sales of skin care products and also make-up. Cosmetics packaging sales stood at approximately \$13.6 billion in 2004, representing an increase of 10% on 2003, and are forecast to grow at an annual rate of 6.4% to reach \$18.5 billion by 2009. Plastic packaging accounts for around two-thirds of all cosmetics packaging sales, with paper accounting for a further 15% of the market with the remainder split between metal and glass containers.

The key event in 2005 was the merger of Procter & Gamble (P&G) and Gillette in a deal valued at some \$57 billion. P&G is among the top three players in cosmetics alongside L'Oréal and Unilever and ahead of Japanese number one Shiseido, with P&G's portfolio encompassing major make-up brands such as Max Factor and Cover Girl, Oil of Olay skin care and Head and Shoulders shampoo. The Gillette deal will make P&G the leader in global men's lines, and also add a number of other major consumer brands such as Duracell and Braun.

**TABLE E.30 Forecast cosmetics packaging consumption by region, 2003-09 (\$ million)**

| \$ million                | 2003   | 2004   | % change<br>2003-04 | 2005   | % change<br>2004-05 | 2009   | CAGR (%)<br>2004-09 |
|---------------------------|--------|--------|---------------------|--------|---------------------|--------|---------------------|
| Western Europe            | 3,303  | 3,690  | 11.7                | 3,823  | 3.6                 | 4,242  | 2.8                 |
| Eastern Europe            | 637    | 747    | 17.2                | 825    | 10.5                | 1,264  | 11.1                |
| Middle East               | 811    | 927    | 14.4                | 1,081  | 16.6                | 1,935  | 15.8                |
| Africa                    | 567    | 613    | 8.1                 | 642    | 4.7                 | 756    | 4.3                 |
| North America             | 4,550  | 4,834  | 6.2                 | 5,137  | 6.3                 | 6,285  | 5.4                 |
| South and Central America | 246    | 263    | 6.8                 | 298    | 13.4                | 471    | 12.3                |
| Asia                      | 2,132  | 2,364  | 10.8                | 2,527  | 6.9                 | 3,342  | 7.2                 |
| Oceania                   | 140    | 162    | 16.1                | 174    | 7.5                 | 221    | 6.3                 |
| World                     | 12,386 | 13,599 | 9.8                 | 14,507 | 6.7                 | 18,515 | 6.4                 |

Note: constant prices from 2005 onwards; totals may not add up due to rounding

Source: Pira International Ltd

## Other consumer markets

Sales of other consumer packaging amounted to around \$75 billion in 2004, up 8.5% on 2003 levels with strong growth in emerging packaging markets. Between 2004 and 2009, other consumer packaging sales are forecast to grow at an annual rate of 4.6% to reach \$94.6 billion by the end of the period.

Key products within other consumer products include tobacco. China is the world's largest producer of cigarettes, ahead of the USA, Russia and Japan. Producers in emerging markets moving from soft, flexible packs to hard, hinge-lid and flip-top packs, and more generally there has been growing usage of OPP films in cigarette pack wrap.

China is also emerging as a major market for other forms of consumer packaging, as companies shift an increasing proportion of consumer goods production to the country. China already accounts for around three quarters of production of toys and textiles, half of all cameras and telephones and also around one third of all TVs.

**TABLE E.31 Forecast consumption of other consumer packaging by region, 2003-09 (\$ million)**

| \$ million                | 2003   | 2004   | % change<br>2003-04 | 2005   | % change<br>2004-05 | 2009   | CAGR (%)<br>2004-09 |
|---------------------------|--------|--------|---------------------|--------|---------------------|--------|---------------------|
| Western Europe            | 18,323 | 20,437 | 11.5                | 21,089 | 3.2                 | 23,485 | 2.8                 |
| Eastern Europe            | 3,980  | 4,563  | 14.7                | 4,914  | 7.7                 | 6,424  | 7.1                 |
| Middle East               | 1,792  | 1,953  | 9.0                 | 2,163  | 10.7                | 3,184  | 10.3                |
| Africa                    | 1,440  | 1,623  | 12.7                | 1,775  | 9.4                 | 2,410  | 8.2                 |
| North America             | 20,703 | 21,289 | 2.8                 | 21,834 | 2.6                 | 23,526 | 2.0                 |
| South and Central America | 2,853  | 2,965  | 3.9                 | 3,211  | 8.3                 | 4,329  | 7.9                 |
| Asia                      | 19,332 | 21,388 | 10.6                | 22,864 | 6.9                 | 29,920 | 6.9                 |
| Oceania                   | 996    | 1,116  | 12.0                | 1,157  | 3.6                 | 1,269  | 2.6                 |
| World                     | 69,420 | 75,334 | 8.5                 | 79,007 | 4.9                 | 94,547 | 4.6                 |

Note: constant prices from 2005 onwards; totals may not add up due to rounding

Source: Pira International Ltd

## Industrial/bulk packaging

The global market for industrial and bulk (transport) packaging was valued at \$105 billion in 2004, representing an increase of 5% on 2003. At \$30.8 billion, North America represents the single largest market with a 30% share – set to fall to 27%, behind Asia by 2009. Overall sales are forecast to grow at an average rate of 2% over the period to reach \$117 billion.

**TABLE E.32 Forecast industrial/ bulk packaging consumption by region, 2003 09 (\$ million)**

| \$ million                | 2003   | 2004    | % change<br>2003-04 | 2005    | % change<br>2004-05 | 2009    | CAGR (%)<br>2004-09 |
|---------------------------|--------|---------|---------------------|---------|---------------------|---------|---------------------|
| Western Europe            | 26,360 | 28,484  | 8.1                 | 28,447  | -0.1                | 28,851  | 0.3                 |
| Eastern Europe            | 5,628  | 6,269   | 11.4                | 6,554   | 4.5                 | 7,999   | 5.0                 |
| Middle East               | 3,173  | 3,401   | 7.2                 | 3,704   | 8.9                 | 5,326   | 9.4                 |
| Africa                    | 2,447  | 2,639   | 7.9                 | 2,760   | 4.6                 | 3,294   | 4.5                 |
| North America             | 30,782 | 30,841  | 0.2                 | 30,797  | -0.1                | 31,019  | 0.1                 |
| South and Central America | 3,778  | 3,811   | 0.9                 | 4,007   | 5.1                 | 4,995   | 5.6                 |
| Asia                      | 26,164 | 28,041  | 7.2                 | 28,992  | 3.4                 | 34,611  | 4.3                 |
| Oceania                   | 1,385  | 1,510   | 9.0                 | 1,520   | 0.7                 | 1,550   | 0.5                 |
| World                     | 99,717 | 104,995 | 5.3                 | 106,780 | 1.7                 | 117,645 | 2.3                 |

Note: constant prices from 2005 onwards; totals may not add up due to rounding

Source: Pira International Ltd

## ■ Geographic markets

The world packaging market was valued at \$427 billion in 2003, growing at an annual rate of 3.5% since 1999. In dollar terms, the market grew by almost 12% in 2003, although this was in part due to the weakness of the US dollar versus European, Asian and other currencies. All regional markets grew during the period, with the exception of South and Central America, where the downturn in the economy at the beginning of the decade, coupled with the devaluation of major currencies – and in particular the Argentinean Peso, trading at three to the dollar as compared with one to the dollar the turn of the decade – had a marked impact upon the value of the market.

North American markets, including the USA, Canada and Mexico, accounted for the largest share of global packaging at \$132 billion (32%), ahead of western Europe (26%) and Asia (26%). The overall share of European markets, however, exceeded that of North America at \$137 billion, equating to a 33% share. The fastest growing markets in dollar terms have been in eastern Europe, growing at an annual rate of 16% in the period 1999-2003, principally as a result of strong sales growth in Russia, Poland and other markets during 2003 – as well as the effect of exchange rate movements.

Asian sales, meanwhile, have grown at a slower rate, principally as a result of the sluggish performance of the Japanese packaging market – the second largest packaging market in the world at \$49 billion – as well as slow growth in south-east Asian markets at the turn of the decade. However, towards the end of the period there was a return to growth in the majority of south-east Asian markets, and the Chinese and Indian packaging markets have been growing strongly throughout 1999-2003. China now ranks as the world's third largest market for packaging products at around \$32.1 billion in 2003. The figure is to an extent reliant on official Chinese data that rather inflates the value of the market – but probably not to the extent that more reliable data would relegate China below that of the fourth largest market, Germany.

The world's largest packaging market, however, is the USA with sales of \$113 billion. The US packaging market fell back in 2002 before rallying somewhat into 2003, but was just 3.3% ahead of 1999 levels at the end of the period 1999-2003.

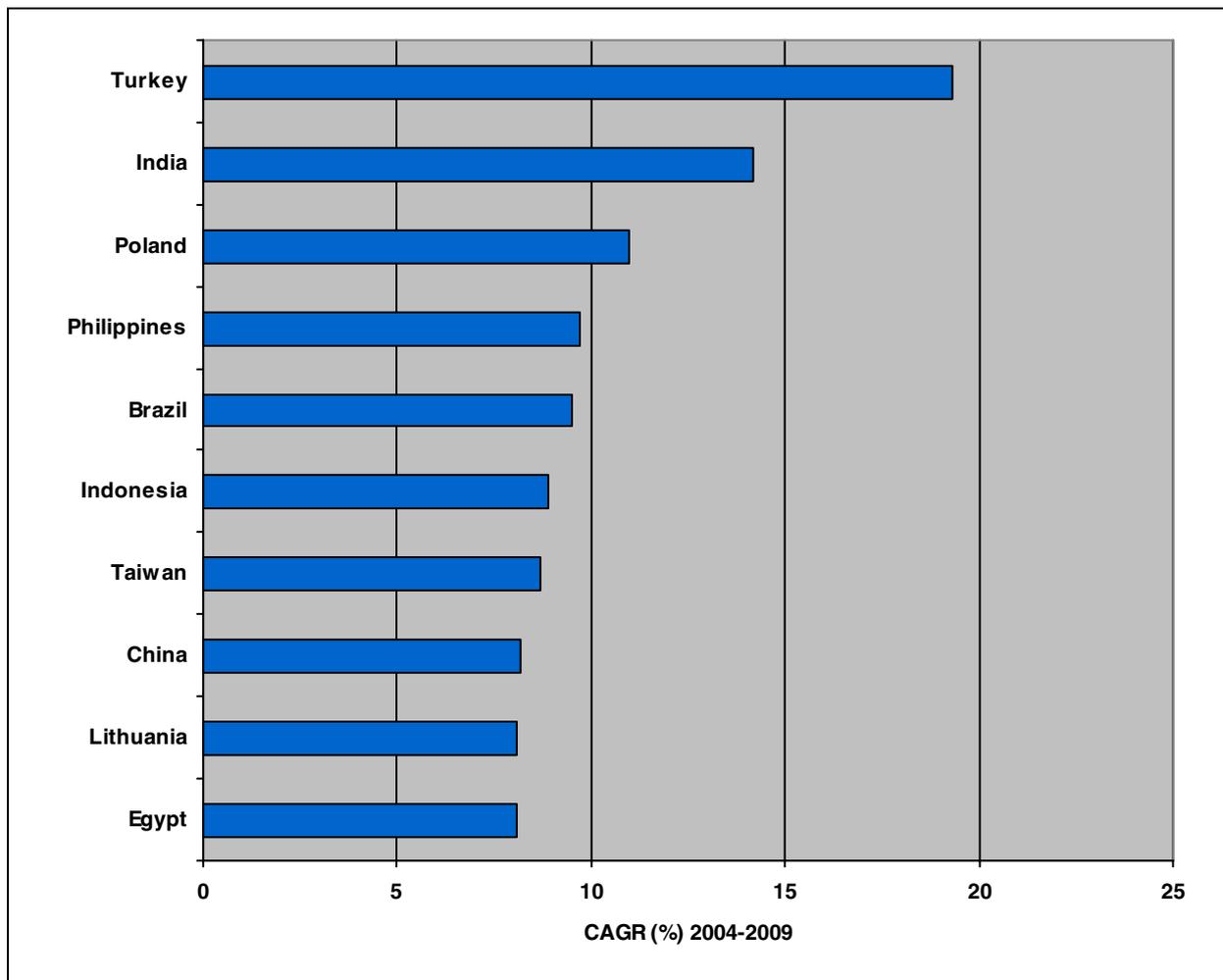
Ranked four to seven, the four leading European markets – Germany, France, Italy and the UK – all posted dollar sales growth in 2003, but there were declines in local currency terms in the UK and France. German sales though grew by over 2%, despite a decline in metal packaging sales, and Italian were also ahead by 2%. Of the remainder of the top ten, Canada, Spain and Russia all recorded rising sales – Russia replaced Brazil in the top ten into 2003 after consecutive years of strong growth in Russian packaging demand and output, while dollar revenues in Brazil have been broadly due to a weakening exchange rate and depressed economic performance.

Into 2004, the packaging market grew by around 7.5% in dollar terms, although again, the weakness of the dollar against other major currencies (e.g. trading at 0.82 in 2004 against 0.89 in 2003) boosted market value in a year when static or at best slow growth in consumption was recorded in most developed countries. For the remainder of the decade, however, real growth of the order of 4.2% is forecast, driven by rising consumption of packaging in emerging and transitional economies.

The Middle East is likely to be the fastest growing region at over 11% year on year to 2009, with the Turkish market recovering strongly after the downturn at the beginning of the decade and some degree of normalisation returning to the political arena. There is of course a degree of uncertainty to this forecast given recent history. Elsewhere, a recovery in South and Central American packaging consumption is forecast, with demand growing at an annual rate of around 7.5%, and possibly higher dependent upon a recovery in currency values, while continuing growth is anticipated in transitional eastern European economies and emerging Asian economies.

Asia's share of global packaging consumption is set to rise from 26% in 2003 to 29% in 2009 as the shares attributable to western Europe and North America fall by one and six points respectively to 25% and 27% respectively. This will be principally down to continuing strong growth in Chinese packaging demand and output, with the market growing at an annual rate of just over 8% to reach \$51.4 billion in 2009. Only very minor changes are expected in the make-up and order of the top ten, while Turkey is set to claim 13<sup>th</sup> spot – the fastest growing market of those detailed in this report.

**FIGURE E.28 Fastest growing national packaging markets, 2004-09**



Source: Pira International Ltd