Global PVC capacity was approximately 45 million tonnes in 2009. The increase of some 11 million tonnes over the period from 2004 to 2009 corresponds to a cumulated annual growth in capacity (CAGR) of 5.9 %. Almost 10 million tonnes, has been created in China, which now has more than a third of worldwide capacity. An overview of the regional distribution of PVC capacities is given in Figure 1.

Producers and Ranking

A further increase in PVC capacity is expected in Asia in the near future. China will continue to play a key role here, with growth rates probably not in two digits as in the past, but in the single-digit range.

The predominant production process for PVC in China is based on the carbide route rather than on ethylene. This method has been completely superseded in Western Europe, and only small capacities still remain in Eastern Europe, since it greatly pollutes the environment and has a high energy requirement. The advantages of this process are the low investment costs and, in particular, the ready availability of the raw material base of coal, which is in plentiful supply in China, by contrast to the case for oil and gas. The level of the production costs – especially by comparison to ethylene-based production – thus depends to a marked extent on the price of coal and, in particular, on the state-regulated and subsidised cost of electricity in China.

Some 90 % of global PVC capacity is based on suspension technology (S-PVC), which is used predominantly to manufacture products for general-purpose applications. When it comes to PVC specialities, the biggest area is products for paste processing. Paste PVC – frequently designated E-PVC as well – is produced either by the emulsion or the microsuspension process or by variants of these. Paste blending resins – so-called extenders – are normally produced by a special suspension process.

The supplier concentration in the individual regions differs greatly. In China, PVC comes from a large number of smallish suppliers, while North America has a high level of concentration. The five biggest producers have a share of 88 % of overall capacity here. In Western Europe, the five biggest suppliers, by contrast, account for only 64 % of the PVC on offer. Central and Eastern Europe have the highest concentration in the individual regions.
for what is, admittedly, only a small share of the PVC market. Here, the five biggest suppliers virtually completely cover the market for suspension PVC, while imports are largely relied on for specialties. Figure 2 shows the capacities of the world’s biggest producers in 2009. There have been a number of shifts here over the past few years: Shin-Etsu Chemical (in 1st place) and Formosa Plastics (in 2nd place) have switched places; LG (in 4th place) has risen one place; Solvay and Ineos have maintained their positions while the Americans and the (other) Europeans have dropped back in the capacity ranking and – scarcely surprising – Chinese competitors have moved into the top ten. The picture for PVC specialties for paste processing is somewhat different: the Europeans occupy places 1 to 3 here, represented by Vinnolit, Vestolit and Solvay/Solvins.

Demand and Foreign Trade

PVC is the plastic with the third-highest consumption level after the polyolefins. In 2009, global demand for PVC was more than 32 million tonnes (Fig. 3). The cumulated annual market growth (CAGR) of only 1.3 % over the period 2004 to 2009 is distorted by the effects of the global financial and economic crisis. Here, global demand of more than 35 million tonnes in 2007 fell to between 32 and 33 million tonnes in 2008/2009.

As far as future development is concerned, a moderate, yet stable, recovery in global demand is expected, with China, as the biggest PVC market, probably to be the driving force behind this development, as in the past. From 2004 to 2009, the CAGR in China was in excess of 8 %.

In Europe, the share of PVC compared with other plastics is roughly 12 %. PVC thus also constitutes the third-biggest plastics in Europe, too. Compared with developments worldwide, the financial and economic crisis had a much greater impact on the European market. While 2007 constituted a record year, with PVC consumption running at almost 6 million tonnes, demand in Western Europe fell by a total of 26 % in 2009 by comparison to 2007. This resulted in the cumulated West European growth rate assuming a negative value of -2 % per year from 2004 to 2009. In Europe as a whole, this effect was less noticeable at -0.5 % per year. In the North American region, by contrast, the decline over this same period was much more pronounced at -5 % per annum (Fig. 4).

A moderate recovery in market demand is expected for the future in Western Europe. A decisive factor here is the further development of the building industry: approximately 70 % of demand for PVC is dependent on this sector. It is thus uncertain when the demand level of 2007 will be reached again in Western Europe, since it is still difficult to predict how far structural effects will have a lasting impact on market recovery. The displacement of processing capacities from Western to Eastern Europe that has been seen in the past could lead to a situation where the export of semi-finished and finished goods to Central and Eastern Europe falls to a greater extent than has been the case in the past. This is a development which would especially affect products closely associated with the building trade, such as window profiles, floor coverings and wall paper, since the rising incomes in this region are being largely invested in increasing the standard of living through improvements to people’s homes. The counter-effect to this displacement is the positive development that can be expected in the export of PVC raw materials to Eastern Europe and the CIS states, where the construction of local capacities once the pre-crisis level has
been attained again (probably on a long-term basis too) will not keep pace with local demand.

The massive increase in capacity in China will have a key influence on global trade flows. This has already produced a situation where demand in this country is largely covered by local production. It is expected that China will develop into a net exporter in the near future. Producers from other Asian countries, such as South Korea, Taiwan and Japan, in particular, are suffering from the lack of export opportunities. These producers are under pressure to increase their exports to Russia, the West Coast of the USA and India.

**Price Development and Trends**

It was 2007 that marked the peak of the last economic cycle in Europe. The strong demand that prevailed at this point in time led to availability bottlenecks for both general-purpose grades and specialties. The PVC processors were able to transform this situation into higher prices but had to pass on a large part of the (consumer) price increases on account of the continually rising ethylene and electricity prices in the supply chain. While the average ethylene price in 2004 was still EUR 630/t, it rose by a steady EUR 100/t per year in the years that followed, attaining a level in excess of EUR 900/t in 2007. Over this same period, spot electricity prices doubled to EUR 40/MWh, traded on the EEX European Energy Exchange in Leipzig, Germany. The trend reversal in the cycle came in 2008, with a weakening in demand for general-purpose PVC during the first six months already, which then became significantly worse with the start of the financial and economic crisis in the autumn of 2008. Consumption of PVC specialties was maintained up to and including the third quarter of 2008 through high demand from Russia and the Ukraine, in particular; this was then followed by a slump during the last three months of the year that was more extreme than could ever have been thought possible. Running counter to demand for PVC, the highest ethylene price to date was achieved in the third quarter, at EUR 1,228/t, and the electricity prices also attained peak values with quotations up to EUR 88/MWh.

The price level for raw materials was only aligned to the...
sudden drop in demand for PVC in 2009. This year will go down in history as a crisis year. Demand for general-purpose PVC in the European market settled at -24 % in the course of 2009 compared with the record year of 2007. The specialties were hit even harder, suffering a decline of almost 30 % compared with 2007 in an exceptionally difficult market environment in the first half of 2009. The low capacity utilization rates that resulted from this placed high demands on the PVC producers. A clear revival in demand was seen in 2010, with the specialties having almost reached their pre-crisis level again, thanks to the CIS market having regained its strength, while general-purpose PVC is still lagging behind. It is seen here that the construction industry is following the general development in the economy (which is driven by consumption and exports) with a certain time lag.

For a number of years now, certain trends have been evident in the range of PVC applications, which have also continued during the crisis:

The share of rigid applications is slowly increasing in Europe. The principal field of application is profiles, followed by rope. The principal field of applications is slowly increasing in Europe. PVC in the European market having regained its level again, thanks to the CIS and China have already reached their pre-crisis levels and are continuing to grow at pre-crisis growth rates.

When it comes to the stabilization of PVC products, the trend toward Ca-Zn formulations has become even stronger. Now that stabilizer systems containing cadmium have no longer been in use in the EU since 2001 already, in the EU since 2006 and in the EU since 2007, the replacement of lead stabilizers is also progressing well. Under the terms of Vinyl 2010 – the voluntary commitment of the European PVC industry – this is to have been completed by 2015. From 2000 to 2009, a reduction of 68 % was achieved in lead stabilizers according to the Vinyl 2010 progress report (www.vinyl2010.org). Vinyl 2010 has also reached the finishing straight in overall terms, and is regarded as a positive example for a voluntary commitment by industry that is actually working. As a result, the associations and companies in the PVC sector are currently engaged in establishing a follow-on initiative to this successful sustainability program.

The switch in chlorine production in the EU from the mercury to the environmentally-compatible and energy-efficient membrane process is being pushed ahead further by the European chlorine industry and the PVC producers. At the start of 2009, the mercury process accounted for a share of only 34 % of chlorine production, with this downward trend set to continue.

Market Forecasts

The financial and economic crisis led to a temporary decline in demand for PVC in all the global economic areas. While mature markets such as the European Economic Area (EEA) and North America are recovering more slowly, growth areas such as the CIS and China have already reached their pre-crisis level and are continuing to grow at pre-crisis growth rates.

After a slump of almost 9 % in global demand for PVC in 2009, the market is expected to grow by 9 % in 2010, starting from the lower base level. After this pronounced recovery move, market growth will weaken in the years that follow, until it reaches approximately the same level of growth as for the global GDP again in 2004. The PVC producers will also take the different market development forecasts into account. Demand for general-purpose PVC in the EEA, which is still in the recovery phase and will presumably only slowly increase to above its pre-crisis level as of 2013, is set against over-capacities which need to be eliminated through consolidation within the industry. At Arkema and Ineos, for example, the first small, uneconomic PVC plants have been switched off already. Despite massive interventions on the part of the Italian state, Vynils Italia has still not managed to find a buyer for its monomer and PVC activities, which means that the future of this business still remains open. Ineos’ hiving off of its PVC business into the independent company, Kerling, and the dissolution of the production joint venture between Arkema and Solvin for part of their French and Spanish plants are indications that further consolidation steps could be imminent.

In the specialties field, the closure of plants at Ercros and Vynils Italia and also the strong demand from the CIS region, which is covered to a large extent by Western European goods, have led to a more balanced ratio of supply and demand. Despite this, no essential capacity increases are to be expected in Western Europe.

Two plants are currently under construction in Europe: one is being built by Karpaltreff in Kalush, Ukraine, with a planned capacity of 300,000 t/a general-purpose PVC and the other by RusVinyl, a joint venture between Sibur and Solvay, in Kstovo/Russia, with a capacity of 300,000 t/a general-purpose PVC and 30,000 t/a paste PVC.

The picture is similar in global terms: further consolidation in saturated markets, such as North America, with smaller market participants withdrawing from the market and a permanent expansion of capacity in growth markets such as China and South America.

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