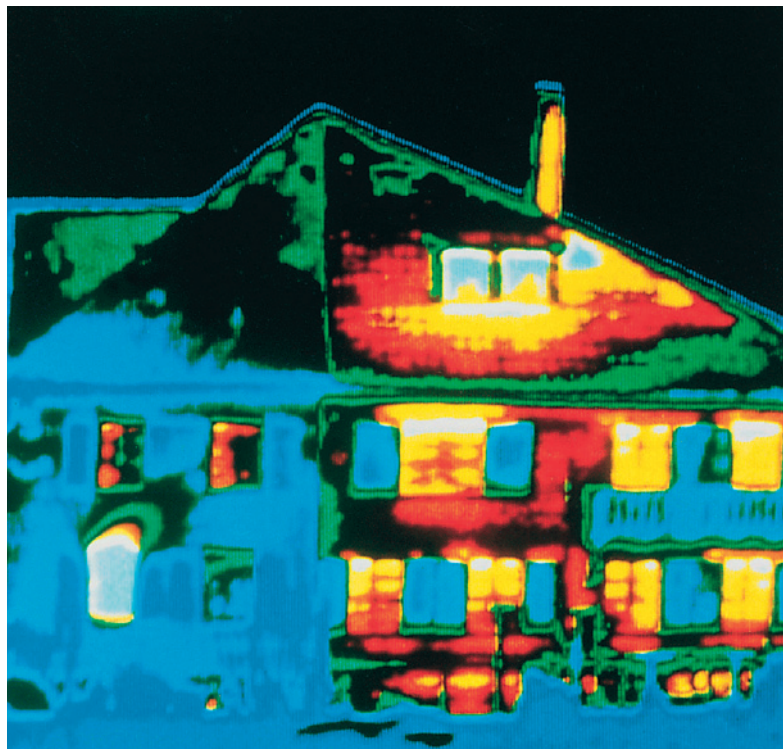




Thermograph of a residential building. The yellowish-red areas point to the elevated heat loss through poorly-insulated components. The blue areas are insulated with EPS foam



Secured Growth. Demand for insulating materials and packaging in EPS is continuing to rise worldwide. Applications in the construction industry – for both new buildings and renovation work – have gained particular importance over the past few years and will ensure growth in the EPS field over the years to come.

Expanded Polystyrene (EPS)

Asia is the region with the highest growth and highest demand for EPS and, as in other regions, this growth is being driven primarily by increased use in the construction industry. In Europe, the new, harmonised building standards are opening up opportunities for innovative products. The speciality products introduced over the past few years, offering low thermal conductivities that were previously unattainable with EPS foams, have become established on the market and hold good prospects for above-average growth.

Demand and Applications

Demand for products in expanded polystyrene is continuing to show positive development. In 2003, worldwide

demand for EPS increased to around 3.5 m t (Fig. 1).

Asia is now the region with the highest demand, at 1.5 m t, having pushed Europe with its 1.2 m t into second place. The demand figures in Fig. 2 and the expected increases show that this gap will grow rapidly over the next few years. The Nafta region ranks third, at 0.6 m t. Contrary to the case for other regions, cups for hot and cold beverages have become well-established here. These cups require special-

purpose EPS products, and hence this application is generally considered separately. Without cups, demand for EPS in the Nafta region is considerably lower. Somewhat higher growth rates than those in Europe are expected over the next few years, however. Demand in all the remaining regions together totals only 0.2 m t.

Above-average growth is evident in Asia. This is due to key customers of the EPS packaging producers shifting

their production (especially brown goods) from America and Western Europe to Asia, as well as to rising demand for the thermal insulation of buildings.

A comparison of the consumer segments shows that packaging applications still dominate in Asia. In Europe and the Nafta countries (without the special “cups”), it is applications in the construction industry that predominate. In view of the fact that energy prices will doubtless continue to rise, and considering the global endeavours being made to reduce emissions of greenhouse gases, the construction industry is set to gain even further importance as an application segment in all the different regions.

The growth forecast for Europe will stem primarily from the Eastern, Central-Eastern and Southern states of Europe. Two-figure growth is even expected in Russia over the next few years, in view of

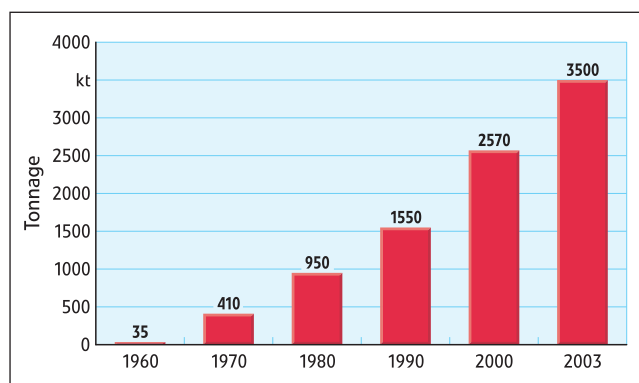


Fig. 1. Development in global demand for EPS from 1960 to 2003

Translated from Kunststoffe 10/2004, pp. 80–84



the especially big backlog demand for thermal insulation measures. A comparatively low level of growth of around 2.5 % p.a. is expected in Central Europe.

The EPS market in Germany is influenced to a very considerable extent by the level of activity in the building sector, which has a more than 80 % share. The trend that was

be expected here. This development is being driven by the rise in energy prices, which is set to continue, the efforts to further reduce CO₂ emissions and the growing importance of ecological efficiency analyses in planning and implementation.

When it comes to the value and rentability of apartments, the "Energy passport", which

sales endeavours in other fields – especially in moulded parts for the construction sector and the automotive industry. A further possibility for the EPS packaging producers who have been hit by a drop in sales is to follow the industry that uses the packaging and open up new production facilities. A large number of companies have adopted this approach, especially when their customers have moved into the new EU member states. What was previously a purely national EPS packaging production sector is thus acquiring an increasingly international character. Consumer acceptance of EPS packaging has shown a gratifyingly positive development in Germany, with only a minority still rejecting packaging of this type [2]. This has been achieved through the extensive educational campaigns conducted by national and international associations and their member companies (e.g. www.styropor.de, www.eu-meps.org).

Raw Materials and Foam Producers, EPS Machinery Builders

The raw materials necessary for foam production come primarily from the chemical industry. Backwards-integrated foam manufacturers who produce EPS raw materials to cover their own requirements are only of minor importance. In Europe, the EPS producers BASF, Nova, StyroChem, BP and Polimeri have a market share of around 60 % when taken together. The remainder is divided over 15 further manufacturers, some of whom only operate on a regional basis or produce only what they need themselves.

The majority of big producers of insulating materials are to be found in the cement and plaster industry. The leaders in the packaging segment include companies from the cellulose/paper processing in-

dustry and companies specialised in foam production. Alongside these big processing companies, there are also very many small and medium-sized processing firms that supply insulating materials or – in the majority of cases – moulded parts for packaging. The global leaders in EPS machinery come primarily from Germany, Austria and Italy and supply foam producers with highly-refined automatic processing units for pre-foaming raw materials, fully foaming them into foam blocks or moulded parts, and cutting insulating elements to size. The ranges of the EPS machinery manufacturers are rounded off by high-performance recycling systems for production waste and post-consumer waste.

European Harmonisation of Standards

Last year, insulating material standards were harmonised throughout Europe, resulting in the key changes set out below. Standard EN 13 163 describes the EPS product classes as a function of the different foam properties, such as compressive stress, bending strength, dimensional stability and water absorption. There is no longer a summary of specific property combinations, with the properties linked to a specific bulk density, as used to be the case in Germany. All properties can now be freely combined within the framework of the uniform gradations specified throughout Europe. The regulations for material testing have similarly been harmonised throughout Europe in numerous testing standards. Application standards for insulating materials still take the form of national standards, however, reflecting the different building techniques and requirements of the different countries.

In Germany, DIN 4108 describes the requirements

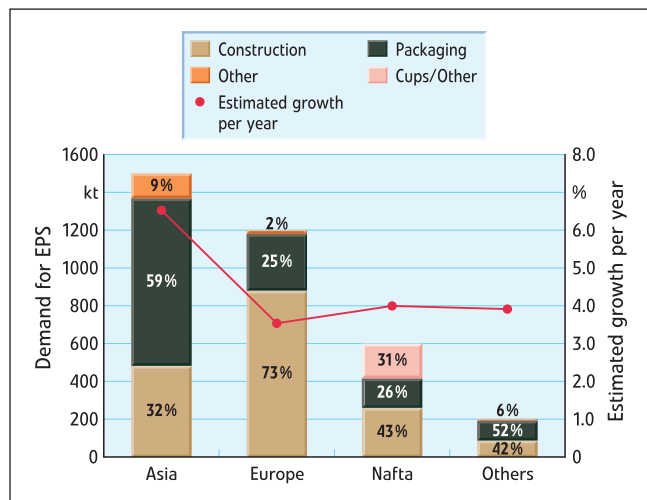


Fig. 2. Global demand for EPS by region in 2003 (source: BASF)

evident at the end of the 90s already for investment to be moved away from new buildings and channelled into the modernisation and renovation of residential accommodation has gained momentum in the new millennium. Investment in new buildings has been cut back dramatically, while more has been invested in modernisation and renovation work (Fig. 3). Since EPS insulation materials are used both in new buildings and for upgrading the thermal insulation of existing buildings, the EPS converters have been able to modify their production ranges accordingly. The universally applicable EPS systems for upgrading the thermal insulation of outside walls and roof areas (external thermal insulation composite systems and roof overlay systems) have thus become much more important. In view of the high pent-up demand for insulation measures in old buildings, further growth is to

provides evidence of compliance with the requirements of the German Energy-Saving Ordinance (EnEV), will assume growing importance. Thermal insulation standards, such as low-energy or passive energy houses, will become more firmly established for new buildings. In renovating a residential building dating from 1930, BASF has even shown that old buildings can be made into low-energy houses by means of the appropriate insulation measures [1].

Sales of EPS packaging in Germany have been characterised by the loss of electrical household-appliance and consumer-electronics producers, who were key customers for the sector. Increased sales in the field of thermally-insulating and other packaging have been unable to offset this loss. EPS moulded part manufacturers have opened up new sales opportunities through increased

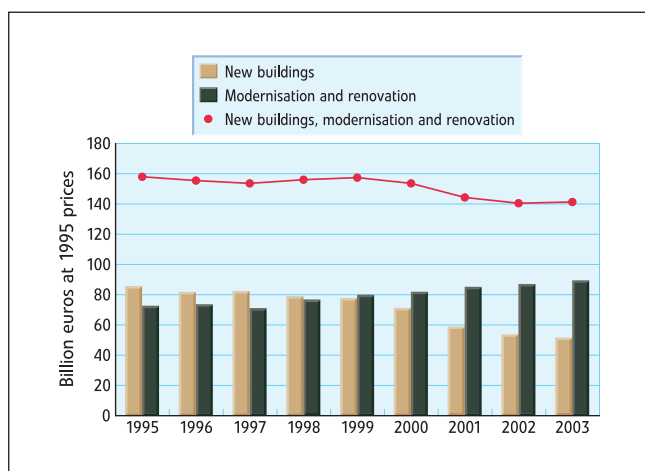


Fig. 3. Rising importance of renovation and modernisation (source: Internet data
DIW Berlin – Surveys by banking industry associations; DIW calculations)

placed on insulating materials such as EPS, XPS, polyurethane and mineral wool. All the established fields of application in ceilings/roofs, walls and around the perimeter are listed. DIN 4108 also specifies minimum requirements for the relevant properties on the basis of the product classes specified in EN 13 163. The chief outcome of these harmonised insulating material standards is that:

- insulating materials can be better described as a function of specific applications
- properties are no longer linked to bulk density
- enhanced property differentiation is now possible. In other words, the advantages that can be derived from the foam properties, or through the use of improved raw materials or more favourable processing conditions can now be marketed more successfully.

Three examples will serve to illustrate the prospects

opened up in this way for innovative products:

Product Development

Thermal conductivity is the most important property of insulating materials. Product developers and those who use insulating materials aim to have products with the lowest possible degree of thermal conductivity, i. e. with a high insulation effect. An insulating material (Neopor) has now become available which offers a considerably lower thermal conductivity than conventional EPS insulating materials, together with a lower weight. This property improvement was achieved by largely eliminating the thermal radiation effect through infrared absorbers and reflectors. Neopor is made into insulating panels, footfall-sound insulation panels and moulded parts on conventional EPS plant.

A product with particularly low water absorption has

been developed specially for perimeter applications (Peripor), i. e. for the production of insulation panels that are permitted to be in contact with the soil without any protection or which are in direct contact with water (inverted roof). In the diffusion test, these foams absorb considerably less water than conventional EPS foams. This is achieved through hydrophobic treatment and product properties that permit efficient welding of the pre-foamed raw material particles.

EPS insulating materials are dimensionally stable as a matter of course. Certain applications, however, will not even tolerate the very small, product-conditioned dimensional changes that are caused by post-shrinkage. The quality specifications for a range of applications stipulate a permitted post-shrinkage of < 0.2 %. This specification can be met by storing the foams at the production plant. The storage time has to be kept to a minimum for economic reasons, however. The use of special products (e. g. Styropor F295) allows the maximum permitted post-shrinkage values to be achieved with considerably shorter storage times.

Conclusion

Demand for EPS insulating materials and packaging is continuing to rise worldwide. Applications in the construction industry have gained a great deal of importance over the past few years, both for new buildings and for renova-

tion work, and these will also ensure growth in the EPS sector over the years to come. In Germany, the focus of demand has shifted from new buildings to renovation with value-enhancing thermal insulation measures. Roof overlay and Etics external thermal insulation composite systems based on EPS thermal-insulation panels provide ecologically advantageous systems for upgrading thermal insulation in old residential properties and also for new buildings. These thermal insulation systems will gain increasing importance as ecological efficiency analyses and statutory energy-saving measures become more widespread.

The harmonisation of the standards governing insulating materials, together with the elimination of barriers to trade, will ensure that greater attention is focussed on the application-specific properties of EPS foams. This will trigger a disproportionately high growth in products that offer more favourable thermal insulation properties. ■

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