THE SOCIO-ECONOMIC VALUE OF EPOXY RESINS
- MAIN FINDINGS -

EPOXY RESIN COMMITTEE AUGUST 2017

Introduction

The socio-economic report has been prepared by AMEC Environment and Infrastructure UK (AMEC), now called Amec Foster Wheeler, on behalf of the Epoxy Resins Committee (ERC) of Plastics Europe. Drawing on a survey of ERC members, it evaluates the socio-economic value to industry and to consumers in Europe of the group of chemicals known collectively as epoxy resins.

The socio-economic contribution of epoxy resins

Epoxy resins have a unique combination of properties and performance characteristics. They are used in the manufacture of a huge variety of components and end products where their presence is not always obvious. At the point of contact with consumers, both epoxy resin content and potential for exposure to the chemicals used in their production is very small.

ERC members that provided input to this study manufactured a total of 259,000 tonnes of epoxy resin in 2013, in plants located in Germany, Spain, Netherlands, Czech Republic, Poland, and Switzerland. Some 2,500 FTE employees are employed by these companies in Europe, which generated sales turnover of some €806 million in 2013. Just under €16 million was invested in R&D activities by the manufacturers, which include university collaborations. The socio-economic value (and linked employment levels) of downstream industries that depend on the enabling characteristics of epoxy resins are many times these values.

Germany is the largest market for epoxy resins in Europe, with sales (by ERC members) of 88,000 tonnes in 2013, or 35% of all European sales. The United Kingdom accounts for the second largest volume – some 11%. Italy and France both account for around 10% of total sales. Other significant markets are Spain (7%), Austria (5%), Denmark (4%), the Netherlands (4%), Portugal, Poland and Belgium (all around 2%) and Sweden, Czech Republic and Finland (all around 1% or less).

The subsequent assessment focuses on the use of epoxy resins in five 'key sectors', in two ways. First, the current benefits are evaluated. Second, socio-economic implications if regulatory action prevents their use in Europe are considered.

Key Sector 1: Energy

Sales of epoxy resins to downstream users in the energy sector accounted for the largest volume (69,000 tonnes or 27% of total epoxy resins production volumes), creating turnover of some €208 million in 2013. The largest epoxy sales values were into Germany, Denmark, Spain and Austria.

Epoxy resins are used in construction of wind turbine blades and applied as protective coatings. They provide the blades with sufficient strength and durability alongside low weight, enabling longer blades. Protective coatings prolong operational lifetimes of both components and turbines, lowering costs. The sector employs around 250,000 people in the EU; key end user markets are Germany, Denmark, Spain, the UK, Italy and France. European turnover generated by companies involved in wind energy activities is estimated at over €7 billion, creating some €2.9 billion of Gross Value Added (GVA – or economic output), per year. Epoxy resins are used extensively in a large proportion of these turbines.

They are also used in electrical and energy distribution systems as sealants, coatings and adhesives, as well as in the manufacturer of primary components such as transformers, insulators and bushings. They are used as protective coatings in large generators and on printed circuit boards. They contribute to longer-lasting and more reliable components and electricity distribution and supply. Downstream sectors include component/appliance manufacturers and those involved in electricity transmission/distribution, with a combined turnover of some €187 billion, employing over 800,000 people. Epoxy resins help to enable much of this activity to take place.

Key Sector 2: Food and Water

Sales of epoxy resins to downstream users in the food and water sector accounted for 28,000 tonnes or 11% of production volumes in 2013, creating turnover of some €79 million. The largest epoxy sales values were into Germany, the UK, France and Italy.

Epoxy resins are applied to food cans as protective coatings, preventing corrosion and prolonging shelf-life of the can and food. The metal packaging sector accounts for some €16.5 billion turnover and nearly 60,000 employees in Europe in 2011. Key end user markets are Germany, France, Spain, Italy, the UK, and Poland. However, only a proportion of this relates to use of epoxy resins in the food sector.

Data based on the characteristics of the UK market suggests that metal packaging using epoxy resins is used in around 10% of foodstuffs.

In food/beverage processing machinery, epoxy resins protect food from contamination from machinery, helping to raise hygiene standards and lower production costs. They protect machinery from chemicals in foods and cleaning products, prolonging operational lifetimes. Manufactures of this machinery account for over 6,000 active companies, with over €21 billion turnover employing over 110,000 people across Europe, and again part of this is enabled by epoxy resins.

In the water pipe/infrastructure sector, epoxies prevent corrosion and leaks and extend operational lifetimes of pipes. They are durable and, as well as being applied to new pipes (e.g. in joints), they can be applied in situ (i.e. to underground pipes) and provide effective repair of larger faults, holes or breaks in pipes, saving the time, cost and inconvenience of removing pipe/pipe sections. Significant end user markets include Germany (with some 30,000 employees in the sector, Italy (17,000), France and the UK (both with around 10,000).

Key Sector 3: Transportation

Sales of epoxy resins to downstream users in the transportation sector accounted for some 49,000 tonnes (19% of total production volumes), creating turnover of €185 million for the manufacturers in 2013. The largest epoxy sales values were into Germany, Spain, the UK, France, Italy, Austria and the Netherlands.

Epoxy resins are used in cars/trucks/motorcycles and trains. In motor vehicles, epoxy coats are applied to the outside of cars through the cathodic electrodespositon (CED) process, providing water and corrosion resistance, prolonging the useful life of components, making cars last longer than they did just a few years ago. In internal parts, advantages include weight reduction (hence lower emissions), increased durability, mechanical strength and heat resistance. In railways their use prevents damage from debris, increases service life and help reduce weight. In boat building, epoxy resin composite materials help to reduce weight and the need for repair and maintenance. In 2011 some 45,000 companies were involved in the manufacturer of motor vehicles, trailers, motorcycles railways and rolling stock and boats and ship building and repair in the EU. These firms accounted for turnover of some €908 billion and employed over 2.5 million people. Significant end user markets include Germany, France, Italy Poland, the UK, Spain Romania and the Czech Republic. Epoxy resins are used in a large proportion of automobiles.

In aviation/aerospace, epoxy resins have supported the increased use of lightweight composite products/components in aircraft; contributed to improved strength/durability of aircraft components; and contributed to reducing weight and improving fuel efficiency (and reducing CO2 emissions) of contemporary aircraft. Their use increases safety/reliability of components and prevents rust/corrosion, helping to extend operational life and reliability. Some 240,000 people are directly employed in the manufacture of aircraft in the

EU, and a further 70,000 in aircraft repair in some 3,200 companies. These activities accounted for some €107 billion turnover and substantial export values.

Key Sector 4: Home and Leisure

Sales of epoxy resins to downstream users in the home and leisure sector accounted for some 25,000 tonnes (10% of total production volumes), creating turnover of €80 million in 2013. The largest epoxy sales values were into Germany, Austria, Italy and the UK.

Epoxy resins are used in various sporting equipment including skis, surfboards, tennis racquets, fishing rods and golf clubs. They help reduce weight, increase responsiveness, and enable lighter, stronger and longer-lasting components. Across Europe, the sector accounts for turnover of €4 billion and employs around 25,000 people, with epoxies being present in many different products across the sector. Key end user markets are Italy, Germany and Poland.

In DIY Home improvement, they are used in sealants/adhesives, mortars and for the repair of woods/plastics, providing a strong, durable, weather/chemical and heat-proof seal, prolonging the useful life of various products and ultimately saving unnecessary expenditure on replacement goods and preventing damage from water leaks. 260,000 tonnes of adhesive and sealant are sold across the EU to consumer/DIY uses, of which a proportion is epoxy-based. Key end user markets are Germany Italy France and Spain.

Key Sector 5: Construction

Sales of epoxy resins to downstream users in the construction sector accounted for 60,000 tonnes (23% of total production volumes) creating turnover of €183 million in 2013. The largest epoxy sales values were into Germany, Italy, the UK and the Netherlands.

Epoxy resins are extensively used in commercial construction, providing particularly strong bonding adhesives, sealants and fillers. They are often marketed as replacements for mechanical fixings and are suitable for internal and external use given their strength, durability and weather resistance. Epoxies are used extensively on flooring, protecting from wear, tear and slippage, and they are used in the construction and repair of roads and bridges, and as chemical anchors (for example coating and securing bridge cables). As the largest end-user sector considered (by sales of epoxies), there are some 3.3 million companies involved in construction and civil engineering, accounting for turnover of €1,556 billion and some 10.5 million employees across Europe. Of these, epoxy resins play enabling roles in a large number of different construction activities, despite the relatively small quantities used in any one project.

Potential regulatory action and implications

Some or all uses of epoxy resins could be affected by a requirement for 'authorisation' or 'restriction' of their constituent substances under the REACH Regulation. Outcomes may include an outright restriction or temporary authorisation for use, pending replacement at a later date. Importing finished products containing cured epoxy resins into Europe in the event of restriction or authorisation in Europe may still be possible, placing EU firms at a competitive disadvantage. The following socio-economic effects are expected based on the consultation and research undertaken for the current study.

EU and international scientific assessments

One of the starting substances of epoxy resins, Bisphenol A (BPA), has been thoroughly assessed by EU and international regulatory agencies such as the European Food Safety Authority (EFSA) and the US Food & Drug Agency (FDA). Both concluded that epoxy materials based on BPA are safe under current use and exposure conditions. In addition, after the reaction that is needed to produce the epoxy resins, epoxy resins themselves contain only minute residual amounts of unreacted BPA.

High quality products at a reasonable price

Epoxies are a high-performance, high-tech material that enables the European industry to produce outstanding products and thus remain competitive also in critical times. Consumers benefit from high quality and long lasting products that enable today's lifestyle (at a reasonable cost).

For more information, visit www.epoxy-europe.eu or contact info@epoxy-europe.eu