




# The Compelling Facts About Plastics 2009

An analysis of European plastics production,  
demand and recovery for 2008



## 2008 – At a glance

- Global production fell back in 2008 to 245 million tonnes from 260 in 2007 on the back of the financial crisis. The plastics industry experienced a dramatic 3<sup>rd</sup> and 4<sup>th</sup> quarter triggered by the economic crisis – more for those serving capital markets and less in daily consumables.
  - Europe produced 60 million tonnes and remained a major region contributing about 25% of the global total.
  - The plastics industry – plastic producers, converters and machine manufacturers – employed 1.6 million people and many times more in industries depending on plastics for their business. The plastics producers and converters also contributed together around 13 billion € in trade surplus to EU27 which helped to reduce the 242 billion € trade deficit for the whole industry in 2008.
  - Demand by European converters fell back 7.5% to 48.5 million tonnes in 2008.
  - Waste generation increased by just under 1%. Both recycling and energy recovery increased to drive total recovery rate for plastics to 51.3% and disposal at landfill down to 48.7% thereby opening up a gap of 2.6%. Recycling increased by 4.3% over 2007, a lower year-on-year increase than in recent years, reflecting the severe impact of the economic crisis on this sector. Energy recovery increased 3.6% over 2007.
  - Seven of the EU Member States plus Norway and Switzerland recover more than 80% of their used plastics. These countries adopt an integrated resource management strategy using a range of complementary options to address each different waste stream with the best environmental and economic option.
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# Plastics protect the climate, boost resource efficiency and give us a safer life

Plastics play a significant role in the environmental, societal and economic dimensions of sustainable development. Our modern lifestyle would not be possible without plastics. Plastics meet the needs of society by enabling the eco-efficient manufacture of many valuable products. E.g. protective packaging, light and safe materials in cars, mobile phones, insulation materials in buildings, medical devices, and important parts for applications as different as renewable energy production and protection in extreme conditions.

## Climate protection

In cars, around 40% of plastics used contribute to weight reduction, saving fuel and reducing CO<sub>2</sub> emissions. A further 60% of the weight of the plastics used enhance comfort and safety. The weight reduction from plastic in a modern car saves over 500l of fuel over 150.000km. In an Airbus A380, high performance plastic composites reduce passenger costs per seat as the lighter weight results in lower fuel consumption.

Homes and buildings stay warm (or cool!) with plastic insulation. Nearly 40% of all primary energy consumed globally is used in buildings. Efficient insulation is a key priority in reaching the Kyoto targets.

Lightweight plastic packaging reduces both the weight of transporting goods and the amount of packaged goods that go to waste – both of which reduce CO<sub>2</sub> emissions.

Plastics enable the rotors in wind turbines to be longer and more effective; and components in solar panels to increase their efficiency.

## Resource efficiency

Without plastic packaging, it is estimated that the tonnage of alternative packaging materials would increase by a factor of 4, greenhouse gas emissions by a factor of 2, costs by a factor of 1.9, energy use by a factor of 1.5 and waste by a factor of 1.9 in volume. As the use of plastics continues to grow, this effect would increase each year.

Plastics packaging also saves resources. It protects food as it travels from farm to supermarket and into

our kitchens. For example, in the developing world 50% of food is wasted between farm and kitchen; at the supermarket loosely-packed fruits and vegetables create 26% more waste than pre-packed produce; 1.5g of plastics film extends the shelf life of a cucumber from 3 to 14 days. Some 10g of multilayer film in a MAP (modified atmospheric packaging) for meat extends shelf life from a few days to over a week. The amount of CO<sub>2</sub> used to produce a single portion of meat is almost 100 times more than that used to produce the multilayer film.

Innovative design uses plastics for the outer drum of washing machines, reducing both water and energy consumption. Plastic pipes ensure the efficient, safe and leak-free transportation of drinking water and sewage without any waste or contamination.

## Plastics make life safer

Plastics protect us from injury – in the car, working as a fire fighter or when skiing. Car airbags and motorcyclists' helmets are made of plastics; as is the protective clothing for most motorcyclists. An astronaut's suit must sustain temperatures from -150 degrees Celsius to +120 degrees. Firefighters rely upon flexible plastics clothing which protects against high temperatures and ventilates.

Plastics protect our food and drink from contamination. Plastics flooring and furniture are easy to clean. This prevents the spread of bacteria and reduces the cost of maintenance, e.g. in hospitals. In medicine, plastics are used for blood pouches and tubing, artificial limbs and joints, contact lenses and artificial cornea, dissolving stitches, splints and screws that heal fractures. Soon nanopolymers will carry medicines directly to damaged cells and micro-spirals will be used to combat coronary disease. Artificial, plastic based blood is also being developed to complement natural blood.



# Plastics' significant contribution to the sustainable use of resources

## Reduce

The use of plastics saves energy and reduces CO<sub>2</sub> emissions. From a lifecycle perspective, if all plastics in all applications were substituted with a mix of alternative materials, 22.4 million additional tonnes of crude oil would be needed each year.

This means additional greenhouse gas emissions that are 30% of the EU27 Kyoto target for 2000-2012.

Plastics reduce waste by providing many resource-effective solutions. This includes lowering energy consumption during production and reducing the plastics material needed for a particular job. There is also less waste of packaged goods, be it food, water or a computer (e.g. lighter bottles for water, soft drinks or detergents and thinner packaging film).

## Reuse

Plastics are reused in many ways. Plastics soft drink bottles are reused in many Member States. Carrier bags are reused in a variety of ways and plastic supermarket trays provide a clean, robust and cost-effective way of transporting fresh food from producer to customer.

## Recycle

Plastic recycling is increasing every year. Apart from familiar applications like recycling bottles and industrial packaging film, there are also new developments e.g. the Recovynil initiative from the Vinyl 2010 programme of the PVC industry (covering pipes, window frames, roofing membranes and flooring).



Another example being tested in some Member States is “mixed packaging plastics”.

This important development must continue. The full potential of existing recycling streams must be realised and new eco-efficient streams developed.

## Recover

With existing and emerging applications there will always be items which cannot be recycled in an eco-efficient way:

For these end-of-life streams plastics offer an additional advantage – energy recovery. Plastics enable many vital primary fossil fuel substitution from oil well to final energy uses such as heat cooling and electricity. As long as fossil fuels continue to be used for energy production, plastics will provide more value to society when end-of-life plastics are not landfilled.

Landfill and disposal must be minimised. This is a waste of valuable resources and adds to greenhouse gases.

## The vision of the 4 partners for a forward-looking resource management approach:

- Minimise disposal of plastics waste to landfill
- Use a mix of recovery options for the best environmental and economic result in every situation
- Treatment and recovery of waste should meet defined environmental standards
- Overall lifecycle impact taken into consideration

# Plastics production and converter demand in a global context

Since 1950, globally there has been an average annual increase in the production and consumption of plastics of 9%. This has been driven by a track record of continuous innovation. From 1.5 million tonnes in 1950, total global production reached 245 million tonnes in 2008 (see Figure 1).

This continued growth was reversed in 2008 as a direct consequence of the global financial crisis which has affected virtually all sectors. An analysis of plastic materials consumption on a per capita basis shows that this has now grown to approximately 100kg per year in NAFTA and Western Europe. These regions have the potential to grow to approximately 140kg per capita by 2015. The biggest potential growth area is the rapidly developing Asian countries (excluding Japan), where current per capita consumption is only around 20kg.

In Europe, new Member States are expected to see the biggest percentage increase, as their economies develop.

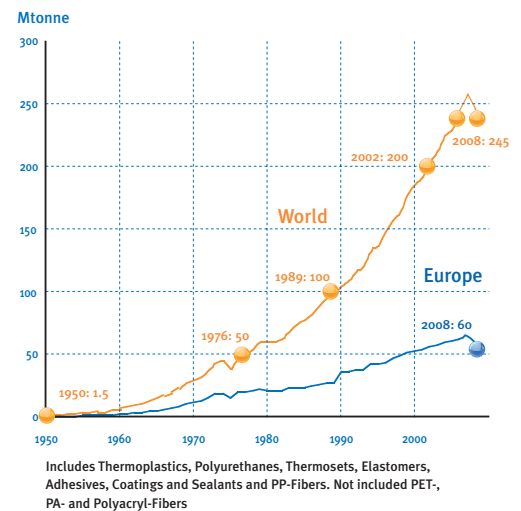


Figure 1. World plastics production 1950-2008  
Source: PlasticsEurope Market Research Group (PEMRG)

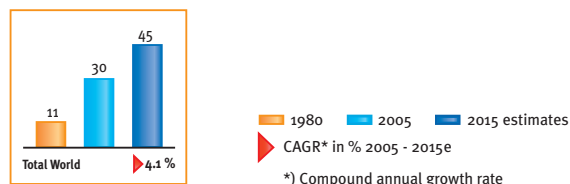
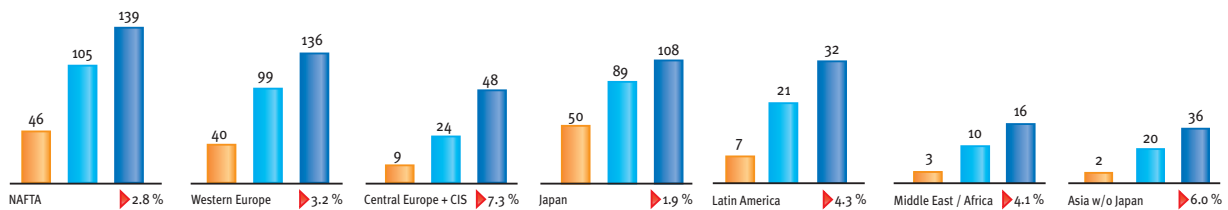


Figure 2. Plastics demand by converters in kg per capita per region  
Source: PlasticsEurope Market Research Group (PEMRG)

## Production and demand in Europe

Europe produces approximately 60 million tonnes of plastics, representing 25% of the global plastics production. This is slightly more than NAFTA (23%).

Plastic production facilities are well placed across Europe. Germany is the major producer, accounting for 7.5% of global production followed by Benelux (4.5%), France (3%), Italy (2%) and the UK and Spain (1.5%) (Figure 3).

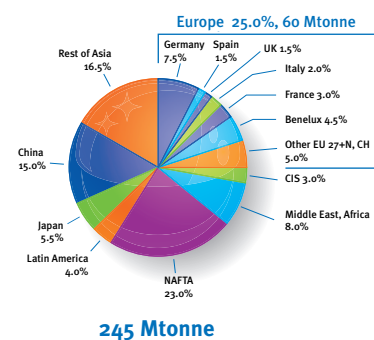


Figure 3. World plastics production 2008 by country and region  
Source: PlasticsEurope Market Research Group (PEMRG)



Plastics demand by converters in Europe was 48.5 million tonnes in 2008. The demand is, expressed as tonnage of virgin resin processed by European converters by country (See Figure 4). The major countries are Germany and Italy, together accounting for around 40% of the European conversion to plastic products. Of the new Member States, Poland has the highest plastic conversion rate 2.55 million tonnes of the European total). Followed by the Czech Republic at 1.05 million tonnes and Hungary at 0.84 million tonnes. The converting industries in many of the new Member States are expected to grow above the average of the old Member States in the coming years.

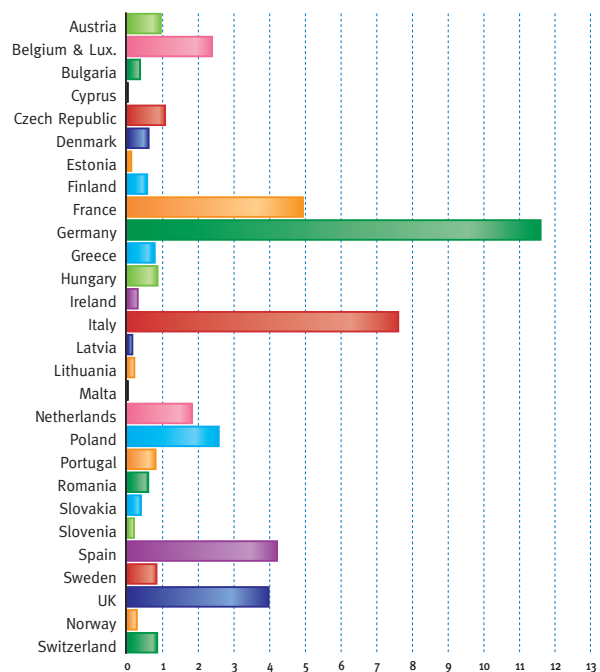


Figure 4. Plastics demand by converters: breakdown by country in Europe (Mtonne) 2008

Source: PlasticsEurope Market Research Group (PEMRG)

## Plastics demand by converters per polymer and application

There are around 20 distinct groups of plastics, each with numerous grades available to help make the best choice for each specific application. There are five high-volume plastics families; polyethylene (including low density (LDPE), linear low density (LLDPE) and high density (HDPE)), polypropylene (PP), polyvinylchloride (PVC), polystyrene (solid PS and expandable EPS) and polyethylene terephthalate (PET). Together the big five account for around 75% of all European plastics

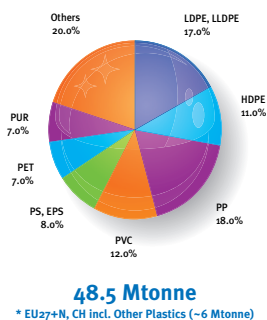


Figure 5. Plastics demand by converters 2008:

breakdown by types in Europe

Source: PlasticsEurope Market Research Group (PEMRG)

demand. During 2008 all these groups saw a drop in demand – ranging from 1 to 11% – with an average around 7.5% (Figure 5).

Packaging remains the biggest end-use for plastics (38%) followed by Building and Construction (21%). Automotive (7%), Electrical&Electronic (6%). Other applications, which include medical and leisure, use 28%. (See Figure 6).

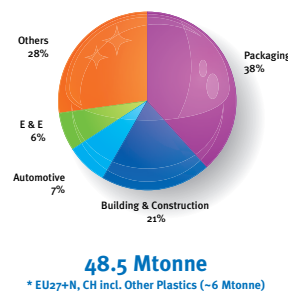


Figure 6. Plastics demand by converters 2008:

breakdown by end use segments in Europe

Source: PlasticsEurope Market Research Group (PEMRG)

## Plastics trade – a strong contributor to European wealth

Plastics contribute to sustainable development and bring quality of life to citizens. As an example plastics make many goods in our daily life more affordable and reduce the wastage of many valuable resources. The plastics industry (polymer producers – represented by PlasticsEurope, converters – represented by EuPC and machine manufacturers – represented by EUROMAP) within the EU27 provide employment to 1.6 million people – two thirds of the number of employees in the automotive sector – and indirectly to many times more in industries which are enabled or depend on plastics for their products.

Leisure shoes, sports garment and equipment, electronic goods like the mobile phone – to give a few examples – would not be so convenient or so affordable was it not for the plastics used in their design and manufacturing.

In addition the plastics industry<sup>(1)</sup> add wealth to the EU27 by exporting more in value and volume terms than what is being imported from outside the EU27. The EU27 is therefore a net exporter of both primary plastics and converted plastics products (plastics in non-primary forms).

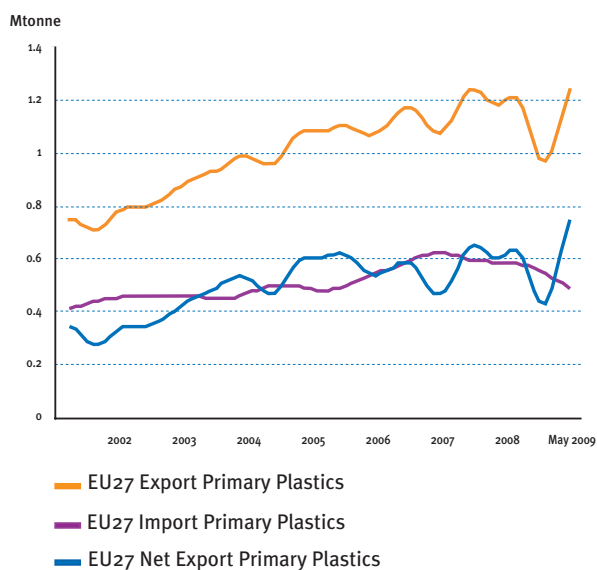


Figure 7. EU27-Trade with Primary Plastics (SITC 57) with non-EU Countries (Extra EU), trend cycle

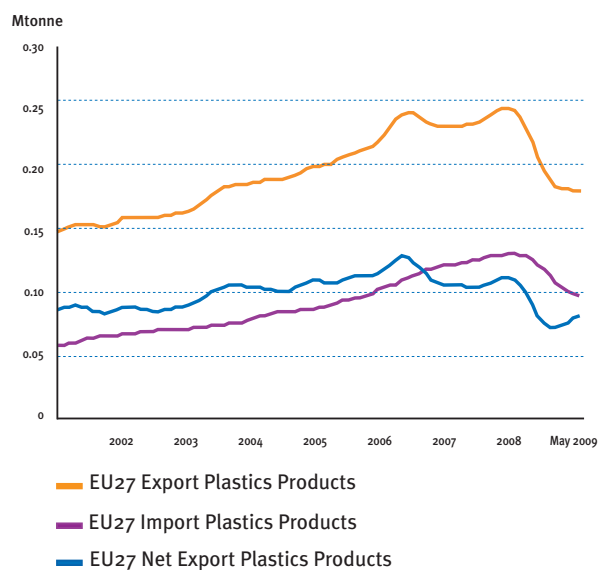


Figure 8. EU27-Trade with Plastics Products (SITC 58) with non-EU Countries (Extra EU), trend cycle





This attractive position has been achieved by a constant focus on cost effectiveness, quality management and by embracing new technologies combined with innovation and customer focus.

Figure 7 (on page 8), shows the EU27 export, import and net export of primary plastics (SITC 57) from 2002 up to May 2009 with non-EU countries. In 2008 the net export amounted to 6.8 million tonnes with a value of about 8.7 billion €.

The corresponding development for converted plastic products (SITC 58) is shown in figure 8 and demonstrates a net export of 1.2 million tonnes with an value of 4.4 billion €.

The trend for both primary plastics and the converted plastics products was down during the fourth quarter 2008 reflecting the beginning of the severe recession in plastics which hit the EU27 plastics industry very heavily. The deterioration has however been reversed in 2009.

In 2008 the plastics industry<sup>(1)</sup> created an EU27 trade surplus with non-EU countries worth around 13 billion €. Since 2002 the surplus has increased steadily as shown by the graph below whilst the total EU industry<sup>(2)</sup> net trade has shown a growing deficit.

The strong net export position of the EU27 plastics industry is constantly challenged by international competition. Many of the progressive legislative

initiatives in EU27, which are often in advance of other parts of the world, mean that the plastics industry is often under pressure to be able to remain globally competitive. It is therefore important that new initiatives are carefully framed to try to maintain a level playing field and balance environmental, economic and social considerations.

If EU27 moves too fast, without consideration of the market impact, in introducing new initiatives, then there is a risk that the strong contribution by the EU27 plastics industry – and indirectly by the many dependent industries mentioned above – will deteriorate over time with job losses and adverse social consequences.

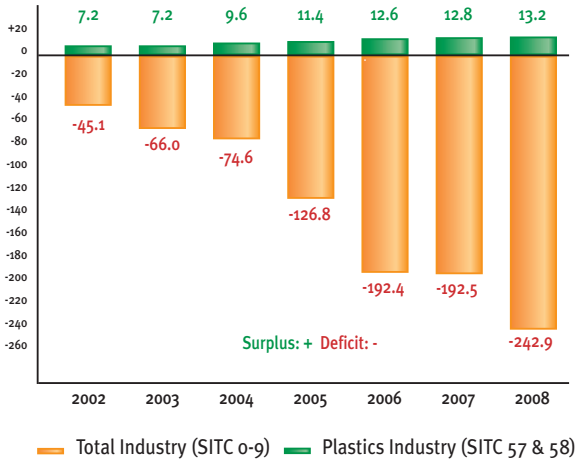


Figure 9. EU27-Trade Balance with non-EU Countries (Extra EU) Total Industry (SITC 0-9) compared to the Plastics Industry (SITC 57 & 58) in billion €

1 SITC (Standard International Trade Classification of the United Nations) 57+58  
 2 Total industry SITC 0-9

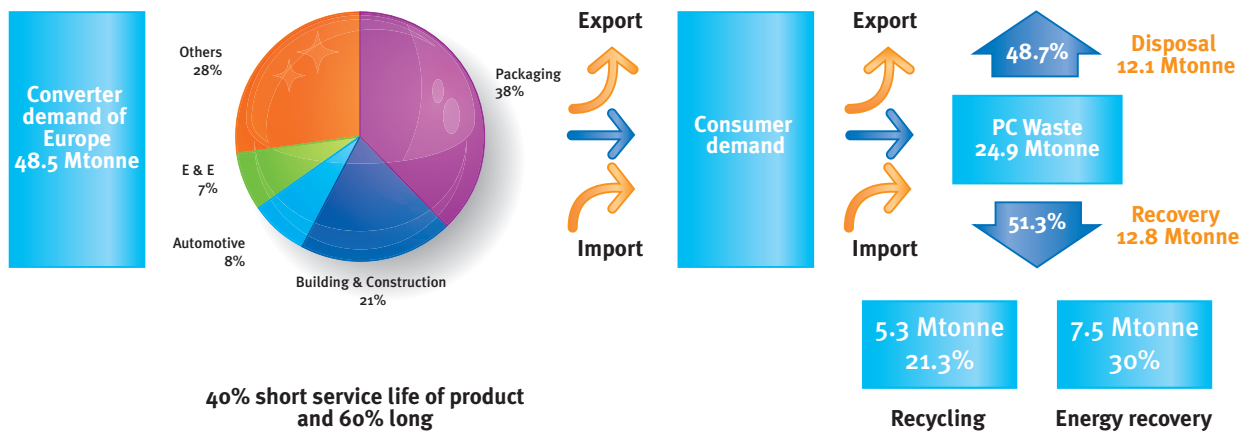
# Plastics supply chain from cradle to cradle

Figure 10 shows the flow of plastics from conversion to the end-of-life phase in Europe.

The converters used 48.5 million tonnes of plastics in 2008, down 7.5% on 2007. Of all plastics used by consumers, 24.9 million tonnes ended up as post-consumer waste, up from 24.6 million tonnes in 2006. 51.3% of post-consumer used plastic was recovered and half went to disposal. Of the 51.3% recovered, 5.3 million tonnes were recycled – as material and feedstock – and 7.5 million tonnes were recovered as energy.

The total material recycling rate of post-consumer plastics in 2008 was 21.3%. Mechanical recycling was at 21% (up 0.9 percentage points over 2007) and feedstock recycling at 0.3 % (unchanged from 2007). The energy recovery rate increased from 29.2 to 30%. In 2008, 12.1 million tonnes of plastic waste was still wasted on landfills.

Figure 10. Plastics from cradle to cradle (EU27+NO/CH 2008)



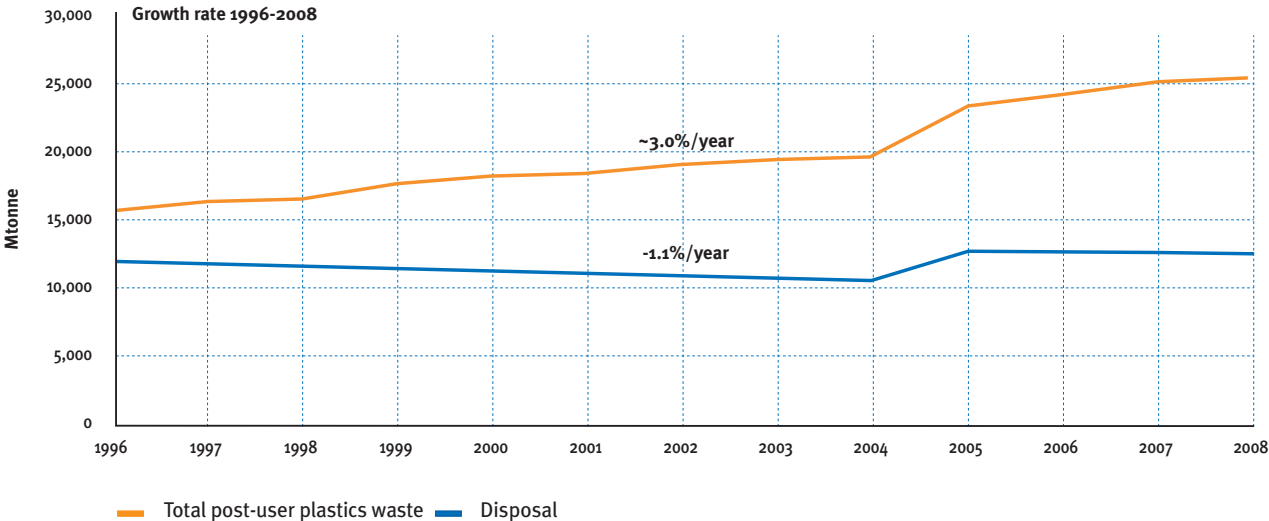


# Plastics continue to decouple growth in demand from material to landfill

Despite 3% annual growth in the past decade for post-consumer waste, landfill amounts have remained stable. Figure 11 shows the history for EU15+NO/CH until to 2004 and for EU27+NO/CH from 2005. There are many reasons for the growth of post-consumer plastic waste; plastics continue to replace alternative materials, economic growth drives greater consumption, smaller households require more packaging per person and proportionally more ready-made single-portion meals are consumed.

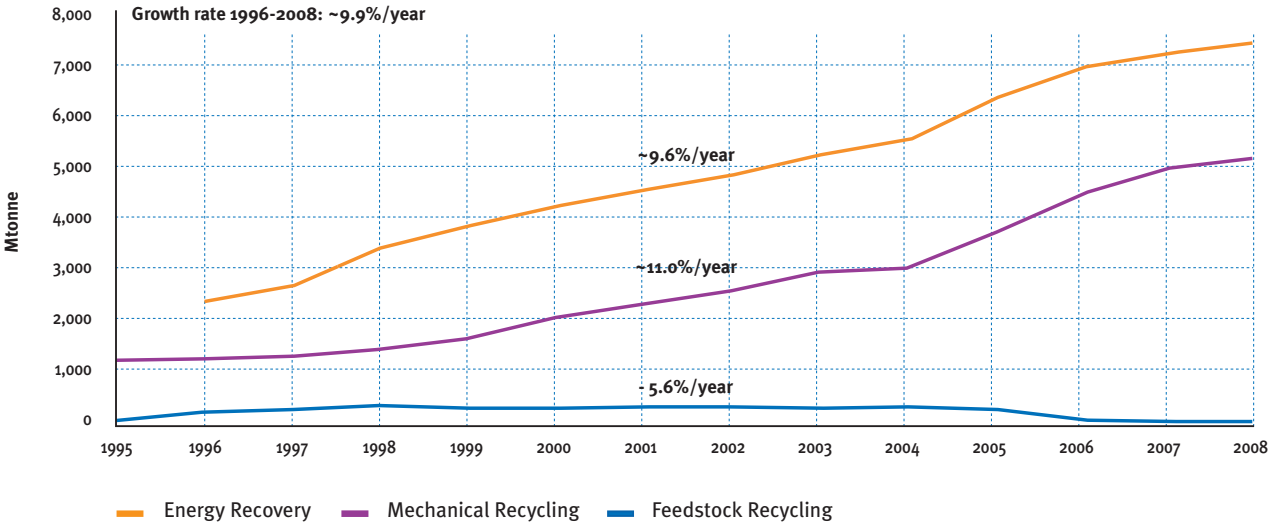
Figure 12 shows the growth of both mechanical recycling and energy recovery. Over the last decade the average annual growth rate has been about 10%. Mechanical recycling increased by 4.3% which is down compared to 2007 due to the impact of the financial crisis. Growth in energy recovery increased 3.6% up slightly on 2007. More investment in energy recovery facilities is needed to divert streams which cannot be eco-efficiently recycled from landfill.

Figure 11. Continued decoupling of plastics waste and landfill



The figure shows the history for EU15+NO/CH until 2004 and for EU27+NO/CH from 2005 onwards.

Figure 12. Strong continued growth of recycling and energy recovery



The figure shows the history for EU15+NO/CH until 2004 and for EU27+NO/CH from 2005 onwards.

# Slow but steady progress towards diverting plastics waste from landfill

Material recycling and energy recovery of post-consumer plastics waste are very different by country. In Switzerland, Germany, Sweden and Denmark there is very little landfill. These countries have almost completed their diversion-from-landfill strategy.

A recent study by the Swiss consultancy Prognos<sup>(1)</sup> showed that 7% of the EU Kyoto target for greenhouse gas (GHG) emissions could be saved if all waste currently going to landfill was moved to a combination of recycling and energy recovery. The best results were achieved without specific targets but with full flexibility to explore recycling and energy recovery for each waste stream. In addition to saving GHG emissions, diversion from landfill helps increase resource efficiency and energy security, while reducing litter.

Figure 13 shows that countries with high recovery rates score highly on both recycling and energy recovery. This means that a strategy which includes

energy recovery is not contradictory to achieving good recycling results. A complete resource management strategy, therefore, needs to address both areas. No country can recycle all post-consumer waste. Figure 13 also shows that whilst recycling performance is similar across most European countries there are big differences in the utilisation of energy recovery. Countries which depend on landfills must not only maximise their full recycling potential but also quickly expand their energy-from-waste network.

Diversion from landfill progress is, on average, slow. Recycling (mechanical+feedstock) across Europe increased from 20.4% in 2007 to 21.3% in 2008. Energy recovery increased from 29.2% in 2007 to 30% in 2008. Significant efforts are necessary in many Member States if they are to maximise the full potential of a diversion from landfill strategy (e.g. GHG emission savings, enhanced resource efficiency and energy security and avoiding landfill penalties).

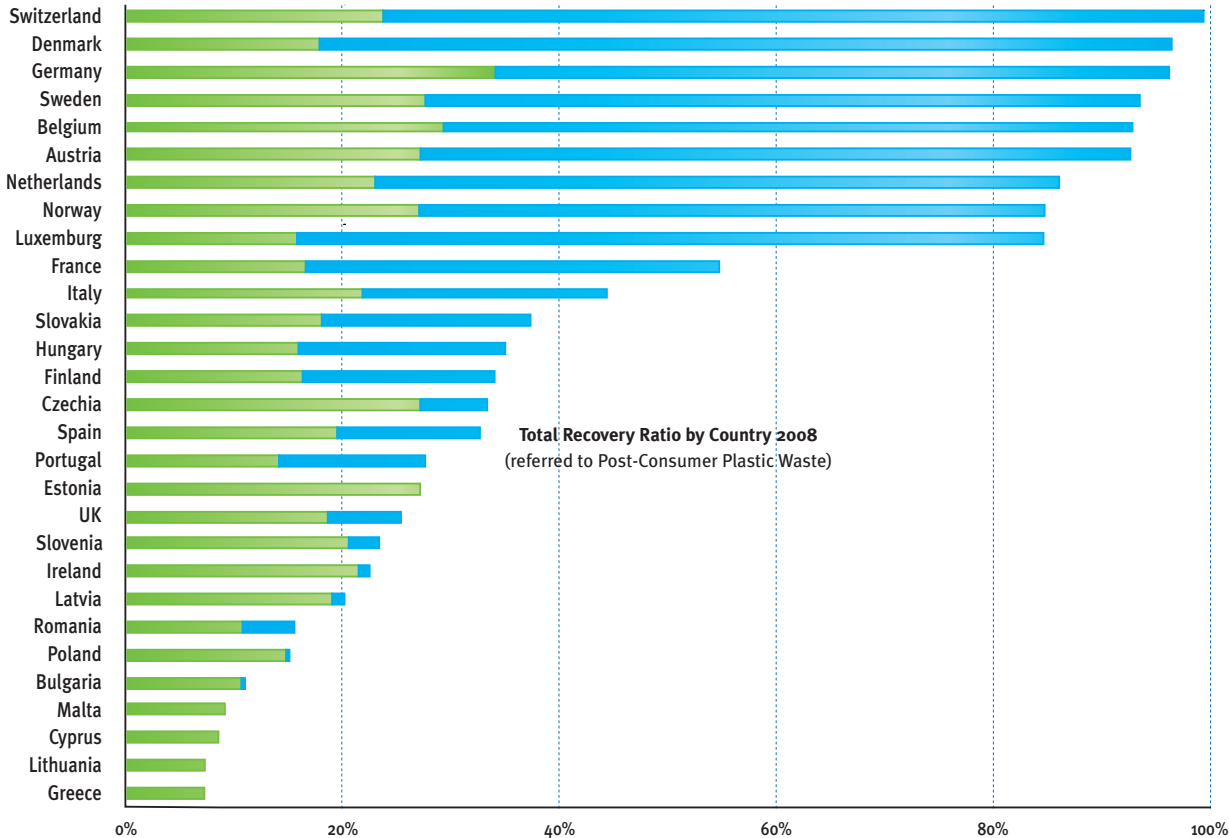


Figure 13. Recycling and energy recovery rate per country

■ Recycling rate 2008 ■ Energy Recovery rate 2008

1 <http://www.prognos.com/Singleview.306+M5c828d79ff6.o.html>

## Voluntary initiatives to stimulate the mechanical recycling of PET bottles

PET bottle collection in Europe is steadily increasing; about 40% of all PET bottles are now collected for recycling. This recycling rate must continue to increase especially in high value applications like food packaging. A good balance between new PET bottle technologies and recyclability is needed. Consequently, several European organisations involved in the PET recycle chain have formed the European PET Bottle Platform (EPBP).

This voluntary initiative, aimed at the packaging industry, will assess the impact of new PET bottle designs on recyclability. This 'front-end' evaluation will help to maintain the sustainability of PET recycling industry in Europe.

EPBP members include the recycling stakeholders such as PET producers, bottle makers, beverage producers, recovery organisations and recyclers.

EPBP's focus is to evaluate technologies/products and encourage new PET bottle innovations to ensure that the success of PET recycling is not compromised.

PET bottle recyclability will be promoted by:

- Creating harmonised European guidelines for PET bottle recyclability via protocol development;
- Encouraging the industry to test new PET bottle concepts/materials before market launch;
- Providing stakeholder guidance and recommendations;
- Sharing knowledge across the value chain.

To enable an independent evaluation of new technologies and their impact on recycling, the Platform includes technical experts from PET production, design and recycling. EPBP has established test procedures to assess the recycling profile of new packaging technologies. e.g. barriers, additives, closures, labels, etc. Products passing these tests will be given approval thus ensuring that PET recycling continues to build on its successful track record.

For more information visit [www.petbottleplatform.eu](http://www.petbottleplatform.eu).

## New trends in recovery of packaging

Many plastics pots, tubs and trays are made from Polypropylene (PP), Polystyrene (PS) and Polyvinylchloride (PVC). Those packages are used for packing fruits, dairies, ice-cream and many others type of food.

When looking into what could be done beyond bottle recycling (e.g. HDPE and PET bottles), several EPRO members have found out that the remaining rigid plastics present in the selective collections are mainly composed of two resins; PP and PS.

In France, for example, market evaluations and sorting centre analysis have demonstrated that about 40% of the rigid plastics are composed of PP and 20% of PS, the rest being split between PET, HDPE and PVC. The next question is then if, and how, these packages could be sorted, reclaimed and then recycled in new applications.

Some countries such as Germany, Italy and the UK have already automatic sorting facilities capable of sorting out these packages. Once sorted, they can be sent to reclaimers, which have similar washing lines like bottle recyclers, equipped with grinding, washing, drying and in some cases extruding equipment. The reprocessed flakes or pellets can then be used to replace virgin material in new applications, such as hangers, flower pots, pallets, crates and car parts.

EPRO is currently undertaking tests with PlasticsEurope to define which further applications could be reached with these recyclates, and what kind of extra equipment (if any) it would take for the reclaimer/recycler to reach those new markets.





## Mechanical recycling of food grade HDPE in the UK

The UK has conducted much research and development in recent years on recycling HDPE milk containers into recompounded pellets suitable for use in food grade applications. Research commissioned by WRAP (the Waste & Resources Action Programme) suggests that producing food grade HDPE is both technically achievable and commercially viable.

This research, along with interest from the plastics recycling industry, has been driven by demand for food grade polymer from plastic bottle converters. These include Nampak who manufacture most of the UK's plastic milk containers, and retailers, including Marks and Spencer.

The first two plants capable of producing food grade HDPE pellets came on stream during 2008. As more UK reprocessors begin to install equipment production will increase further. To date, Nampak has signed supply contracts for 24,000 tonnes per annum of food grade HDPE from UK reprocessors. This should enable the company to meet its target of using 30% recycled HDPE in all its plastic milk containers by 2010.

Unlike other European countries, the production of food grade HDPE in the UK is helped by the high percentage of natural HDPE milk bottles in the plastic

waste stream. (Around 80% of the HDPE waste bottle fraction). Natural HDPE milk bottles must be sorted to a polymer and colour purity of 99% prior to reprocessing. In the UK, automatic NIR sorting equipment is used, followed by a final manual inspection and sort stage.

The bottles are flaked and washed, before passing through automatic flake sorting equipment. This removes any remaining contamination (e.g. particles of metals, wood, glass, etc) and any coloured HDPE which may have entered the recycling process. The final step is extrusion of the flake – at a high temperature and under vacuum – to produce a recompounded pellet.

Demand for recycled HDPE for use in food contact applications is still strong, despite current economic conditions (especially compared to demand from the construction and automotive sectors). The timing of this additional HDPE reprocessing capacity is ideal because of recent increases in the UK's plastic bottle recovery rates.

Similar developments are happening with the production of food grade PET. WRAP recently commissioned research to investigate if food grade PP can be produced using a similar process to that used for HDPE.



## Mechanical recycling of agricultural film – a Norwegian success story

The collection of agricultural film in Norway began in the mid-90s, before the introduction of the national plastic recycling scheme. Norwegian farmers took environmental responsibility for sorting their used plastics (although participation was legally enforceable). Farms in Norway are widespread and face two main challenges for collection and recycling: maintaining a good quality of film collected from farms and greenhouses and providing efficient transport to cover long distances.

### Collection system

Most farmers collect their agricultural films and other recyclables and drive to the local recycling station. Larger

farms are often visited by waste collectors. Green Dot Norway cooperates with about 100 waste collectors nationwide. They collect and ensure bales are of the right quality and weight. Green Dot makes agreements with recyclers on behalf of the local recycling businesses.

### Lower CO<sub>2</sub>-emissions

There are challenges. Agricultural film needs cleaning before it can be recycled (caused by soil, small stones, water etc). In 2008, a licence fee was paid for 8.666 tonnes of agricultural films. Of this 7232 tonnes – or 83% – were recycled saving up to 2kg of CO<sub>2</sub> per kg plastics compared to using virgin material.

## Feedstock recycling

The use of plastic waste in iron ore production is a valuable and familiar feedstock recycling application. Traditionally, iron production used coal and coke as a reduction agent in the blast furnace.

Later, heavy liquid petroleum fractions replaced coal because it was easy to handle and saved money. Plastic waste first substituted heavy fuel oils in the 1990s. Several German companies have used approximately 300k tonnes per year of ground plastic waste in their blast furnaces.

Voest-Alpine in Austria has now developed in-house expertise to use mixed plastics waste in their blast furnace operation. They substitute almost 25% of the oil with mixed plastics waste<sup>(1)</sup>.

Current iron production can use a maximum of approximately 220k tonnes per year of mixed plastics waste. The operation has proved reliable and performs well environmentally. Using mixed plastics instead of oil in iron production is more eco-efficient than when it is used just as a fuel e.g. in cement production. It is also classified as recycling in the revised Waste Framework Directive.

<sup>1</sup> Identiplast2009 Conference, April 20-21, Thomas Buergl





## Energy from Waste

The recovery of energy from waste in Europe dates back 100 years. Today about 420 plants treat 64 million tonnes of municipal, commercial and industrial waste every year to produce electricity for 7 million households and heat for 13.4 million household. This also reduces CO<sub>2</sub> emissions per year by 23 million tonnes; equivalent to taking 11 million cars off our roads.

The EU member states demonstrate very different “energy from waste” footprint and can be divided into three groups.

### Strong position for EfW

Austria, Belgium, Denmark, Germany, the Netherlands, Sweden and Switzerland have demand and supply in balance and use EfW extensively.

### EfW can be expanded

Ireland, Italy, France, Portugal and Spain offer market opportunities for growth but also market barriers.

### Major growth potential

The Czech Republic, Greece, Poland and the UK all offer major growth opportunities which require very large investments.

The EfW route is technically, environmentally and economically fully proven. If Europe used the full potential of its residual waste stream, using the EfW technology, it could bring electricity to 17 million households and heat 24 million households.

### Example Denmark

Denmark has the highest per capita production of both power and heat from EfW plants in Europe. The 30 EfW plants use 3.5 million tonnes of waste per year to produce 5% of the national need for electricity and 20% of the heat need. The district heating system today covers 53% of the heating market and this is planned to increase to 70% by 2030 by increasing the amount of waste treated in EfW plants to between 4.5-5 million tonnes per year.





## The Greater Manchester waste management solution – a model for diverting waste from landfill?

Greater Manchester is comprised of 9 boroughs in the North West of England and has about 1 million households. They generate 1.3 million tonnes of municipal solid waste, which is about 5% of the UK's total.

Greater Manchester has outsourced the management of their waste in a 25-year contract estimated to cost £3.8billion through which they expect to save their taxpayers around £1 per household per week.

The planned solution will achieve recycling and composting of at least 50% of the municipal waste, which meets both the UK waste strategy and the recently revised Waste Framework Directive for 2020.

For the non-recyclable fraction, treatment in a mechanical biological treatment (MBT) plant with anaerobic digestion is planned. This treatment will take out the compostable content and produce methane for energy use. From the 570.000 tonnes per year of non-recyclables, the output stream will be about 275.000 tonnes/year of a fuel called Solid Recovered Fuel – SRF, which has a higher calorific content than un-treated municipal waste.

The SRF produced from municipal solid waste that cannot be recycled will be transported to a new Energy from Waste CHP (combined heat and power) plant at Runcorn, which is being built by a consortium of INEOS Chlor, Viridor and John Laing. This plant

will produce heat and power for the neighbouring INEOS chemical manufacturing operation. The plant, which received planning permission from the UK Government in September 2008, will have the capacity to take 750.000 tonnes/year of SRF, and could produce 100MW electricity and 360MW heat at full capacity representing 20% of the INEOS energy needs at Runcorn.

In addition to the saving for taxpayers, Greater Manchester will reduce their dependence on landfill from today's 65% to below 25% thereby minimising landfill penalties and the need to open new landfill sites.

For INEOS the investment will secure part of their energy need with a fuel which is disconnected from the volatility of fossil fuels and which is locally sourced thus reducing the need to import energy from outside the UK.

In addition to the waste taken from Greater Manchester, the INEOS facility will have the potential to take waste from other neighbouring waste disposal authorities in the North West region.

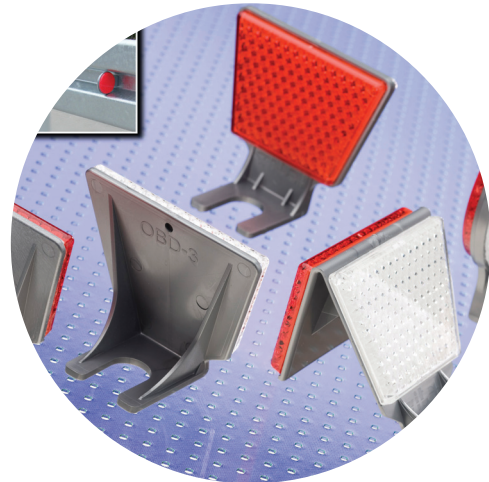
The Greater Manchester model provides an integrated resource management solution where complementary technologies are combined to utilise the full potential of the value of the waste to the benefit of taxpayers, the country and the environment.

# Plastic products, applications and goods – enablers of innovation in society

Plastics have been around for over 100 years but are considered ‘modern’ when compared to other materials and, through their ubiquitous use, have become something of a ‘symbol’ for modern society. Over the last few decades, plastics have been behind numerous technological advancements and play an important part ‘behind-the-scenes’ – they have enabled innovative designs, cost savings and the breaking down of barriers towards achieving a myriad of shapes, forms and applications. Thanks to plastics, the only limitation to creativity nowadays is that of the mind and no longer of the material.



Source: Photo Argo Medical Technologies Ltd., ReWalk™



Source: Photo BASF, 2008

## Health

With plastics, a major technological breakthrough has been reached in the field of bionics. Thanks to a revolutionary wearable, partially concealable, motorised, plastic suit called ReWalk™, people who have lost the use of their legs can walk again.

ReWalk™ uses advanced motion sensors, sophisticated robotic control algorithms, on-board computers, real-time software, actuation motors, tailored rechargeable batteries and, of course, composite plastic materials.

ReWalk is the perfect illustration of how plastics combined with advanced technology brings tangible health and emotional benefits in addition to relieving suffering.

## Safety

Another life saving achievement thanks to plastics is the protective road barrier reflectors created by Wital, a Polish company. This application uses Luran®, the styrene-based speciality plastic, to make protective road barrier reflectors. The reflectors which are already in use in Poland are produced in a one-process step by injection moulding.

Replacing steel, the use of this acrylate-styrene-acrylonitrile polymer makes the reflector less expensive. It also makes it impact resistant, strong, lightweight and weather resistant – even in the worst weather conditions the surface retains its high quality finish.





### **Mobility**

Plastics' prominent role in the automotive technology is now an established fact. Thanks to their light weight and potential for modularity, plastics help make cars less pollutant, safer and more comfortable.

Thanks to plastics, development in the automotive technology have been taken a step further with racing solar cars such as Nuna. The Nuna car ran, and won, a 3000 km race travelling at an average speed of 91 km/h, right across Australia, powered by solar energy alone.

To run such a long distance, under such harsh climatic conditions, the car had to be light and strong. That's why the entire bodywork was built in carbon fibre, reinforced on the outside with kevlar. Kevlar is yet another extremely strong plastics material and, as such, used in bullet-proof vests; and spacesuits for protection against micrometeorites. The kevlar layer in the Nuna protects the car against the impact of flying gravel during a race.

Nuna is currently in its 5th edition and is being built by the Nuon Solar Team ready to compete in the 2009 World Solar Challenge which begins on 05 October 2009.

### **Intelligent roofing**

Thanks to plastics, architects can nowadays combine both aesthetics and energy efficiency. With recycled plastics, another breakthrough has been achieved in harnessing solar energy. An American company has now taken solar panel design to a whole new level by integrating them into roof tiles. The unique designs are integrated right into roof tiles which then serve a dual purpose: offering traditional roofing protection and solar panels at the same time.

The tiles are made from lightweight recycled plastic, moulded together with a flexible solar cell. In addition, the polymers employed in the tile can be recycled once the product reaches its end of life.

These are just few examples of how plastics contribute to enhancing our lives and well-being, whilst contributing significantly to the sustainable development of society.



Source: Photo SRS Energy, Solé Power Tile™



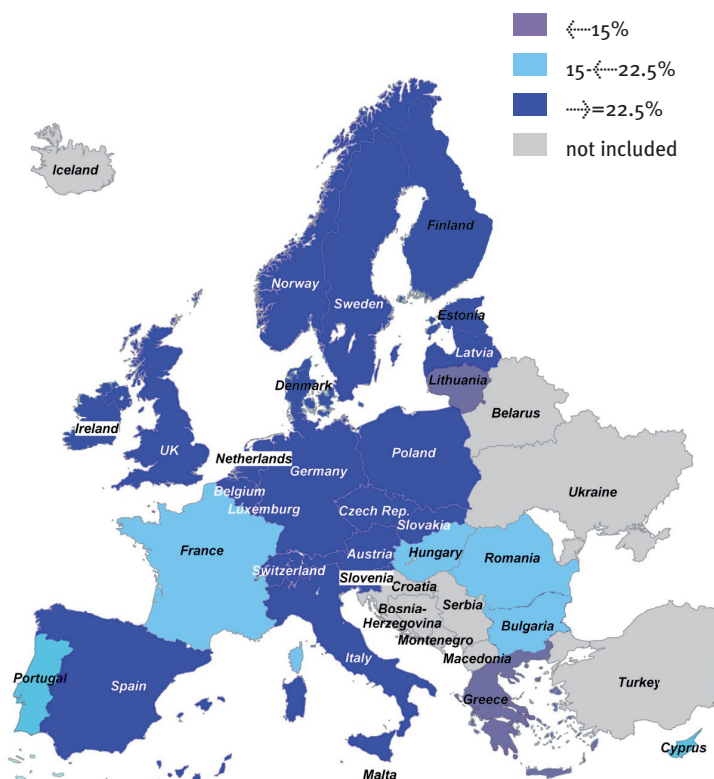
# Recovery trends by application

## Packaging

The packaging application has the longest history of recovery and contributes about 63% of end-of-life quantity. Not surprisingly the major part of what is today recycled therefore comes from packaging. 40% of bottles and industrial film are now being mechanically recycled across Europe. Well over 90% of crates and boxes are recycled. Recycling rates for the remaining mixed plastics are still low – below 10% across Europe. In total the collection for recycling of post-consumer packaging grew in 2008 to an average of 29%, up from 28% in 2007.

Figure 14 shows the European countries performing above and below the packaging directive target of 22.5% for 2008.

Figure 14. Total recycling of plastics packaging waste by country



## Agricultural films

Agricultural plastics waste such as silage film is a good source for mechanical recycling as it is made from a limited range of plastics, mostly polyolefins. However often high levels of contamination by soil pose a technical and financial challenge to eco-efficient recycling or recovery. EuPC and EuPR are engaged in the LabelAgriWaste project – an EU cofunded project – aiming at developing an integrated approach towards the collection, sampling and labelling of agricultural plastic waste. Project was completed in July 2009.

## Automotive

The recycling rate for automotive plastics waste continued to increase to just under 10% in 2008. Volkswagen won an environmental award for their SiCon process – a mechanical process to extract usable secondary raw materials from the residues of vehicles shredded at the end of their useful lives. Plants using this type of technology are being built and starting up in the Netherlands and in Austria.

## Electrical & electronic

Recycling in the electrical and electronic sector is limited by complex products with materials intermingled in a way which makes sorting an intensive and expensive activity.

An example of growing recycling in the E&E sector is the inner liner of a refrigerator. For the majority of waste streams, thermal treatment via feedstock recycling or energy recovery is the most appropriate procedure. There is also some uncertainty about the actual volumes of discarded E&E equipment. It can be assumed that some is exported outside Europe.

## Construction

Plastics used in construction are for long-term use and hence much material still remains in its use phase and is not yet waste. Nevertheless increased recycling is being achieved in e.g. pipes, leading to a recycling rate of 16% for 2008 – up 3% – points on 2007.

## Methodology

This brochure on 2008 production, demand and recovery is the nineteenth annual publication by the European plastics manufacturers and their partners.

The aim of this brochure is to illustrate the life-cycle of plastics from development and production, through their many uses, to the advances made in recovering plastics at their end-of-life phase.

PlasticsEurope's Market Research and Statistics Group (PEMRG) provided input on the production of, and demand for, plastics raw materials.

The end-of-life phase data was collected by a partnership involving PlasticsEurope, EuPC (the European Plastics Converters), EuPR (the European Plastics Recyclers) and EPRO (the European Association of Plastics Recycling and Recovery Organisations).

Figures and graphs in this report are showing data for EU27+ Norway and Switzerland – called Europe. Any other group of countries is specifically mentioned.

Consulting Marketing & Industrieberatung GmbH helped assess waste generation and recovery data.

Official statistics have been used for recovery data, where available, from European or National authorities and waste management organisations. Research or expertise from consultants was used to complete any gaps.

The figures cannot always be directly compared to previous ones due to changes in the estimates of both market demand and the waste generated. However, overall differences are small. Earlier estimates have been revised to enable past progress to be tracked for both the use and recovery of plastics across Europe during the last decade.



## Who are we?

The European plastics industry contributes significantly to the welfare of Europe. Plastics encourage innovation, improve quality of life, and facilitate resource efficiency and climate protection. More than 1.6 million people work in 50.000 companies – many in SMEs for the conversion sector – generating a turnover of € 300 billion per year.

PlasticsEurope is a leading European trade association, with offices in Brussels, Frankfurt, London, Madrid, Milan and Paris. We network with European and national plastics associations; and our 100 member companies produce over 90% of all polymers in the EU 27 Member States plus Norway, Switzerland, Croatia and Turkey.

EuPC – the European Plastics Converters – is the professional representative body of plastics converters in Europe. Their activities cover all sectors of the plastics converting industry, including recycling. Their main objective is to defend and promote the European plastics converting industry's interests by:

- Voicing industry opinion to European and international institutions and NGOs;
- Maintaining relationships with corresponding European and global organisations;
- Conducting surveys, studies and research projects covering all areas of the plastics processing industry.

EuPR – the European Plastics Recyclers – is the professional representative body of plastics recyclers in Europe. EuPR promotes plastics mechanical recycling and an environment that encourages profitable and sustainable business. They provide a platform for members, who represent 85% of Europe's recycling capacity, processing over 5 million tonnes of collected plastics per year.

EPRO – the European Association of Plastics Recycling and Recovery Organisations – is the association of the national organisations responsible for organising and promoting recycling and recovery in Europe. EPRO provides a unique forum for leading European specialists in plastics waste management to exchange learnings, develop integrated plastics packaging waste strategies and support technological development.



# Snapshots 2009

The plastics business developed positively until mid 2008. What happened thereafter is unprecedented in plastics. Never in the relatively short history of plastics has such a market deterioration happened in so short a period of time. From January to June 2009, the production of plastics in the EU27 has dropped by 26% compared to the same period in 2008. Compared to the level that the market had reached before the start of the fall, in autumn 2008, plastics demand has fallen by more than 30%. Since spring 2009 the situation has stabilised – at a very low level – and only started to show signs of recovery in the 2nd quarter of 2009 for plastics.

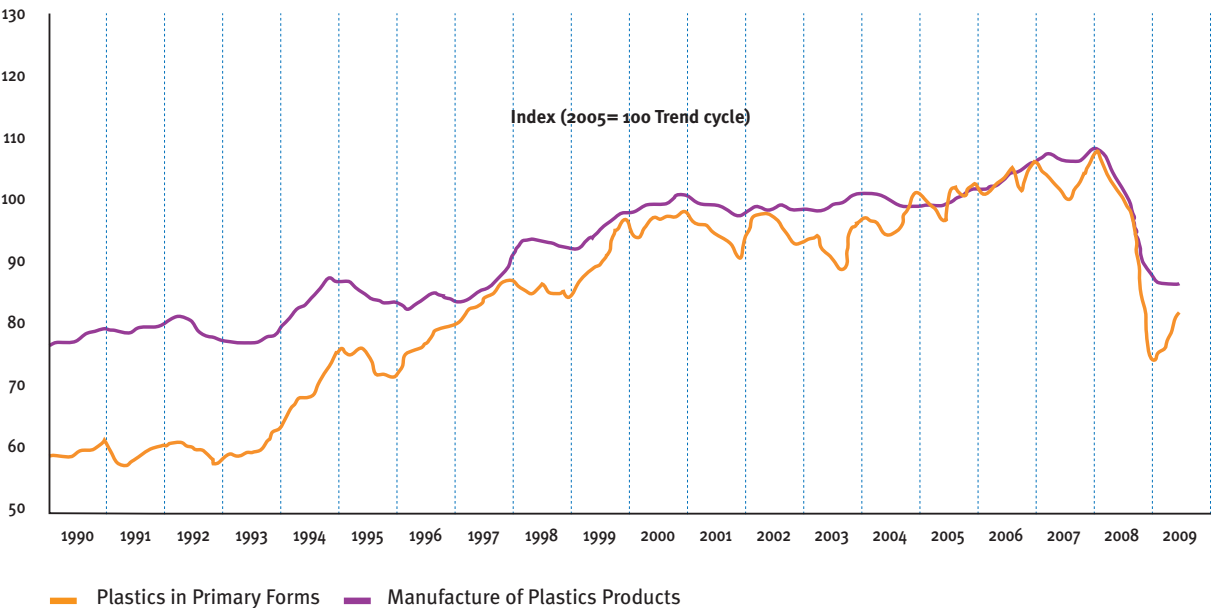
Converted plastics products have been slightly less affected – having lost 18% in production during January to June compared to 2008. Plastics – serving many different markets – have met a varying response from different industries. Whilst demand from packaging has only fallen a very little, the demand from the automotive industry has dropped by 40%. The drop in demand for the construction industry has also been significant. As in earlier turbulent times, we have seen restructuring, temporary shutdowns and plant closures in all parts of the plastics industry.

As this brochure went to press in September 2009, we have begun to see signs of a turnaround in demand for plastics and converted products. Demand has been slowly returning but is far from pre-recessionary levels and a full recovery is likely to take several years.

Due to the global economic crisis – for the first time in many years – the total quantity of plastic waste generated will decrease year-on-year. Recycling volumes in Europe are expected to decrease between 5-10 % for the first 6 months of 2009, and for the full year are expected to be at a lower level than in 2008.

Due to the drastic reduction in demand for recyclates, prices fell by more than 50 % in latter part of 2008, but have since gradually recovered. Especially for higher quality recyclates the market shows a positive trend. This indicates the need for strong national recovery schemes, with sufficient financial reserves and programmes to improve the quality of the collected plastics.

Figure 15. Plastics industry production in EU27  
 Source: Eurostat/PlasticsEurope Market Research Group (PEMRG)





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