Plastics – the Facts is an analysis of the data related to the production, demand and waste management of plastics materials. It provides the latest business information on production and demand, trade, recovery as well as employment and turnover in the plastics industry. In short, this report gives an insight into the industry’s contribution to European economic growth and prosperity throughout the life cycle of the material.

The data presented in this report was collected by PlasticsEurope (the Association of Plastics Manufacturers in Europe) and EPRO (the European Association of Plastics Recycling and Recovery Organisations). PlasticsEurope’s Market Research and Statistics Group (PEMRG) provided input on the production of and demand for plastics raw materials. Consultic Marketing & Industrieberatung GmbH helped assess waste generation and recovery data. Official statistics from European or national authorities and waste management organisations have been used for recovery and trade data, where available. Research or expertise from consultants completed gaps.

Figures cannot always be directly compared with those of previous years due to changes in estimates. Some estimates from previous years have been revised in order to track progress, e.g. for use and recovery of plastics across Europe over the past decade.

All figures and graphs in this report show data for EU-27 plus Norway and Switzerland, which is referred to as Europe for the purposes of abbreviation – other country groups are explicitly listed.
Plastics – the material for the 21st century
For the last 150 years, plastics materials have been key enablers for innovation and have contributed to the development and progress of society.

Discover how plastics have changed the world.

www.plasticseurope.org
Key figures of the European plastics industry

The European plastics industry includes plastics raw material producers, plastics converters and plastics machinery manufacturers in the EU27 member States.

<table>
<thead>
<tr>
<th>Jobs</th>
<th>Companies</th>
<th>Turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>The plastics industry gives direct employment to over 1.45 million people in Europe</td>
<td>An industry in which more than 60,000 companies operate, most of them SME’s</td>
<td>The European plastics industry had a turnover of 320 billion euro in 2013</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Multiplier effect</th>
<th>Innovation</th>
<th>Recycling</th>
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<tbody>
<tr>
<td>The European plastics industry has a multiplier effect of 2.4 in GDP and almost 3 in jobs*</td>
<td>The plastics sector is part of the top 5 most innovative sector in the EU representing 1 in 25 patents submitted by the industry between 2003 and 2012</td>
<td>More than 6.6 million tonnes of plastics waste recycled in 2012</td>
</tr>
</tbody>
</table>

* 2013, The European House Ambrosetti study, data for Italy, 2013
Plastics: jobs, growth and competitiveness
The European plastics industry: a pillar of economics and society

- An industry generating about 26.3 billion euro for public finance and welfare.
- Estimated data for EU-27 (excl. NO/CH), 2013

**Plastics manufacturers**

- 134,000 employees

**Plastics converters**

- 1,267,000 employees


**Turnover (bn €)**

- Plastics manufacturers
- Plastics converters

**Number of employees in 2013**

**Contribution to EU society**

- Tax and social security costs
- Corporate tax
- An industry generating about 26.3 billion euro for public finance and welfare.

Source: 1. Eurostat.
The growth of the plastics industry has a multiplier effect on numerous important sectors of the European economy. The plastics industry is a key enabler of innovation of many products and technologies in other sectors of the economy like healthcare, energy generation, aerospace, automotive, maritime, construction, electronics, packaging or textile.

None of these sector would innovate and grow as much as they do without plastic materials and solutions. Innovation and growth in Europe depend on manufacturing, in particular the plastics industry. A study led in 2013 by leading Italian think tank “The European House Ambrosetti” reveals the “multiplier effect” of the plastics industry:

- It is in one of the sectors that provides the greatest contribution to EU manufacturing
- A 10% increase in the value added of the European plastics sector could lead to a 4.4% increase in the value added to the overall EU manufacturing sector.

And at national level for Italy:

- For every job created in the plastics sector, almost 3 jobs are created in the wider economy
- A 100€ increase in GDP in the national plastics supply chain generates 238€ of GDP in the national economy

Moreover, the unique characteristics of plastics also allow them to make a strong contribution to a more environmentally sustainable and resource efficient Europe. Lightweight, versatile and durable plastics contribute to energy and resource savings in strategic sectors like retail, construction, healthcare, automotive or renewable energies. In addition, significant advances are also being made in the environmental performance of plastics in their production and end-of-life phases, hence contributing to the sustainability of European industries and societies.
Global competitiveness challenges of the European plastics industry

Low energy costs due to non-conventional fuels. The rate of shale gas in the US energy production is expected to grow from current 10% to 36% by 2035.

One-third of the bio-plastics are produced in Latin America. Access to bio-based feedstock provides opportunities for the Brazilian bio-plastics industry.

China is the world leader in plastics production and conversion. Low production costs in plastics' conversion have triggered investments in the plastics industry, including the plastics machinery manufacturing.

67% of the world's oil reserves and 45% of the world gas reserves are located in the Middle East. Feedstock provides opportunities for the plastics industry there.

Forward integration of plastics processing industry is on-going.

Strong growth in plastics conversion sector (more than 22,000 companies and 4 million employees).

Key drivers are the growing population and the growth of manufacturing sectors such as the automotive sector.

Source: based on The European House Ambrosetti study, 2013
Plastics market data
Plastics production grows globally and is stable in Europe

With continuous growth for more than 50 years, global production in 2013 rose to 299 million tonnes, meaning a 3.9% increase compared to 2012.

In Europe, the plastic production stabilised in 2013 after the 2009 turn-down. Actual levels are similar to those in 2002.

World and European plastics production 2002-2013
Includes Plastics materials (thermoplastics and polyurethanes), other plastics (thermosets, adhesives, coatings and sealants) and PP-fibers.

Source: PlasticsEurope (PEMRG) / Consultic
Europe ranks second in the global plastics materials production

2013 World production of plastics materials (thermoplastics and polyurethanes)
Does not include other plastics (thermosets, adhesives, coatings and sealants) nor PP-fibers.
Source: PlasticsEurope (PEMRG) / Consultic
A positive trade balance of 18 billion euros

EU-27 plastics industry: trade balance with non-EU member countries (Extra-EU)
Source: Eurostat

2013 top trade partners
Source: Eurostat
Two thirds of plastics demand in Europe is concentrated in five countries.
Plastics provide for a wide variety of markets

In Europe, packaging applications are the largest application sector for the plastics industry and represent 39.6% of the total plastics demand.

Building and construction is the second largest application sector with 20.3% of the total European demand.

Automotive is the third sector with a share of 8.5% of the total demand.

Electrical and electronic applications represent 5.6% of the plastics demand and are closely followed by agricultural applications which have a share of 4.3%.

Other application sectors such as appliances, household and consumer products, furniture and medical products comprise a total of 21.7% of the European plastics demand.

European plastics demand* by segment 2013
Source: PlasticsEurope (PEMRG) / Consultic / ECEBD
* EU-27+NO/CH
**Different plastics for different needs**

- **PET bottles**
- **PVC boots**
- **PE-HD milk bottles**
- **PE-LD reusable bags**
- **PVC window frames**
- **PE-HD toys**
- **PET bottles**
- **PE-LD, PE-LLD**
- **PP**
- **PVC**
- **PE-HD**
- **PET**
- **Film for food packaging**
- **Office/school PP folders**
- **PP car bumpers**
- **PS plastic cups**
- **PUR sponges**
- **PS glasses frames**
- **Polycarbonate fridge trays**
- **PUR insulation panels**
- **ABS bricks**
- **PTFE (Teflon coated) pans**

**European plastics demand* by polymer type 2013**

Source: PlasticsEurope (PEMRG) / Consultic / ECEBD

* EU-27+NO/CH
European plastics demand increased by 1% in 2013

European plastics demand* by polymer type
Source: PlasticsEurope (PEMRG) / Consultic / ECEBD
* EU-27+NO/CH

European plastics demand 46.3 Mtonne

= European plastics demand

- PE-LD, PE-LLD
- PE-HD, PE-MD
- Others
- PVC
- PUR
- PET
- PS
- PS-E
- PA
- Other ETP
- ABS, SAN
- PC
- PMMA

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Packaging, building & construction and automotive are the top three markets for plastics.

European plastics demand* by segment and polymer type 2013

Source: PlasticsEurope (PEMRG) / Consultic / ECEBD

* EU-27+NO/CH
Waste management data
In 2012 plastics recycling and energy recovery reached 62%

In 2012, 25.2 million tonnes of post-consumer plastics waste ended up in the waste upstream. 62% was recovered through recycling and energy recovery processes while 38% still went to landfill.

Treatment for post-consumer plastics waste in the EU27+Norway and Switzerland

Source: Consultic
Since 2006 recycling and energy recovery have increased...

The annual average of post-consumer plastics waste generation from 2006 to 2012 is 25 Mtonne.

Total plastics waste recycling and recovery 2006 – 2012
Source: Consultic
... but landfilling is still the 1st option in many EU countries

Plastics waste going to landfill (2012)

- Above 66%
- >50% to 66%
- 33% to 50%
- below 10% i.e. landfill ban

Date of landfill ban in force:
- 2006

Date of future landfill ban:
- 2016

Source: Consultic
Zero plastics to landfill, a challenging but worthwhile goal

Plastics waste going to landfill in Europe

- Decrease from 2005-2012 (-26%)
- Trend-line (extrapolation)
- Zero plastics to landfill by 2025 scenario

Mtonne

= 60 million tonnes of plastics prevented from landfill, equivalent to over 750 million barrels of oil or 60 billion euros
In general, countries with landfill ban achieve higher recycling rates.

Treating of post-consumer plastics waste 2012 (EU-27 + CH/NO)

Source: Consultic
Plastics waste is a resource

Plastics are sorted and crushed into “flakes”, washed, dried and sorted again...

The energy value of plastics is used to produce electricity, heating and cooling for millions of homes.

Alternatively, plastics are used as fuel for industrial processes, replacing fossil fuel.

Emissions are subject to strict regulations and control standards.

Those plastics which cannot be sustainably recycled can be used in efficient Waste-to-Energy facilities to produce electricity and heat.

Recycling is the preferred option.

Energy recovery is needed to end the landfilling of plastics.

9.6 million tonnes of plastics waste are landfilled every year in Europe.

16-19 million more citizens potentially supplied with energy recovered from plastics waste.

41% of plastics packaging was recycled in Germany in 2013 (based on input).
Plastics recycling and energy recovery complement each other

Changes in recycling and energy recovery rates by country

Comparison of rates 2012 vs. 2006
Referred to post-consumer plastics

- Energy recovery rate
- Recycling rate

Source: Consultic
* For Bulgaria & Romania: comparison 2012 vs. 2007
Plastics packaging has the highest recycling and energy recovery rates

Packaging recycling and energy recovery rate by country 2012
(Referred to post-consumer plastics waste)
Source: Consultic
Life cycle of a plastic bottle: recycling options

Crude oil components are separated through distillation. Plastic’s major raw material is called naptha.

Smaller molecules result from naphtha cracking, i.e. ethene, propene and butane.

These short molecules (monomers) are particularly reactive, tie together and form long molecular chains (polymers).

The cross linking of the polymer chains determine their ductility: Thermoplastic (T) – Duroplast (D)

Plastic pellets are heated into a viscous substance which is blown and stretched into a mould. The mould must be cooled to set the plastic in (a bottle) shape.

PET bottle
Polyethylene Terephthalate is nowadays the major polyester type

Pre-selection of PET bottles

PET bottles are optoelectronically colour separated. They are crushed into so-called flakes.

Washing

Material separation by density + drying process

Optoelectronic colour selection

Automatic colour separation of flakes for further processing

Extruder processes flakes into granules

Fibres production

Recycled PET is the raw material which is used to produce fleece pullovers

20% of the recycled material goes into the production of new bottles

Thermoformed films

Recycled PET is the raw material which is used to produce fleece pullovers
Snapshot and outlook
In 2014 plastics production is still below pre-crisis level

Production index (2010=100, trend cycle & seasonally adjusted data)

Plastics industry production in EU-27
Source: Eurostat
For 2015: plastics production is expected to have a very slight increase

- In 2013: European producer profited from the recovery of the customer industries.
- The positive trend gained momentum in the seconded half of 2014.
- 2015: Moderate upward trend.

Growth rates:
2013: +2.6%
Est* 2014: +1.5%
Est* 2015: 1.0%

# Glossary of terms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ABS</td>
<td>Acrylonitrile butadiene styrene</td>
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<tr>
<td>ASA</td>
<td>Acrylonitrile Styrene Acrylate</td>
</tr>
<tr>
<td>bn</td>
<td>billion</td>
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<tr>
<td>CH</td>
<td>Switzerland</td>
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<tr>
<td>CIS</td>
<td>Commonwealth of Independent States</td>
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<td>Consultic</td>
<td>Consultic Marketing &amp; Industrieberatung GmbH</td>
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<tr>
<td>ECEBD</td>
<td>Eastern and Central European Business Development</td>
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<tr>
<td>EU</td>
<td>European Union</td>
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<td>EPRO</td>
<td>European Association of Plastics Recycling and Recovery Organisations</td>
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<tr>
<td>ETP</td>
<td>Engineering Thermoplastics</td>
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<tr>
<td>GDP</td>
<td>Gross domestic product</td>
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<tr>
<td>Mtonne</td>
<td>Million tonnes</td>
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<tr>
<td>NAFTA</td>
<td>North American Free Trade Agreement</td>
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<tr>
<td>NO</td>
<td>Norway</td>
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<tr>
<td>Other plastics</td>
<td>Thermosets, adhesives, coatings and sealants</td>
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<tr>
<td>PA</td>
<td>Polyamide</td>
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<tr>
<td>PC</td>
<td>Polycarbonate</td>
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<tr>
<td>PE</td>
<td>Polyethylene</td>
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<tr>
<td>PE-HD</td>
<td>Polyethylene, high density</td>
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<tr>
<td>PE-LD</td>
<td>Polyethylene, low density</td>
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<tr>
<td>PE-LLD</td>
<td>Polyethylene, linear low density</td>
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<tr>
<td>PE-MD</td>
<td>Polyethylene, medium density</td>
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<td>PEMRG</td>
<td>PlasticsEurope Market Research Group</td>
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<tr>
<td>PET</td>
<td>Polyethylene terephthalate</td>
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<td>Plastics Materials</td>
<td>Thermoplastics + Polyurethanes (PUR)</td>
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<tr>
<td>PUR</td>
<td>Polyurethane</td>
</tr>
<tr>
<td>PMMA</td>
<td>Polymethyl methacrylate</td>
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<tr>
<td>PP</td>
<td>Polypropylene</td>
</tr>
<tr>
<td>PS</td>
<td>Polystyrene</td>
</tr>
<tr>
<td>PS-E</td>
<td>Polystyrene, expandable</td>
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<tr>
<td>PTFE</td>
<td>Polytetrafluoroethylene</td>
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<tr>
<td>PVC</td>
<td>Polyvinyl chloride</td>
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<tr>
<td>SAN</td>
<td>Styrene-acrylonitrile</td>
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<tr>
<td>Thermo-plastics</td>
<td>Standard plastics (PE, PP, PVC, PS, EPS, PET (bottle grade)) + Engineering plastics (ABS, SAN, PA, PC, PBT, POM, PMMA, Blends, and others including High Performance Polymers)</td>
</tr>
<tr>
<td>Thermosets</td>
<td>Urea-formaldehyde foam, melamine resine, polyester resins, epoxy resins, etc</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
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<tr>
<td>VCI</td>
<td>Verband der Chemischen Industrie e.V.</td>
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</tbody>
</table>
**PlasticsEurope**

PlasticsEurope is the association of plastics manufacturers and one of the leading European trade associations with centres in Brussels, Frankfurt, London, Madrid, Milan and Paris. It is networking with European and national plastics associations and have more than 100 member companies, producing over 90% of all polymers across the EU28 member states plus Norway, Switzerland and Turkey.

**European Association of Plastics Recycling and Recovery Organisations (EPRO)**

EPRO is the association of national organisations responsible for organising and promoting plastics recycling and recovery in Europe. EPRO provides a unique forum for leading European specialists in plastics waste management to exchange experience and ideas, develop integrated plastics packaging and agriculture waste strategies and support technological development.