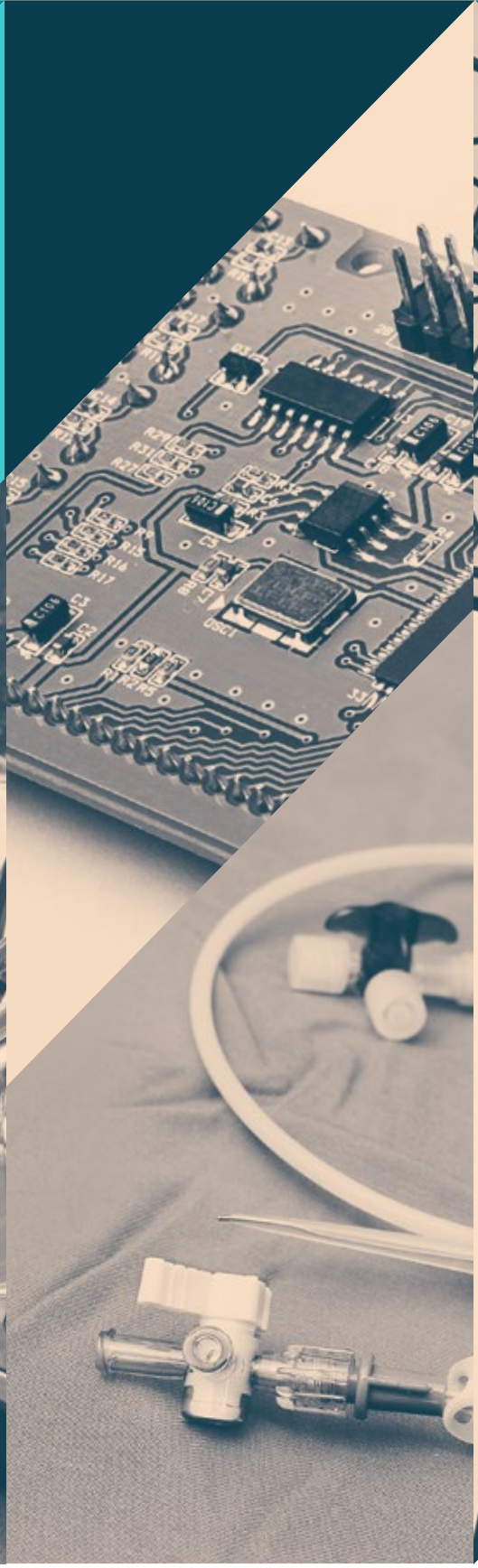
PlasticsEurope
Association of Plastics Manufacturers
Fluoropolymers Product Group



THE FLUOROPOLYMER INDUSTRY IN EUROPE

A SOCIO-ECONOMIC PERSPECTIVE

THE FLUOROPOLYMER VALUE CHAIN

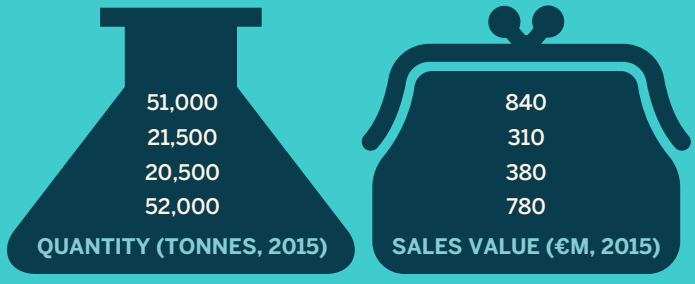
Fluoropolymers are polymers with fluorine atoms directly attached to their carbon backbone. They are plastics which are virtually chemically inert, non-wetting, non-stick, and highly resistant to temperature, fire and weather.

Since the discovery of PTFE in 1938, Fluoropolymers have become critical components in numerous technologies, industrial processes and everyday applications. Their use is so widespread that it is a challenge to identify and evaluate the full extent of the socio-economic benefits that they create.

WHERE ARE FLUOROPOLYMERS USED?

Fluoropolymer sales to key sectors in the EU (2015)			Example application and benefit of fluoropolymers	Statistics on sectors where fluoropolymers are used
Transport	18,500 Tonnes	300 €m	Fluoropolymer fuel hoses enable fuel savings and reduce damage from emissions, worth ~ €140m per year in EU	> 13 million employed
Chemicals & power	16,500 Tonnes	220 €m	Corrosion prevention saving hundreds of millions of € each year in the EU	Nearly 3 million employed
Cookware	3,500 Tonnes	60 €m	Easy clean non-stick properties, allows cooking with less fat	Production value in the order of €2 billion
Electronics	3,500 Tonnes	50 €m	Critical in semiconductor manufacturing, enabling progress in IT that has generated trillions of € globally in the last 20 years	EU semiconductor market worth circa €25 billion
Food & pharma	3,000 Tonnes	40 €m	Safer and cheaper food and pharma by preventing contamination and material failure	Nearly 5 million employed
Textiles & architecture	3,000 Tonnes	40 €m	Enabling novel and unique 'landmark' architectural designs	> 2 million employed
Medical applications	1,500 Tonnes	20 €m	Reduces the risks of failure, cross-infections and clogging of medical equipment	Europe accounts for 41% of global medical device patents
Renewable energy	500 Tonnes	<5 €m	PV module production efficiency increases which save €40m – €90m each year in the EU	Europe leading the global market in installed capacity
Other	2,000 Tonnes	30 €m	–	–
TOTAL	52,000 Tonnes	780 €m		

VOLUME OF USE & REVENUES (2015)



R&D INVESTMENT

€43m = 5.5%
OF REVENUE

Source Amec Foster Wheeler Survey with Members of the FPG, 2016. Tonnages are rounded to the closest 500 hundred tonnes. Figures of sales value rounded to the closest €10m.

TRANSPORT

Fluoropolymers prolong the life of critical components for the performance, emission control and safety in both automotive and aerospace applications. They provide durable and effective protection against heat, aggressive fluids and fuels, humidity, vibrations and compression.

In fact, fluoropolymers are so important that road transport emission standards, such as “Euro 6” and “Euro 7”, could not have been achieved without them.

CAR MANUFACTURING AND AUTOMOTIVE COMPONENTS IN THE EU

296 automobile assembly and production plants in **26 EU COUNTRIES** by 2017

18 MILLION cars, vans, trucks and buses are produced in Europe every year. Of those, **16 MILLION** are passenger cars (22% and 20% of global production respectively)
> trade surplus of **100 BILLION EUROS** every year

R&D expenses for the automobile sector amount to **45 BILLION EUROS, ABOUT 26%** of total EU expenses

Tax revenues from vehicles in **14 EUROPEAN COUNTRIES** alone were **400 BILLION EUROS** in 2015

Global production is expected to exceed **100 MILLION VEHICLES** of all types by 2017

* Applicable to all sectors

PRODUCERS OF RAW MATERIALS USED IN FLUOROPOLYMERS

PRODUCERS OF FLUOROPOLYMERS

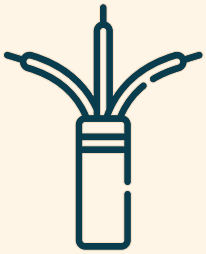
PRODUCERS OF SEMI-FINISHED GOODS

Component manufacturers

Car/automotive manufacturers

Aircraft/aerospace manufacturers

The use of fluoropolymers in high-temperature wire insulation and fuel hoses SAVES €200 MILLION OVER the full lifetime of cars in Europe.



Fluoropolymer use in fuel hoses enables FUEL SAVINGS OF €40 MILLION ANNUALLY IN EUROPE.

CHEMICAL AND POWER

Fluoropolymers prevent corrosion of pipes, vessels, fluid-handling components, filters, vents and cables. This reduces overall life cycle costs including maintenance, waste management and the use of materials to renew corroded components, hence increasing their total lifetime and safety.

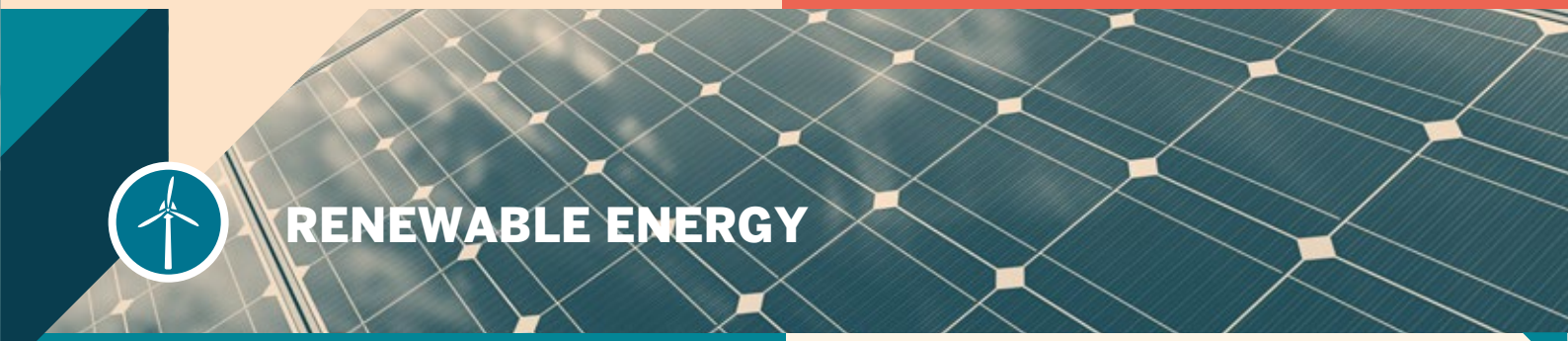
Fluoropolymers prolong the lifetime of plants and equipment. Current maintenance costs in the EU are estimated in the region of €1 BILLION, and the use of fluoropolymers increases machinery lifetime by MORE THAN A FACTOR OF 2.

Fluoropolymers provide health, safety, environmental and energy saving benefits. In combined heat and power plants they contribute up to €8 BILLION IN ENERGY SAVINGS, remove pollution amounting to total CO2 emission reductions worth around €0.5bn at market prices or €3bn considering the societal cost of CO2.

Installation component manufacturers

Power generation

Chemical manufacturers



RENEWABLE ENERGY

Fluoropolymers bring a unique combination of properties beneficial for various components used in renewable energy installations. They provide optical transparency and electrical insulation to photovoltaic panels, fuel cells and batteries, and protect them from wind, humidity, UV, extreme temperatures and chemicals, minimising failures and maintenance stoppages with their associated costs.

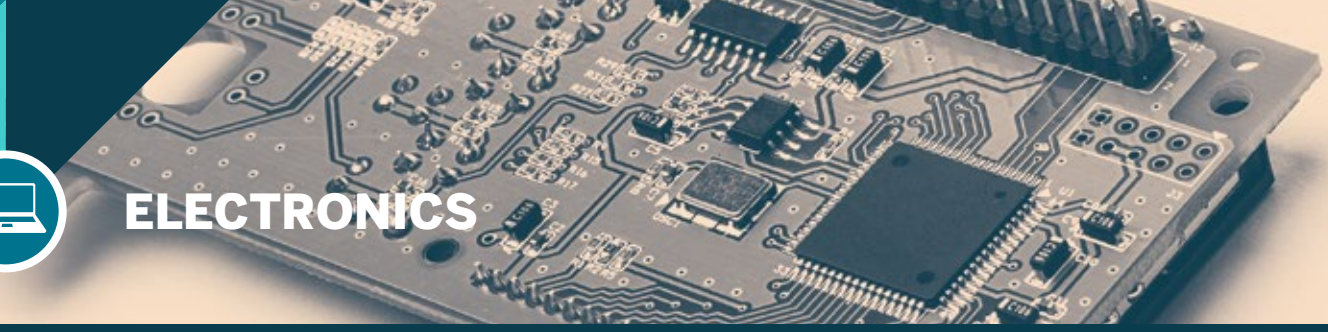
Production efficiency gains in photovoltaic modules using certain fluoropolymers relative to glass provides potential YEARLY SAVING OF AROUND €90 MILLION for consumers in the EU.

Installation component manufacturers

Installation (wind turbine, photovoltaic panel) manufacturers

Renewable power generation

FAILURE RATES ARE AS LOW AS 0.1% in recent PV module designs which use fluoropolymer film-based backsheets, compared to 45% in early backsheet designs.



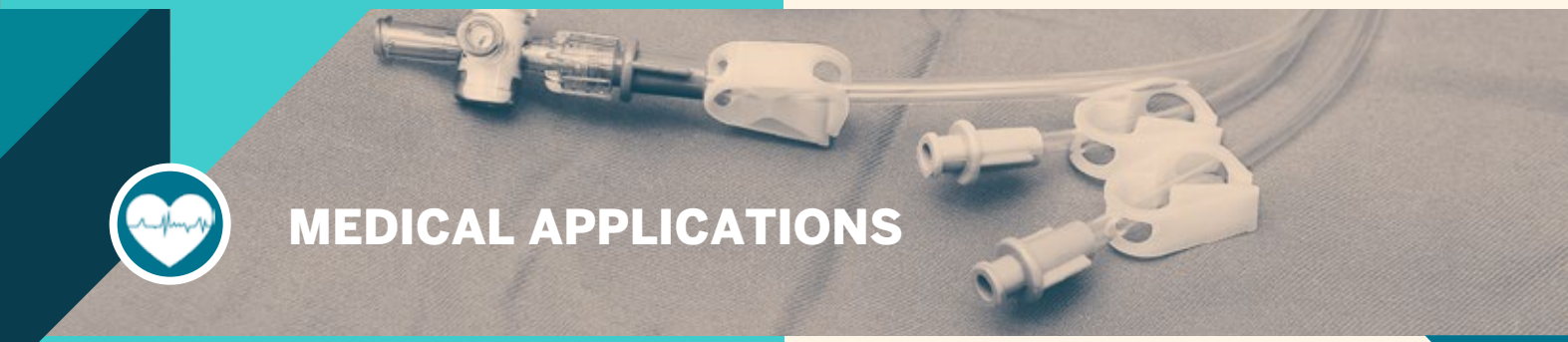
ELECTRONICS

Fluoropolymers components are critical to the manufacture of semiconductors because they are resistant to aggressive etching chemical while providing the necessary purity required in the production of microchips and other electronics. They can also meet the ever increasing wireless antenna requirements in Wi-Fi, 3G, 4G and Bluetooth. Fluoropolymers are used in the manufacturing of millions of products, as these become more powerful but increasingly compact.

- Installation component manufacturers
- Plant engineering
- Cable, semiconductor and other electronic component manufacturers
- Electronic/IT

Annual benefits of fluoropolymers in semiconductor manufacturing are substantial – estimated in a 2006 study at some €10BN ANNUAL BENEFITS per year.

Fluoropolymer cables maintain CONSTANT OPERATION FOR AT LEAST 20,000H at temperatures ranging from -190 °C to +260 °C (depending on which fluoropolymer).



MEDICAL APPLICATIONS

Fluoropolymers enable excellent performance and a long operational lifetime in medical equipment such as surgically-implantable medical devices, catheters, guide wires, filters and pumps. They contribute to the reduction and/or avoidance of medical complications and additional or repeated medical care, thus helping mitigate pain and lower the public cost of medical care.

- Medical equipment component manufacturers
- Medical equipment manufacturers
- Implant manufacturers
- Healthcare

Fluoropolymers facilitate surgical procedures, helping to shorten their duration and the patient's risk. Looking at 36 different kinds of surgical procedures, AT LEAST 20 MILLION take place per year in the EU. A reduction of just one minute per operation across the EU would SAVE AT LEAST €300 MILLION ANNUALLY.

The Fluoropolymers Committee is part of PlasticsEurope, the professional body representing European polymer producers. PlasticsEurope has more than 100 member companies, producing over 90% of all polymers across the EU28 member states plus Norway, Switzerland and Turkey.

PlasticsEurope
Association of Plastics Manufacturers

3M Science. Applied to Life.™ AGC ARKEMA INNOVATIVE CHEMISTRY Chemours™

DAIKIN GORE Creative Technologies Worldwide SOLVAY asking more from chemistry®

READ THE EXECUTIVE SUMMARY OF THE SOCIO-ECONOMIC ANALYSIS OF THE EUROPEAN FLUOROPOLYMER INDUSTRY
WWW.PLASTICSEUROPE.ORG/FLUOROPOLYMERSTUDY

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