



# Contribution of plastics to the sustainability of buildings

SB13 Graz conference, September 2013

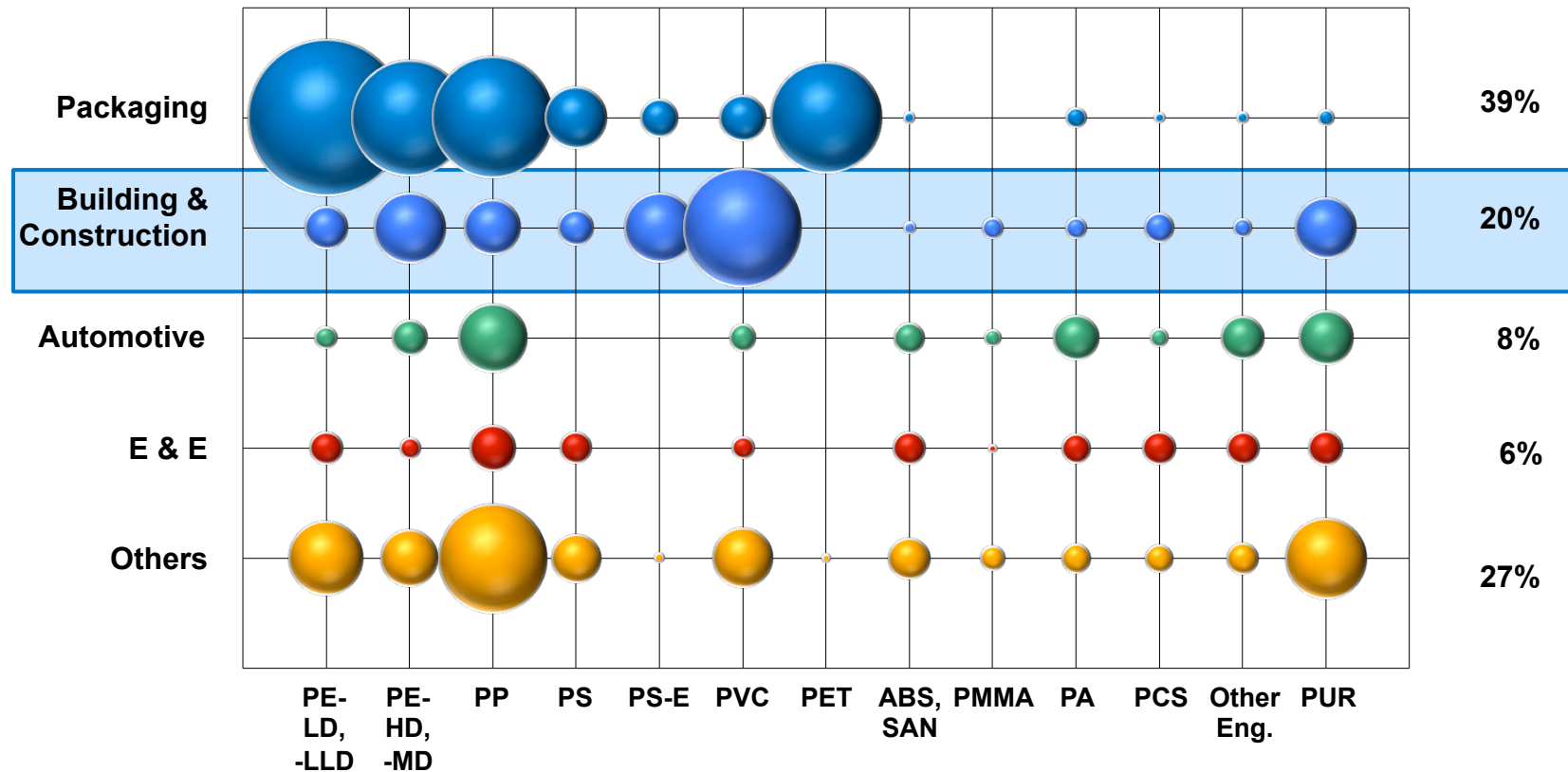
**PlasticsEurope**  
Association of Plastics Manufacturers

## Plastics in B&C



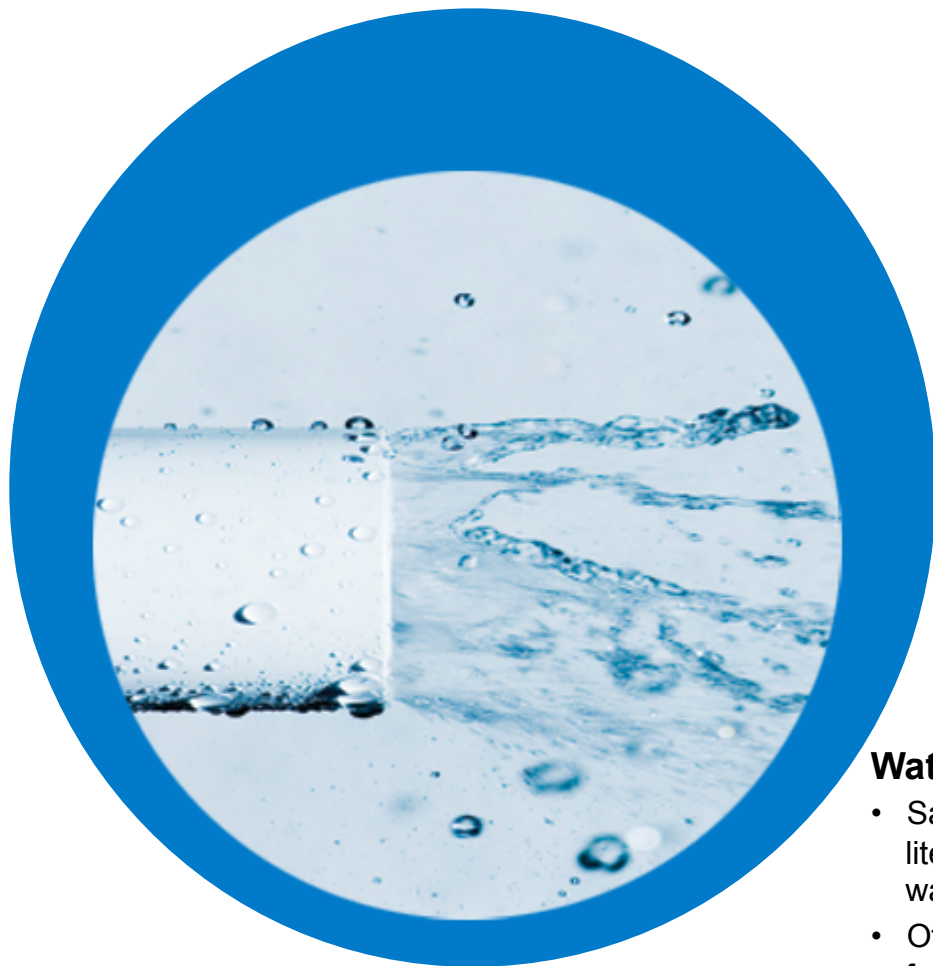
# Europe Plastics Demand by Segments 2012\*

Total: 45.9 Mio t



\* EU27+N, CH incl. Other Plastics (~5.5 Mio t)

# Clean water, clean surfaces



## **Water pipes**

- Save billions of liters of drinking water
- Offer cheaper water for daily needs
- Use less electricity for pumping water
- Offer better quality of life



## **Hygienic and clean**

Plastics are ideal for household surfaces and floor coverings because they are:

- hygienic
- aesthetically attractive
- durable and easy to clean
- available in any colour or pattern.

# Plastic Windows – saving energy for decades

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Their durability and energy-efficiency makes them the window of choice in low-energy buildings



# Tough and long-lasting



**Plastics are the ideal building material, because they are reliable and require minimal maintenance over time**

# Insulation, and much more

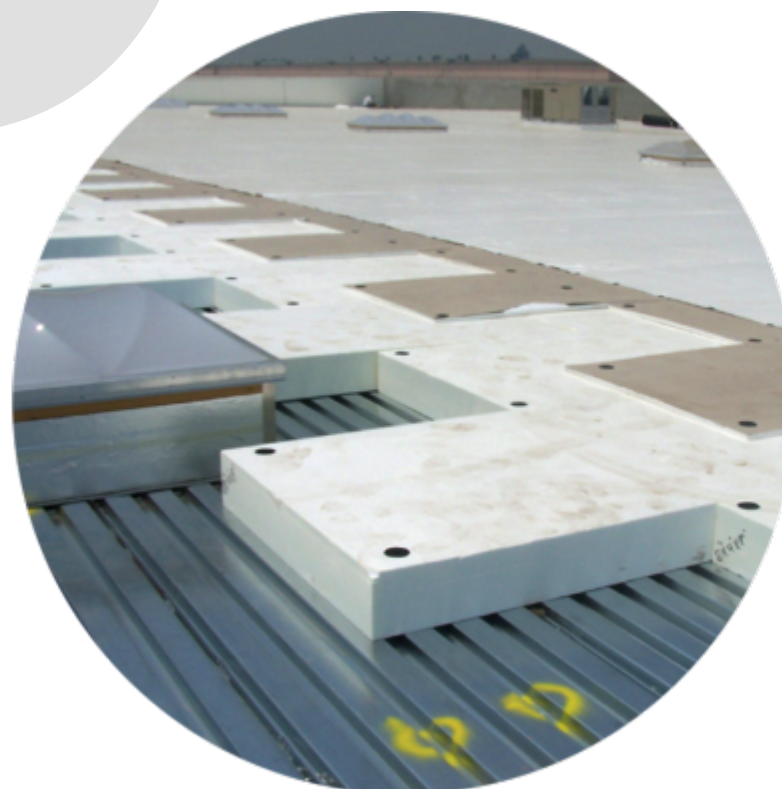
## Unbridles the creativity

Architectural parts made out of plastics open the field of creativity of architects and designers



## Worthwhile investment

On average, the energy needed to insulate a house with plastics is recovered within in one year.

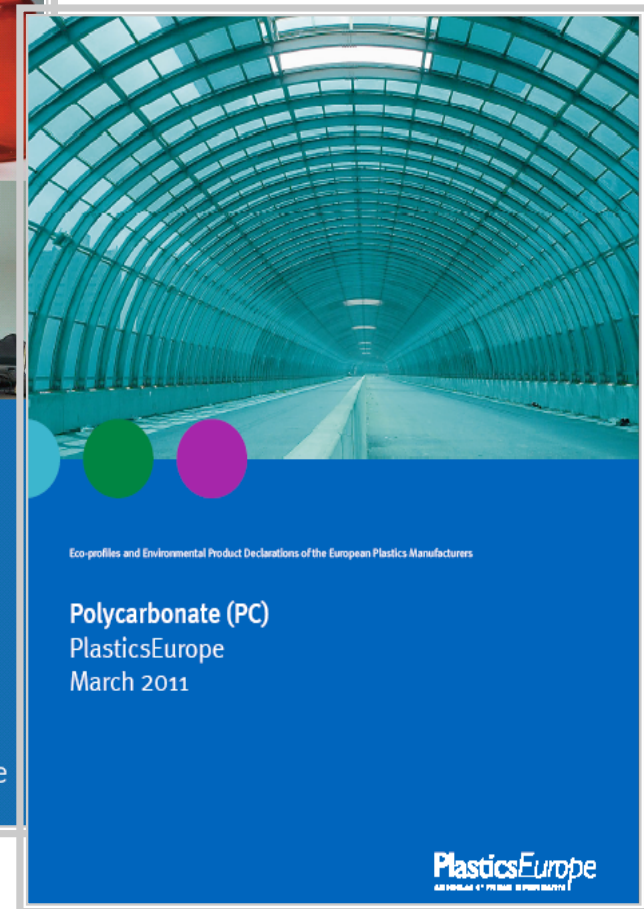
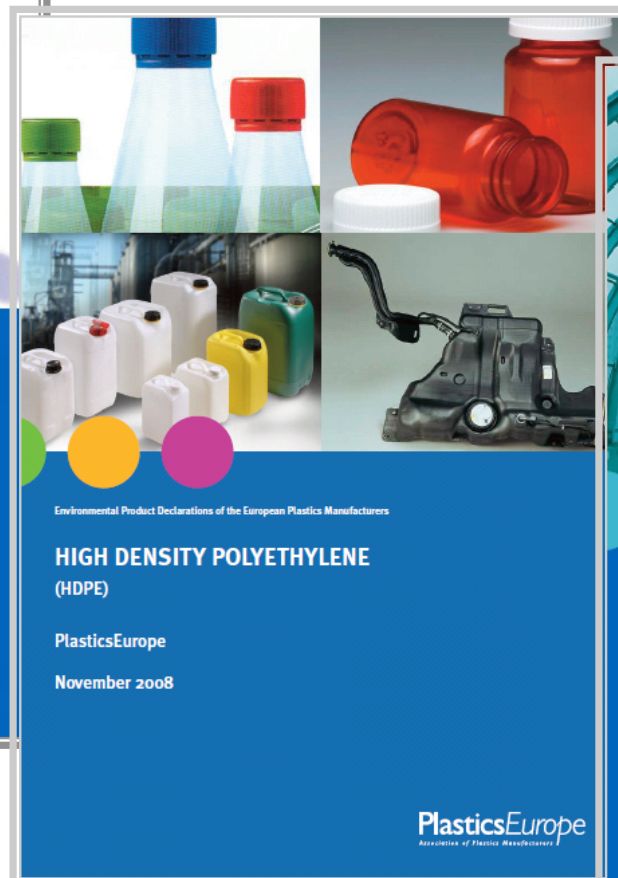
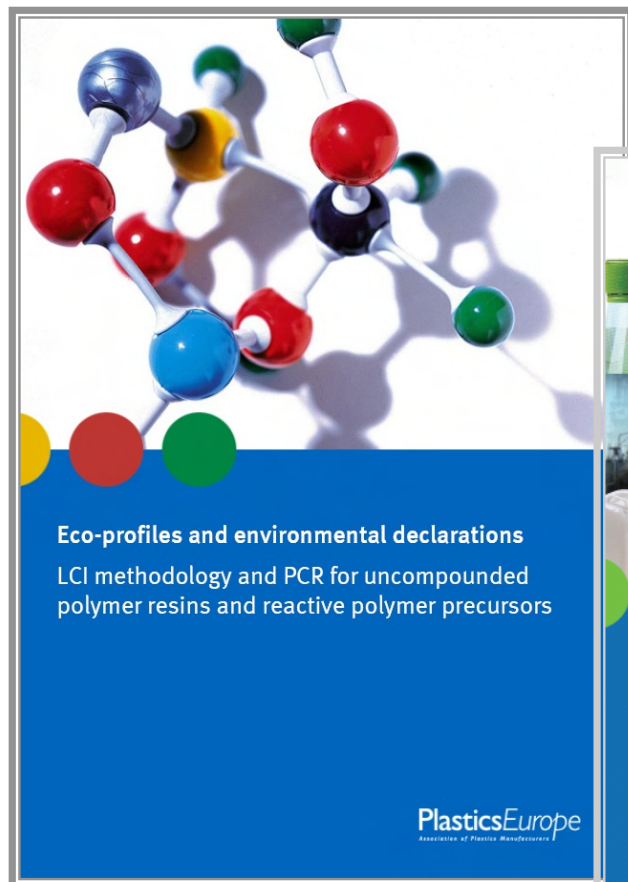


## Plastic Applications: The life-cycle perspective



# Early 1990s: PlasticsEurope starts compiling environmental info of polymers

PlasticsEurope  
Association of Plastics Manufacturers



# Life Cycle Thinking & LCA

Suggest to delete this one, and talk thro.

PlasticsEurope  
Association of Plastics Manufacturers

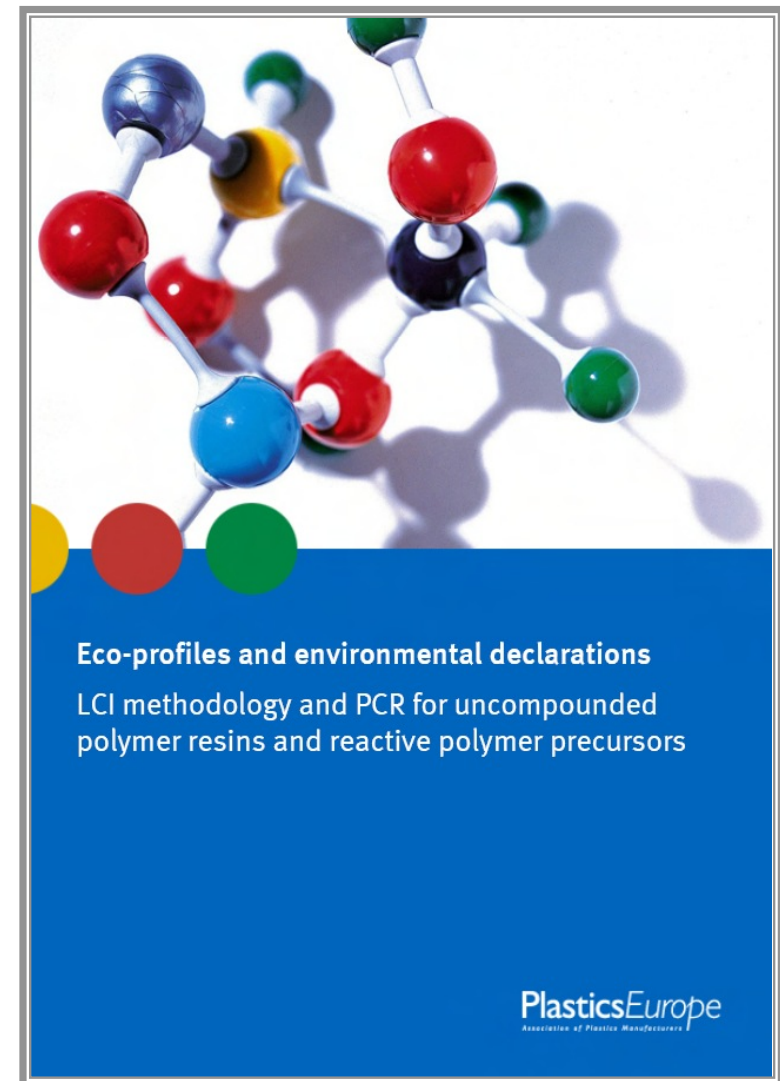
- **PlasticsEurope Eco-profiles are European industry average data.**

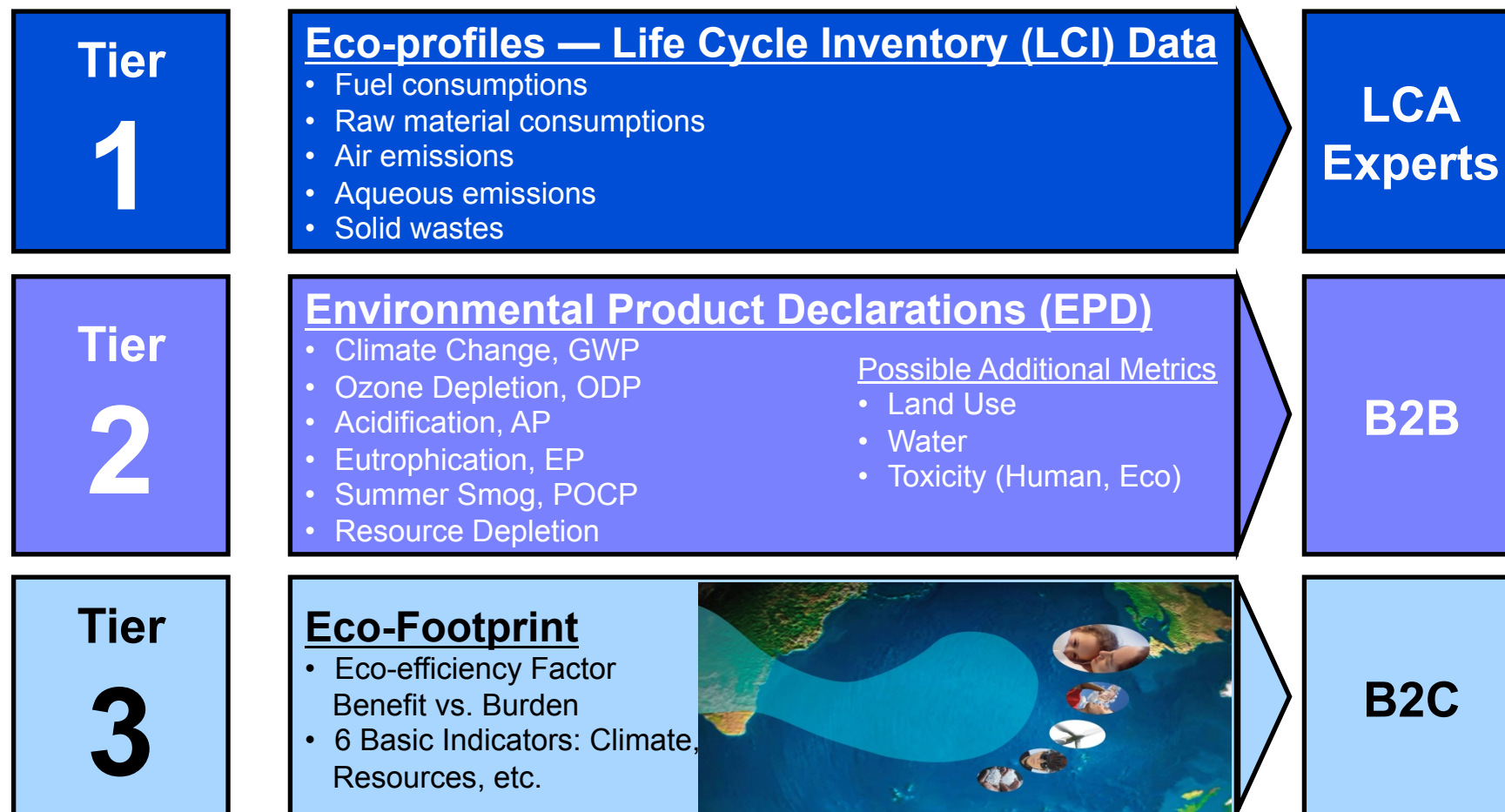
- no comparison of producers,
- only internal benchmarking use.

- **Eco-profiles provide transparent performance declarations**

- no comparisons among polymers at production level possible,
- building blocks for LCA studies.

The Eco-profiles programme started in 1993  
Methodology and Product Category Rules published in 2005-2006, reviewed in 2008  
Environmental Product declarations started in 2007





## Support

Contact our expert!



[Guy Castelan](#)

Related information



[Methodology \(PDF\)](#)

**More about**  
[Life Cycle Thinking](#)

**Questions?**  
[FAQ](#)

## Transparency

### Plastics & Sustainability

- › Consumer protection
- › Climate protection
- › Resource efficiency
- › Energy savings
- › **Eco-profiles**

Browse by flowchart

Browse by family

Browse by list

- › Marine Litter

[Home](#) › [Plastics & Sustainability](#) › [Eco-profiles](#)

## Eco-profiles

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### Welcome to PlasticsEurope's Eco-profile Programme!

This website provides you with easy access to PlasticsEurope's Eco-profiles. Eco-profiles are Life Cycle Inventory datasets (LCI) and Environmental Product Declarations (EPD) for plastics. For more information, please refer to the Life Cycle Thinking section and to the Eco-profile Methodology Document.

#### Browse LCA by Flowchart

The flowchart shows the interlinking production processes and product flows of the chemical and plastics industry.

[Browse by flowchart](#)



#### Browse LCA by Product Family

These tables enable you to look up polymers and precursors grouped into broad product families.

[Browse by family](#)

#### Browse LCA by Product List

This list provides you with an alphabetical directory of all polymers and precursors.

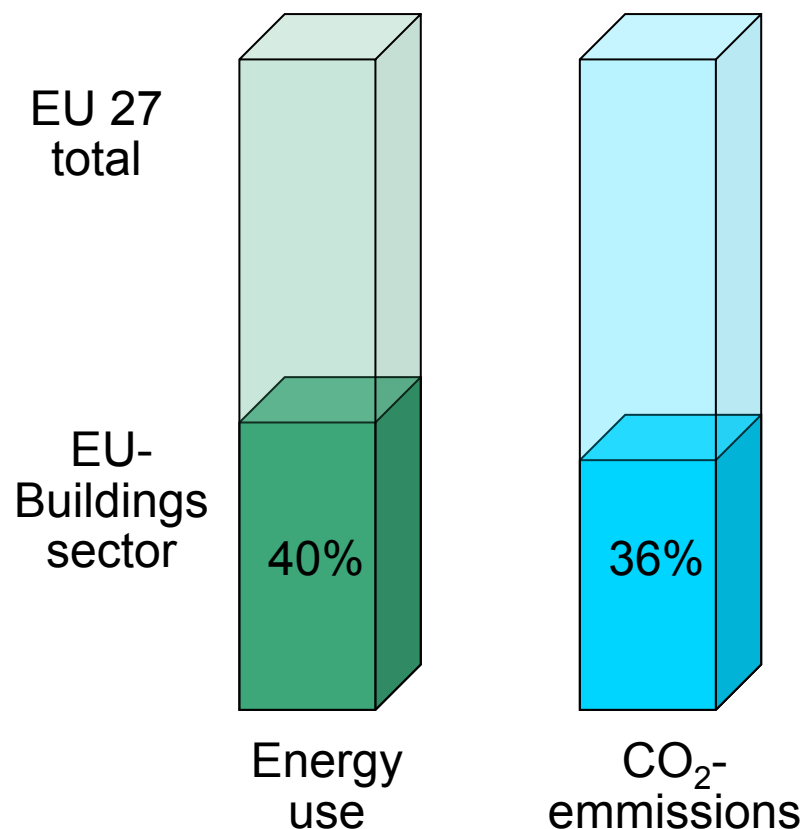
[Browse by list](#)

## **Plastics: Responding to the energy Challenge**



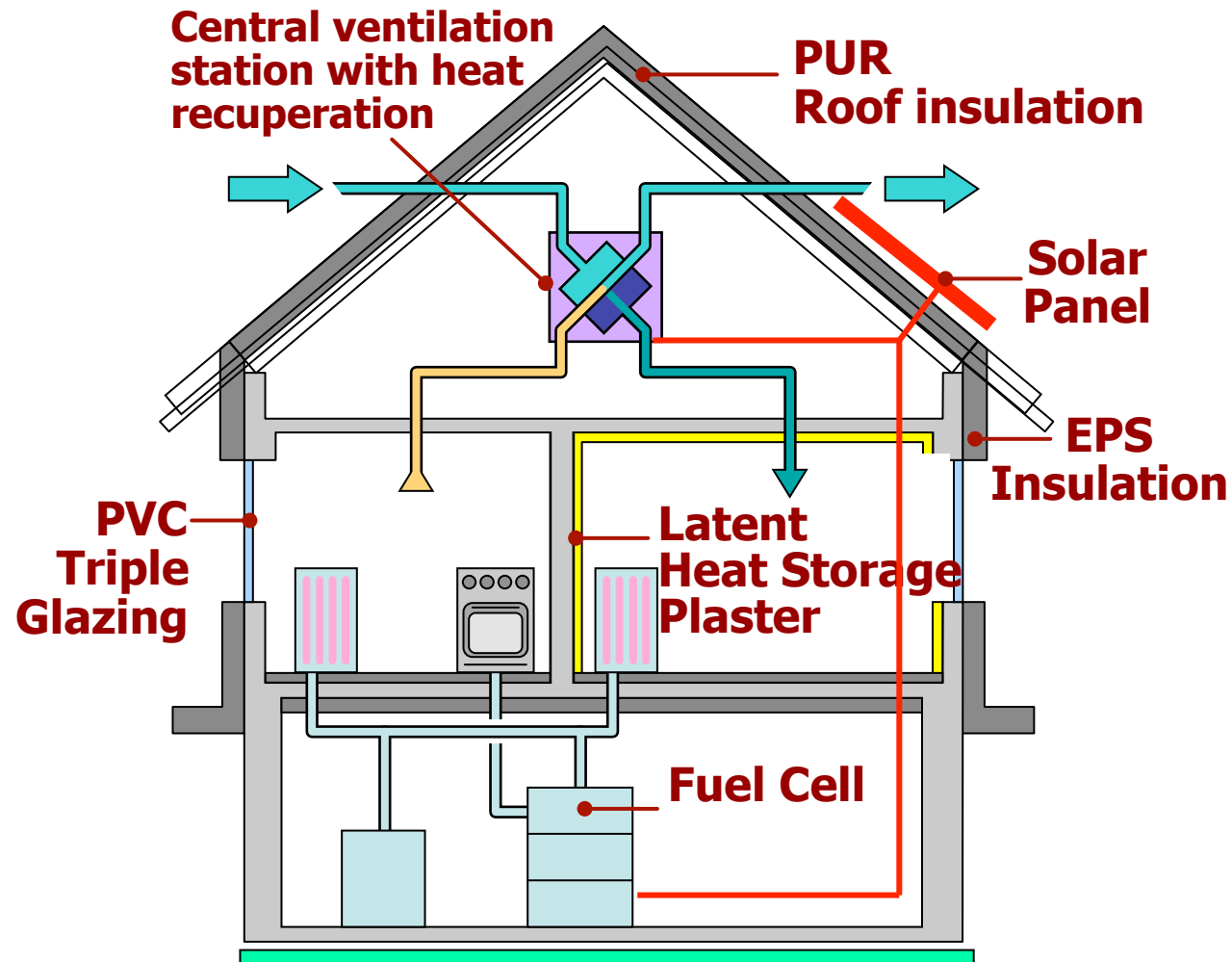


# The energy challenge in buildings



- Buildings are responsible for about:
  - 40% of EU final energy use
  - 36% CO<sub>2</sub> emissions
  - 210 M households, conditioned floor area: 15000km<sup>2</sup> – residential, 6000km<sup>2</sup> - commercial
  - Construction sector: 9% of EU GDP, 8% of EU-workforce, € 2 trillion annual turnover - hardest hit by the crisis
- Benefits:
  - Considerable savings possibilities
  - Positive employment impact: up to 2 million jobs created/retained
  - Lower energy bills + better living conditions
  - Investments in energy efficiency trigger economic activity

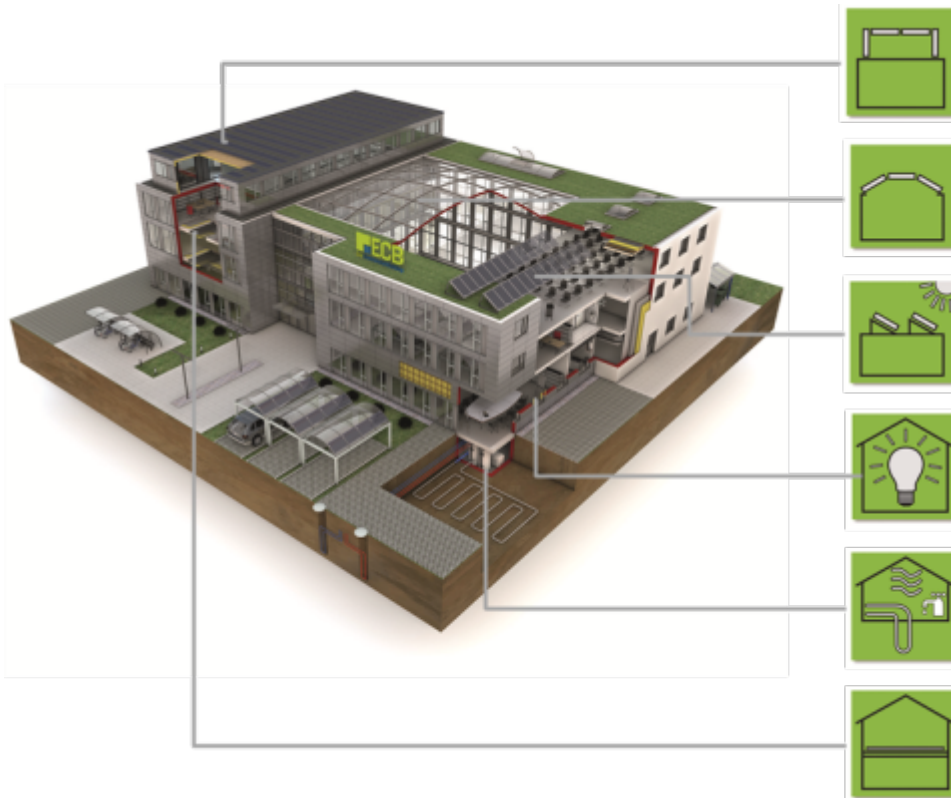
# The plastics paradox



**The plastics paradox:**  
The more you use – the more energy you save

# More Plastic Examples to Save Energy....

**Buildings are responsible for more than 35 % of global energy use and Greenhouse Gas emissions<sup>1</sup>...**



**...while existing industry solutions already enable new and retrofitted zero-emission buildings**

- Rigid polyurethane foam for high- and low-temperature insulation
- Lightweight, stable and transparent polycarbonate sheets
- Components for durable, efficient photovoltaic
- Polycarbonate for energy-saving LED
- Flame retardant polycarbonate blends for smart energy metering and cabling
- Materials for durable low- and zero-VOC paints, coatings and adhesives

<sup>1</sup> Source: WIFO

# Casa 2 Litri/ passive house

**Plastics***Europe*  
Association of Plastics Manufacturers



# Plastics save Energy

## Example: Benefits of insulation

- As a result of all the plastics building insulation installed in one year (2004):
- Lifetime energy savings of 9,500 million GJ
- GHG savings of 536 million tonnes CO<sub>2</sub> - equivalents
- Relevance of production: <1%
- Relevance of recovery: <0,1%





## Resource efficiency

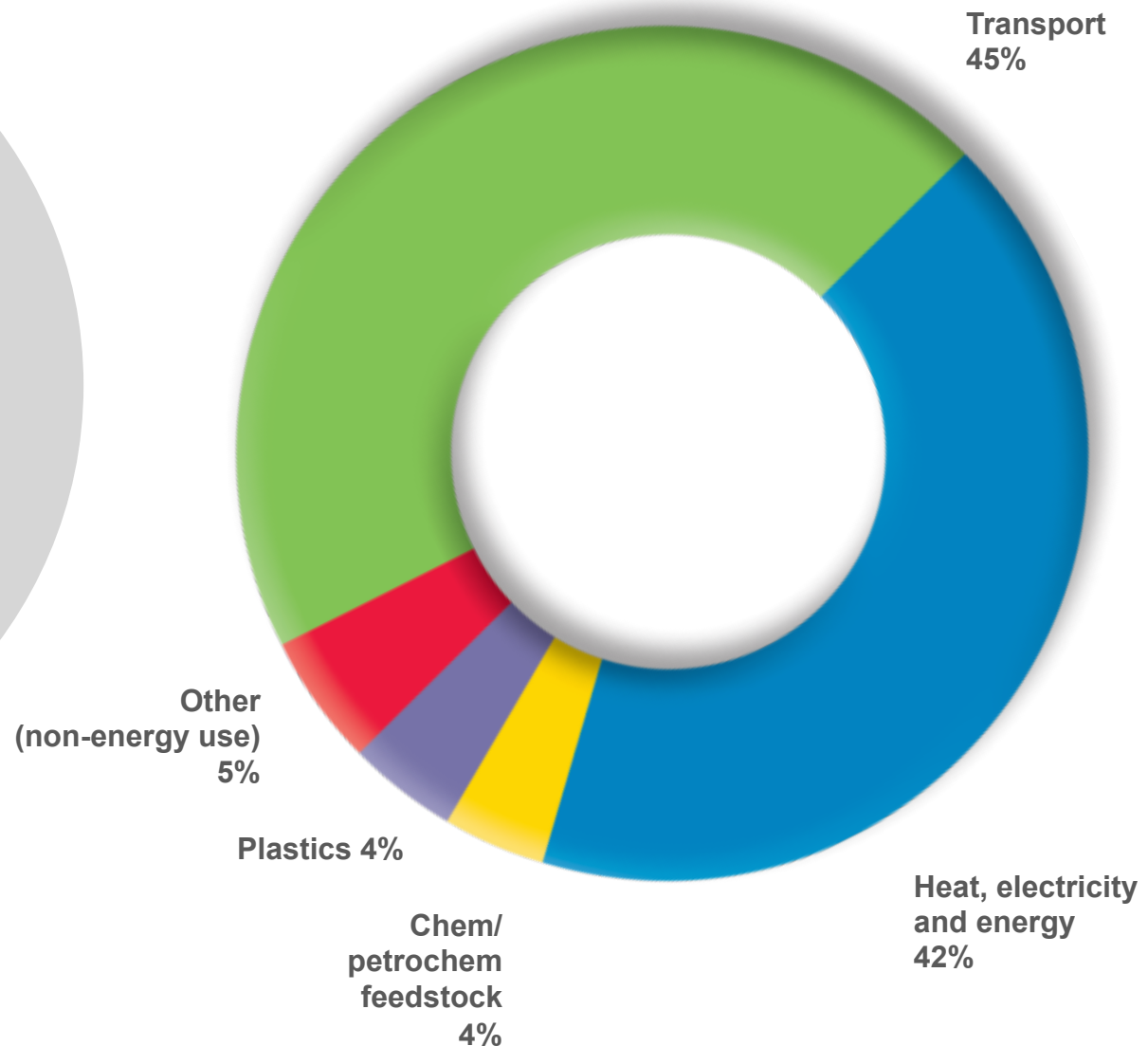


# Reduce plastics consumption to reduce crude oil usage?

Only 4% of oil and gas in Europe are used for manufacturing plastics

**and...**

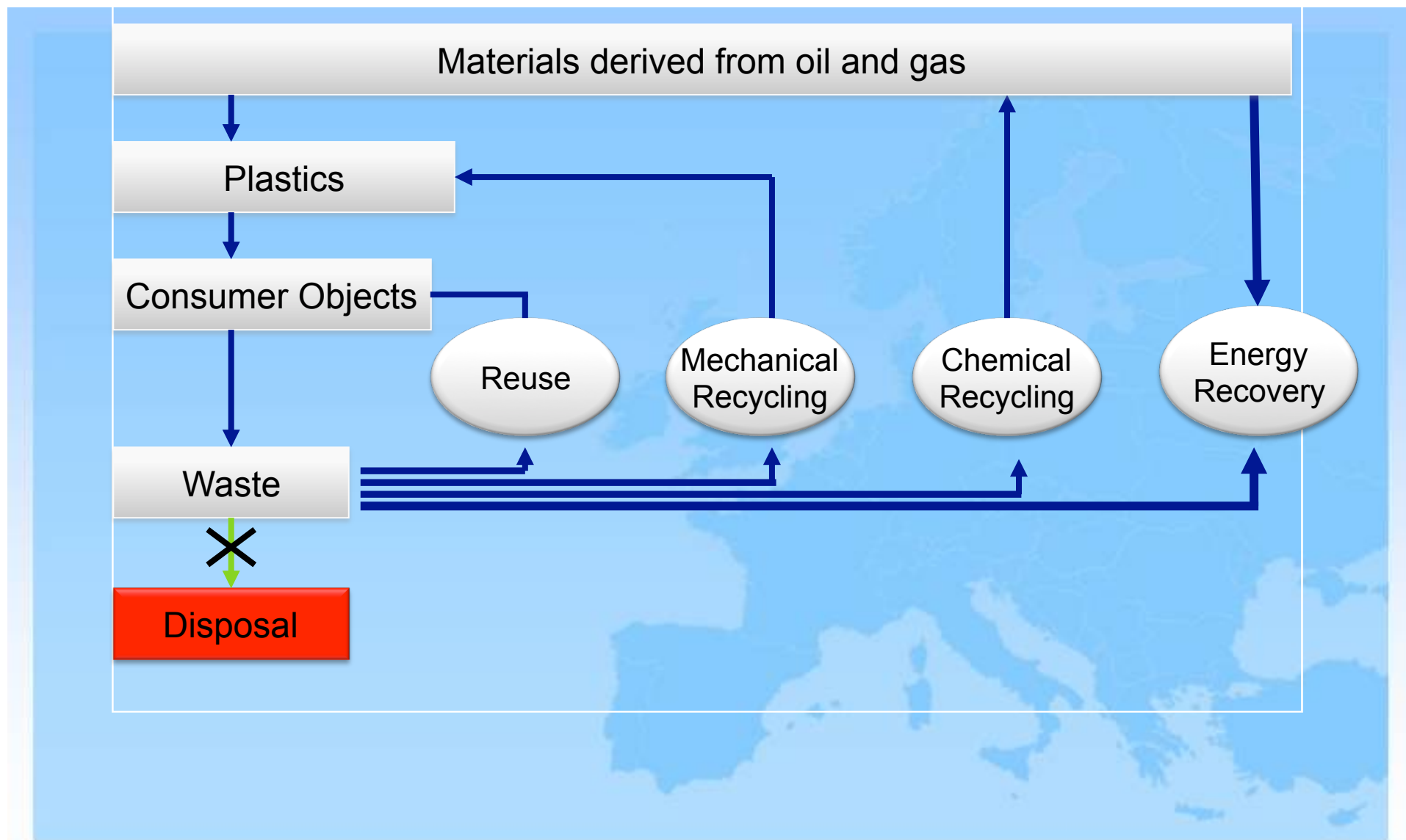
plastics contribute significantly to energy savings and emission reductions



**End of life**



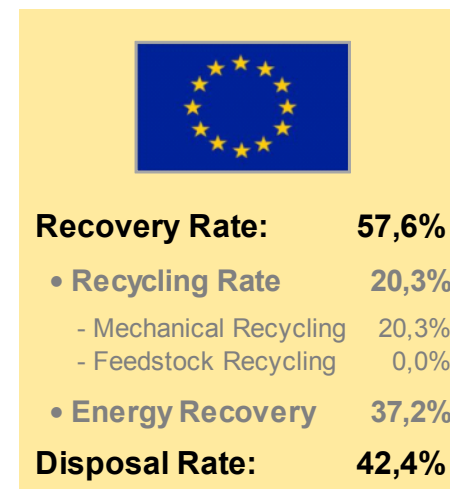
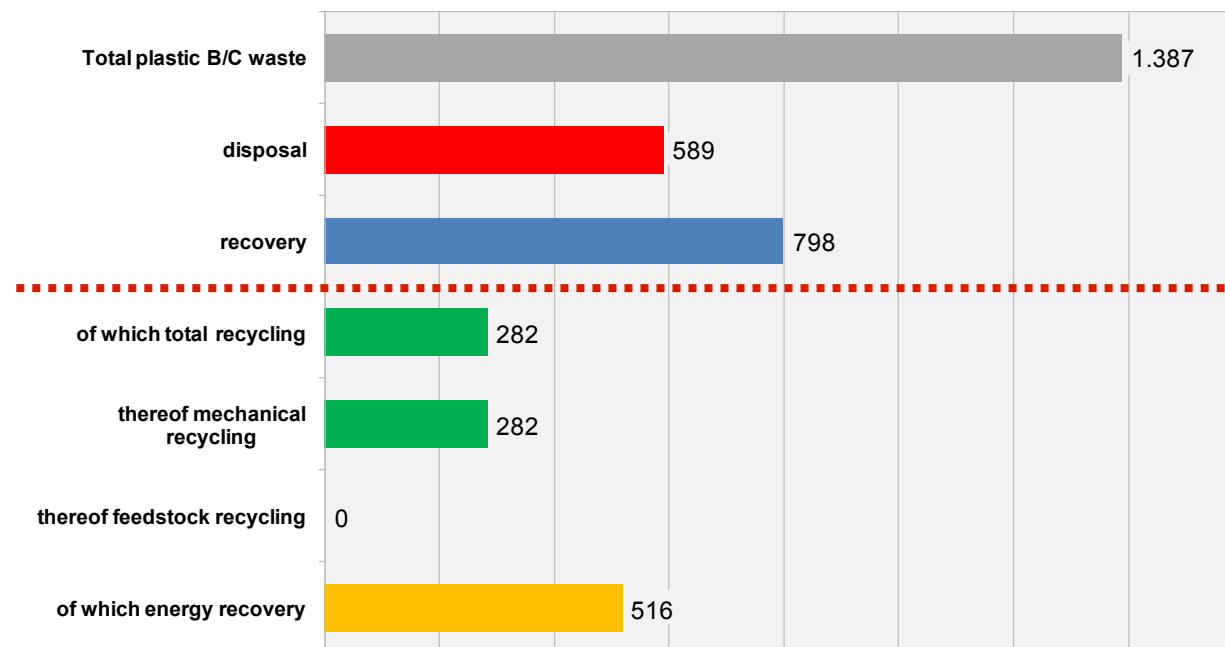
# All recovery options apply for plastics



# Plastic waste and recovery from B&C: Treatment of building/construction waste

The figure shows the treatment of total building/construction plastic waste by the 27 EU countries plus Norway and Switzerland.

## Treatment of plastic waste from building/construction in EU 27+2 2011 (kt)



## Recovery rate of building/construction plastic waste increased in 2011.

In 2011 20,3% (in 2010: 20,0%) of the **total building/construction plastic waste** in the **EU 27 + 2 countries** were mechanically recycled. 37,2% were energetically recovered mainly in waste incineration plants and as RDF.

This results in an **overall recovery rate of building/construction plastic waste of 57,6%** compared to 56,2% in 2010.



# Recovery & disposal of B&C waste by country

B/C 2010 EU 27+2	Total Waste Generation in kt	Recovery in kt					Disposal in kt			
		Total	%	Mechanical Recycling	Feed stock Recycling	Energy Recovery	Total	%	Landfill	Incineration without EFW
Austria	35	33	94%	5	0	28	2	6%	2	0
Belgium	39	32	82%	4	0	28	7	18%	7	0
Bulgaria	9	0	2%	0	0	0	8	98%	8	0
Cyprus	2	0	0%	0	0	0	2	100%	2	0
Czechia	28	9	31%	8	0	1	19	69%	19	0
Denmark	17	15	88%	3	0	13	2	12%	2	0
Estonia	4	0	0%	0	0	0	4	100%	4	0
Finland	12	5	37%	2	0	3	8	63%	8	0
France	155	92	59%	25	0	67	63	41%	62	1
Germany	355	340	96%	94	0	246	15	4%	15	0
Greece	16	0	0%	0	0	0	16	100%	16	0
Hungary	18	2	12%	1	0	1	15	88%	15	0
Ireland	4	1	19%	0	0	1	3	81%	3	0
Italy	136	22	16%	17	0	5	114	84%	114	0
Latvia	6	0	0%	0	0	0	6	100%	6	0
Lithuania	7	0	1%	0	0	0	7	99%	7	0
Luxembourg	2	1	65%	0	0	1	1	35%	1	0
Malta	1	0	0%	0	0	0	1	100%	1	0
Netherlands	68	61	90%	17	0	44	7	10%	7	0
Norway	12	11	88%	3	0	8	1	12%	1	0
Poland	89	18	20%	15	0	3	71	80%	71	0
Portugal	19	6	31%	2	0	4	13	69%	13	0
Romania	27	1	4%	1	0	0	26	96%	26	0
Slovakia	11	5	40%	2	0	2	7	60%	7	0
Slovenia	4	0	0%	0	0	0	4	100%	4	0
Spain	85	17	20%	14	0	3	68	80%	68	0
Sweden	15	14	96%	2	0	12	1	4%	1	0
Switzerland	31	31	100%	8	0	23	0	0%	0	0
UK	158	52	33%	50	0	2	106	67%	106	0
Total	1.365	768	56%	273	0	494	598	44%	597	1
				20,0%	0,0%	36,2%			44%	0,1%

- Significant mechanical recycling activities in Germany, UK, France, Italy, Netherlands and Poland and Spain. These countries cover more than 80% of the recycling activities.
- Strong energy recovery activities could be identified in Germany, France, Netherlands, Belgium, Austria, Switzerland, Denmark and Sweden.
- The total recycling quantity increased from 211 kt in 2009 to 273 kt in 2010 also due to strong activities of Recovynyl.

# Plastics too valuable to waste



**Plastics are too valuable to be thrown away**, as they can be:

- recycled into useful products
- recovered as an energy source.



# Promoting Recycling



**The Voluntary commitment of the European PVC industry**

# Vinyl 2010 voluntary commitment



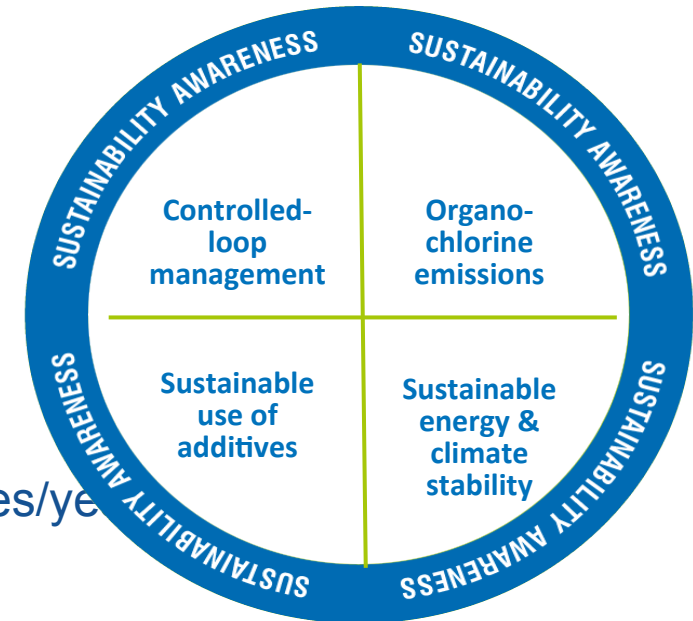
## European PVC industry's Voluntary Commitment

- Signed in 2000 by resin and additives producers as well as converters
- Objectives
  - Recycling target of additional 200,000 tonnes by 2010
  - Several other objectives (phase out of hazardous additives, etc.)
- Achievements
  - More than 200,000 tonnes recycled in 2010
  - Close to 1 million tonnes of post-consumer PVC recycled from 2001 until 2010.
  -

# Followed by VinylPlus

## 30 Measurable and concrete targets organised around 5 challenges for PVC

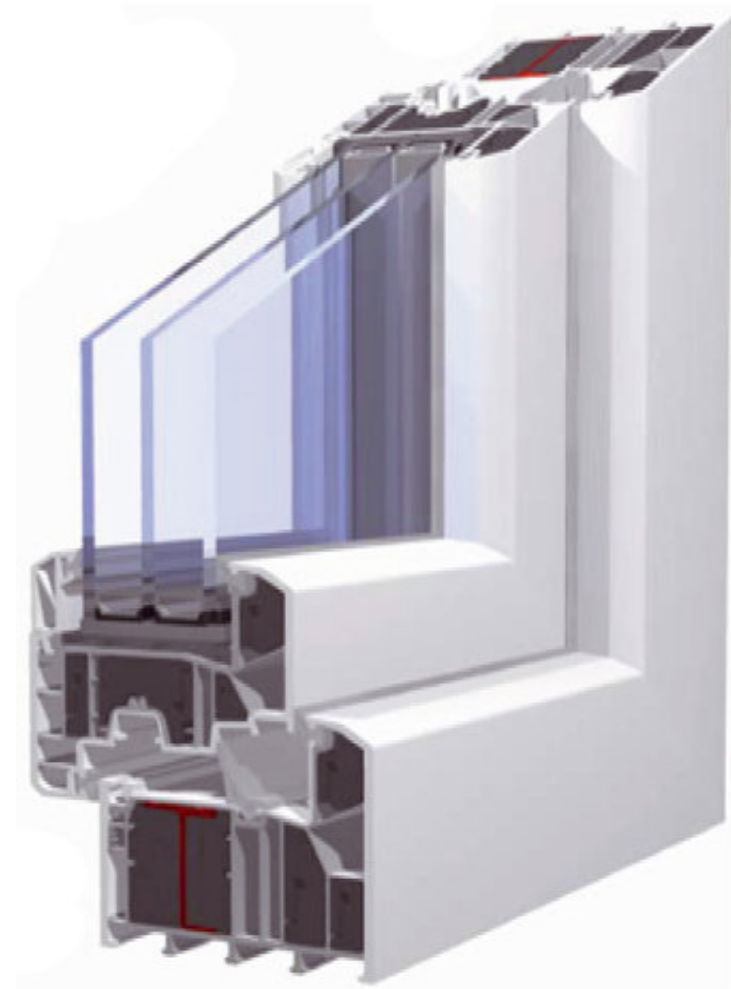
- **Recycling**
  - Recycle 800,000 tonnes/year by 2020.
  - Innovative technology to recycle 100,000 tonnes/year of difficult to recycle PVC material
  - Address 'legacy additives'
- **Reducing emissions**
- **Sustainable use of chemical substances**
- **Reducing energy and raw material use**
- **Awareness raising and open communication with all stakeholders**
  - Sustainability label to be launched soon



Based on  
The Natural Step System Conditions  
for a Sustainable Society



# Promoting Recycling



**Door and window profiles which use up to 50% recycled PVC**  
**Reststofftechnik GmbH near Salzburg part of the Rewindo system**

# Zero Plastics to Landfill by 2020

Requires Value Chain Cooperation



**PlasticsEurope**  
Association of Plastics Manufacturers

**Zero plastics going to landfill by 2020**

**All plastics are collected**

**Quality recycling (mechanical or feedstock)  
ensures thriving market for recycled plastics**

**Plastic which cannot be sustainably recycled is used  
for efficient energy recovery in Europe**

## Social aspects



# Fire safety: Perception versus reality

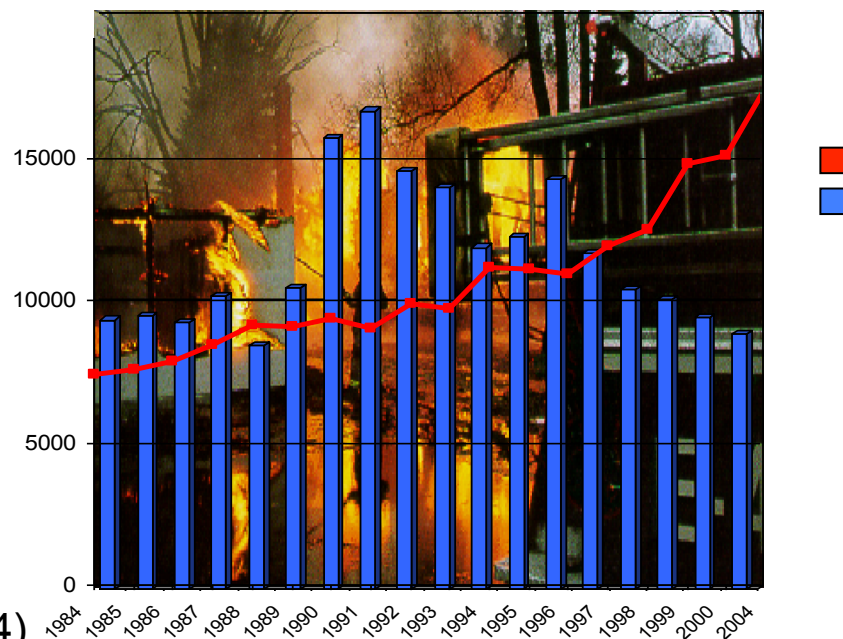
- Perception

- Plastics often more suspected than natural materials.
- Concerns about increasing fire risk due to more use and combustibility of plastic materials
- Fire effluents of plastics suspected to bring unknown and noxious effects on man and environment

## Reality

- Natural organic products not less hazardous than synthetic ones
- Fire fatalities and cost of direct fire losses are decreasing in most developed countries.
- Main toxicant is carbon monoxide, which is present in all fires

Fire fatalities versus plastics production in Germany:  
Red line: plastic production  
Blue bars: fatalities (446 in 2004)



# Indoor air: Minor contribution from construction materials

- EU Commission report
  - Burden of Disease based on DALY/year (disability adjusted life year),



Promoting actions for healthy indoor air (IAIAQ)

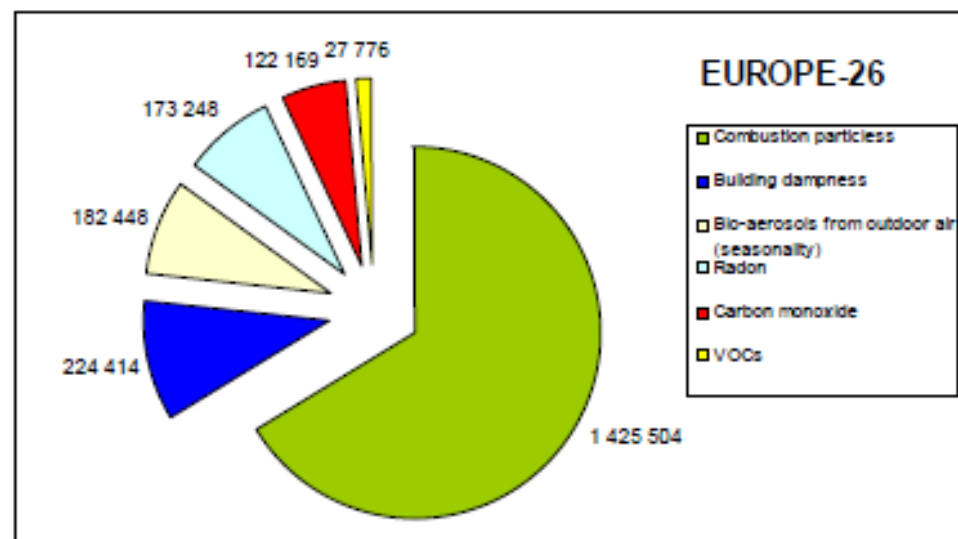


Figure 2. The IAQ associated BoD attributed to the key exposure agents.

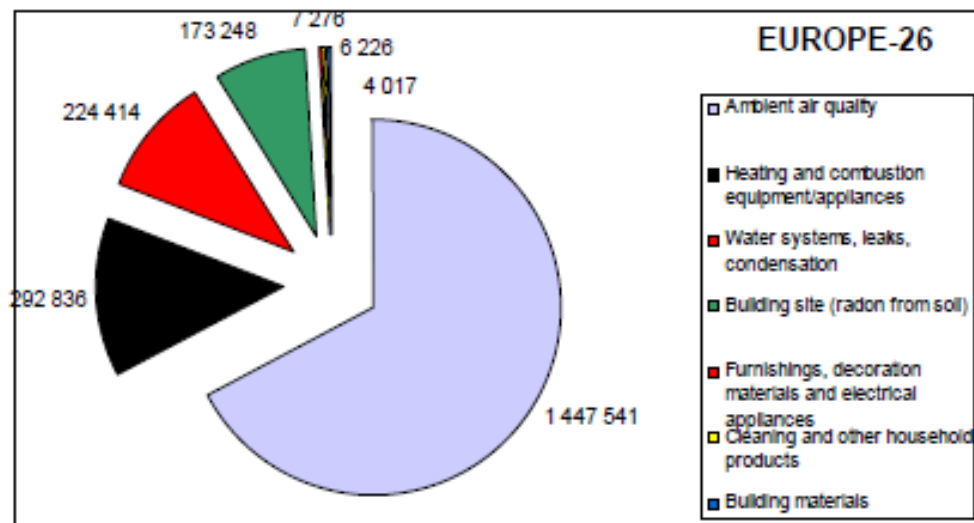


Figure 3. The IAQ associated BoD attributed to the key sources of exposure.

## Economic efficiency



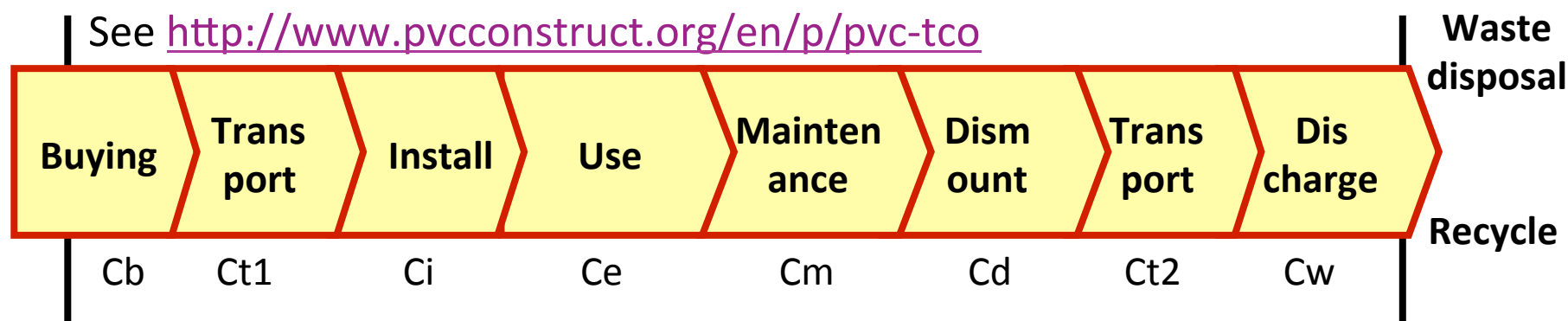


# TCO – Total Cost of Ownership

A Cost of Ownership Analysis (or Total Cost of Ownership, TCO Analysis), is a methodology designed to find the lifetime costs of acquiring, operating, and changing something. TCO is a “customer centric” analysis aimed to account for the difference between the purchase price of something and its long term cost.

Study on windows, pipes and flooring

Durability is a key element. Maintenance and cleaning plays a significant role (e.g. flooring)



$$TCO = \sum Cx$$

alessandro.marangoni@althesys.com

# Conclusions for windows

## Net savings

Net savings are always positive: investing in new windows creates value

## PVC windows

PVC has the lowest initial price, the fastest returns, and the higher net present value over 30 years lifecycle

- ✓ Spending 1 € in a PVC windows generates on average 2 € back
- ✓ PVC is the **best investment** compared to the alternatives not only for the initial price, but also considering the overall economic performance

## Germany

Pay back period:

- ✓ for PVC is 8 years;
- ✓ for wood and aluminium is 9 and 14

## Italy

- ✓ Italy has payback periods longer than Germany (warmer climate, higher buying price)
- ✓ PVC shows anyway the best economic results with a payback time of 12 years

## General conclusion



# Conclusion

- Sustainability requires a holistic view, taking into account
  - Energy and resource efficiency over the entire life cycle
  - Environmental impacts over the entire life cycle
  - Health and safety of consumers and workers
  - Convenience and affordability
  - Optimal life cycle costs
- No single construction material is best in all applications and aspects
  - Choice is always a compromise
  - The diversity and complexity of the building industry requires a broad perspective
  - Performance (“fit for purpose”) is of course a must
  - Rating systems based on a broad spectrum of environmental, economic and social criteria are to be preferred
  - Assessment must be based on benefits and impacts over the entire life cycle, and take exposure into account when considering risk

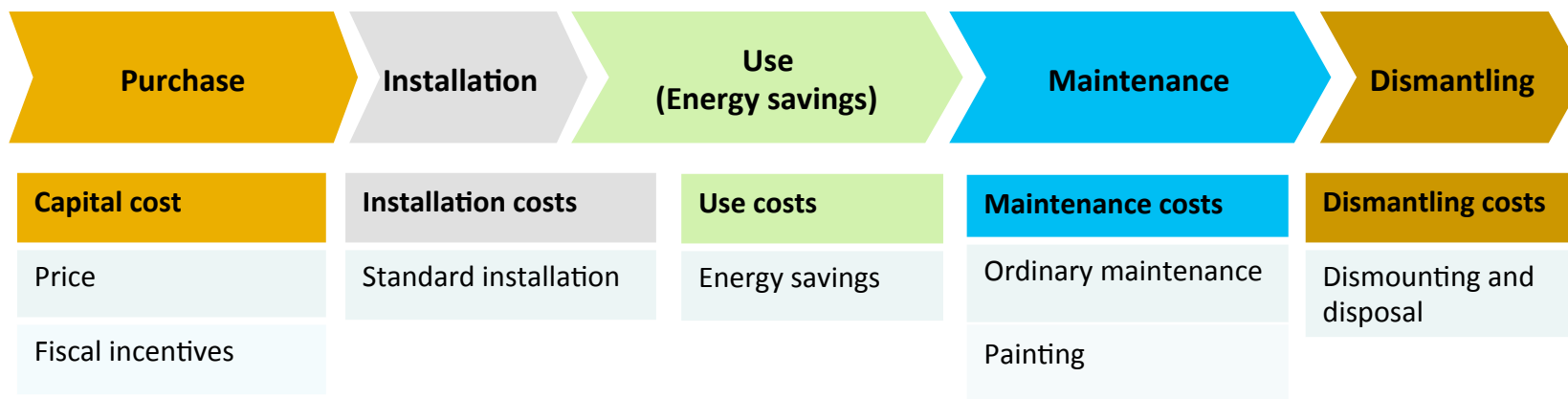


# Plastics

The Material for the 21st Century

# Example: Windows

## The conceptual framework for windows



- The final users are individuals clients
- Functional Unit: 130 x 130 cm (Germany), 123 x 148 cm (Italy)
- All the calculations have been expressed in € per square metre
- The planning period is fixed at 30 years
- VAT (19% in Germany and 20% in Italy ) is accounted as non deductible cost
- All data are adjusted to present value (discount rate: 5%; inflation rate: 2%)