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New JRC report assesses the environmental impacts of plastics recovery processes

Today the Joint Research Centre published a report entitled “Assessment of the environmental advantages and drawbacks of existing and emerging polymer recovery processes". The report describes the plastics waste streams generated by different economic sectors in the EU and develops an outlook of the composition of these streams for the coming 10 years. One of the report's most important findings is that it identifies ways in which new and existing technologies could be combined to improve the recovery of waste plastics from the perspective of their environmental and technological performance. The study provides national and European policy makers with useful information on recycling systems and on the evolution of plastics consumption, thereby facilitating good decision making in the field of waste management.

The versatility and behaviour of plastics makes them suitable for a large variety of applications in sectors like packaging, construction, automotive, telecommunications and electronic equipment. Thus, the use of plastics is rising year by year: today, each European consumes on average approximately 90kg of plastics a year. However, only 40% of the total collectable plastics waste of is being recovered.

This new report assesses the environmental impact of the most common plastics on the basis of their composition, their applications and also their occurrence in specific waste flows. This analysis allows polymers (i.e., the ingredients of plastics) to be ranked according to the need to improve their waste management. On these grounds, the authors have carried out a thorough screening of the state-of-the-art practice and research on polymer recovery technologies, identifying those with the highest potential for improving waste recovery of plastics. The study also presents the technical and environmental performance of emerging recovery processes, and looks at the barriers and drivers that could affect their commercialisation or wider adoption.

Some of the report's main findings are:

- The report presents current plastics consumption figures and estimates future consumption trends and recovery rates for 2015. For instance, at present the packaging sector is the main consumer of plastics with a stable consumption share of 37%. Food packaging accounts for more than 50% of total production, and is growing. According to the report, plastics consumption in packaging will double by 2015 reaching nearly 20,000 tonnes a year, whereas the current 50% recovery rate in the sector will grow to 70%.
- Regarding recovery rates by sectors, agricultural plastics register one of the highest recovery rates (above 50%) despite the fact that no EU legislation covers

this waste and that most schemes are voluntary. The success of those initiatives stems from the homogeneous nature of agricultural plastics and their easy accessibility. In contrast, the automotive, construction, electrical and electronic equipment sectors still recover little of their plastics waste, due to the fact that it is generally made up of many components which are difficult to separate.

- The report shows that there is little demand for "recyclates" (recycled material used to form new products) in any of the six waste streams assessed[1] with the remarkable exception of PET (polyethylene terephthalate) which is used for most bottles. Where there are end markets, waste plastics are generally “down cycled” into cheaper and less demanding applications, usually in the packaging and building sectors. This is the case of LDPE (low density polyethylene) which is the most common plastic in household applications. It is used for packaging films, milk carton coating or toys, and is recycled from packaging applications.
- The report concludes that the best way to achieve an optimal environmental performance of plastics waste recovery is the combination of the different recycling technologies. Mechanical recycling[2] is the most environmentally friendly process in terms of energy consumption and CO2 emissions. However it results in a lower plastic waste recovery: 46% compared to over 60% in the case of energy and feedstock recovery.
- Finally, the report looks into barriers and drivers that can influence further development of recovery technologies for plastics waste. A SWOT analysis identified some of the main challenges: first, getting valuable products from mechanical recycling in low scale plants with advance recycling technologies second, develop large-scale plants for versatile feedstock recovery capable of treating mixtures of plastics and other waste simultaneously ; and finally, the use of the already existing facilities, or their adaptation in order to accept plastics wastes to some extent, shows commercial advantages over construction of dedicated installations for plastics waste recycling.

Background

This report is a contribution to the Thematic Strategy on the Prevention and Recycling of Waste and Integrated Product Policy of the European Commission (COM(2005)666). It provides information concerning the treatment of polymers for the ongoing work on different waste streams as set out in the directives 94/62/EC on packaging waste, 2000/53/EC on end-of-life vehicles and 2002/96/EC on waste electrical and electronic equipment.

Further information:

The full report can be downloaded from: http://ipts.jrc.ec.europa.eu

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[1] The waste streams analysed are: packaging, municipal solid waste, electric and electronic equipment, vehicles, construction and demolition and agriculture.

[2] Mechanical recycling consists in melting (or dissolving) and re-granulating used plastics. Feedstock recovery is a conversion of the waste plastics into basic chemicals, monomers for plastics or hydrocarbon feedstock. Energy recovery is about obtaining energy from plastic waste with or without other by-products.