Chemistry Australia

The Business of Chemistry
Essential for Life

A Guide to

Sustainable Plastics recovery

Interim Version
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1. Preface

This guidance is a non-binding statement of principles and values relating to the management of plastic products at end-of-life.

It is based on a document developed at the 19th Annual Global Meeting on Plastics and the Environment, held in October, 2008 in Rio de Janeiro, Brazil. The meeting was attended by plastics industry associations from Argentina, Australia, Brazil, Canada, China, Europe, India, Japan, South Africa and the USA.

This group of associations, and the plastics industries in various parts of the world they represent, recognise the value and importance of responsibility, leadership and global cooperation in managing environmental issues relating to plastics. This is consistent with the role of plastics providing solutions to the challenges of climate, population and economic change.

The group recognises the role of all types of plastics and that the selection of materials for a given application should be based on technical merit, over whole-of-life, supported by sound science.

2. Objectives

Broadly, the plastics industry recognises the value and importance of energy and resource conservation and efficiency, as well as minimising the environmental and health impacts of plastic products over their whole-of-life cycle.

Specifically, this guidance recognises the environmental, economic and social importance of diverting plastic products from landfill and litter streams at the eventual end of their life cycles. It covers used plastics from domestic, municipal, commercial / industrial and building / construction sources. It includes products with short term, medium and long term product cycles lasting from months to years to decades.

Increased cooperation between country associations, including the development of global guidance, can help improve the recovery of plastics at end-of-life. Sharing knowledge, experience and programs can inform improved policy development, design decisions as well as product stewardship, education and awareness programs - each contributing to the most efficient use of resources and energy.

3. A context of Sustainable Development

The industry understands the contribution that plastics, and the plastics industry, has to sustainable development. A helpful definition of this is the Brundtland Commission[1] definition: *"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*

4. Plastics as a sustainable material

The plastics industry is part of the global economy with plastics used in the value chains for a large proportion of manufactured items in the world. Plastics are unique, not only in their wide range of properties and applications, but in their use as sustainable materials. Plastic products can enable reductions in energy use and carbon emissions over their life cycle, including end-of-life, through material and energy recovery options. These may be possible for single plastic items as well as products with plastic components.

Plastics use only 4% of the world's oil and gas[2], and a very small amount of some crop types, and sequester carbon in the products they are made into. This is compared with the majority of the world's oil and gas releasing carbon as greenhouse gases when combusted as fuels. The lightweight, flexible, hygienic and cost-effective characteristics of plastics mean they are used in a variety of applications able to preserve resources and energy compared with alternatives[3]. Plastic products are often able to go through multiple re-use, recovery and recycling cycles. From this perspective, plastics are too valuable to use only once and then waste. The whole-of-life impact of a plastic product can best be described with a suitable Life Cycle Assessment (LCA). LCAs demonstrating the comparative impacts of plastics and other materials are available for a range of product types including food packaging and building materials. Some examples are provided for reference.[4]

At the eventual end of a plastic products life it has valuable material and energies able to be recovered by a range of technologies, when supported by adequate collection, pre-treatment and recovery infrastructure.

The industry recognises that plastics which end up in landfill or as litter are also wasted sources of materials and energy. Litter, in particular, creates problems socially, economically and environmentally and is best dealt with by a combination of:

- consumer education
- effective waste management infrastructure, and
- the enforcement of suitable laws.

[1] "Brundtland Commission": United Nations. 1987."Report of the World Commission on Environment and Development."
[2] Reference: Plastics Europe and American Chemistry Council
[3] GUA, Vienna Austria, 2005, "The contribution of plastic products to resource efficiency"
[4]

5. Guidance and Standards

The traditional 'waste hierarchy' (prevention, reduction, re-use, recycle, recover energy, disposal/landfill) is a guide to extracting the maximum practical benefits from products and generating the minimum amount of waste. In this way, it supports the efficient use of resources and energy generally. An evaluation of these options to identify most suitable method for managing a given product is important. The evaluation should be thoroughly conducted and consider aspects which include waste type, composition and quality, environmental performance, cost and the like.

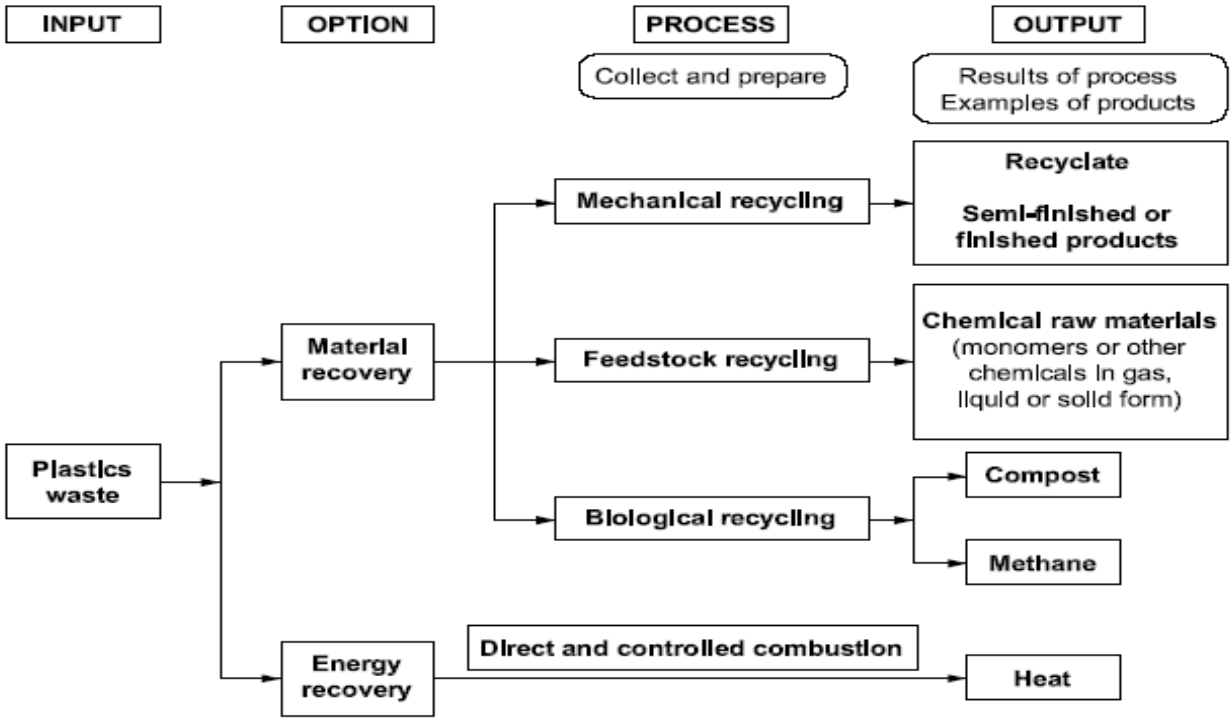
Specifically, in relation to plastics, "ISO 15270: 2008 Plastics – Guidelines for the recovery and recycling of plastics waste" was released in June 2008. It describes various management options and recognises that there are two main avenues for recovering the value of plastics. They are:

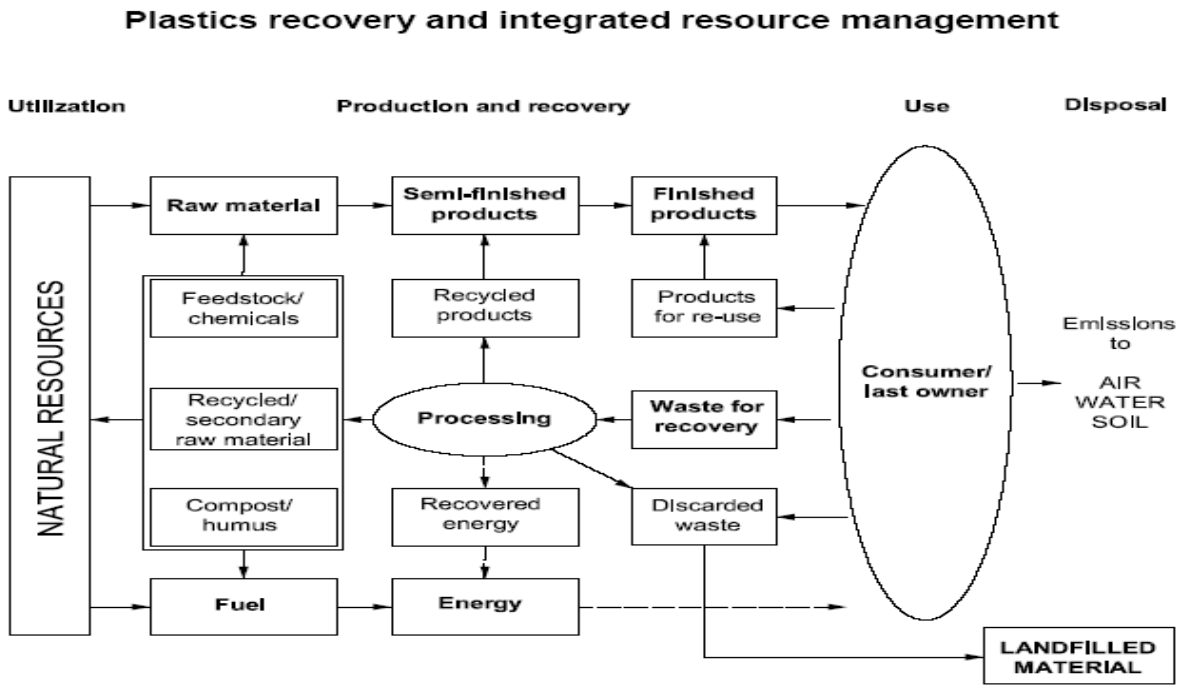
- Material recovery: mechanical recycling, feedstock recycling and for specific types of plastics, biological recycling including compost and methane, and
- Energy recovery for fuels and heat

If variables such as environmental performance and cost were equal, then mechanical as well as feedstock recycling is generally preferable to biological or energy recovery. This allows plastics to continually go through multiple cycles - "keeping plastics as plastics for as long as possible".

The following diagrams illustrate recovery options, processes and outputs as well as the elements and flows within an integrated resource management system.

Schematic diagram of some waste plastic recovery options





These diagrams taken from 'ISO 15270: 2008 Plastics – Guidelines for recovery and recycling of plastics waste' are reproduced with the permission of the International Organization for Standardization ISO. These standards can be obtained from any ISO member and from the Web site of the ISO Central Secretariat at the following address: www.iso.org. Copyright remains with ISO.

6. Increasing recovery beyond systemic limitations

Limits exist to the amount of waste plastic able to be recovered by any technology and its collection infrastructure. For example, the lack of clean, homogeneous streams of material at a cost-effective price will limit the rate of mechanical recycling. It is also recognised that all technologies create percentage losses of material and energy as a result of processing.

It is recognised that there are a variety of social, political and other drivers to continually increase the rate of recycling and that an increased recycling rate is automatically regarded as preferable. However, attempting to recover and recycle plastic products beyond a certain point will create environmental costs rather than benefits. It is important that this point is able to be defined and the consequences of moving beyond this point understood.

Because each technology has limitations, combining technologies in an integrated waste management approach can enable the most effective recovery system for a given community, its mix of wastes, technologies and infrastructures available and cost variables.

All product types have life cycles of varying length, ranging from months (such as most packaging) to years (electrical and electronics) and decades (such as most building products). In some markets, approximately 60 % of plastic products manufactured have long-term cycles and will not be available for recovery for many years.

7. Importance of a cooperative approach – locally and globally

Increasing and optimising all types of recovery is best achieved by the cooperation of the value chain supported by all tiers of governments and the community. Often this can be best achieved by focusing on particular product waste streams and engaging their value chains rather than focusing on the type of polymer used. For example, effort focused on agricultural film is likely to be more effective than a Polyethylene program, or engaging the value chain for dairy packaging more productive than targeting Polypropylene or Polystyrene materials.

A significant proportion of a product's environmental contribution is locked in at the design stage and so the role of design is vital for an effective result. It should include the end-of-life management of products balanced with other design considerations.

Consumer product manufacturers (brandowners) and retailers have an increasing role in specifying plastics and therefore an increasing role in assisting recovery efforts. This may include involvement in voluntary product stewardship programs involving all parts of the value chain, or extended producer responsibility programs involving a payment scheme. Creating pull-through demand for recycled plastics by helping create markets for recycled content products is recognised as valuable. The plastics industry seeks to continue working on stewardship programs with all stakeholders.

It is also important to recognise that plastics recovery and recycling adds social and economic value to communities and economies from generating employment, skill development and business growth.

Improving the recovery of plastic products at a country level can be assisted by coordinating regional and global efforts. Expertise in information and education, targeted programs, collection systems, technologies, markets and advocacy often exist in the networks of product manufacturers and plastics industry associations in various countries. These may be valuable when locally adapted by other countries.

8. Opportunities for improvement

1. Ensuring all resource waste policy objectives, programs and evaluations are holistic in that they identify the entire system eg: product and packaging resources and waste
2. Ensure waste policy, program and evaluation decisions are guided by the principles of selection of materials for a given application, based on technical merit, over whole-of-life, supported by sound science.
3. Encourage product stewardship at all stages of the resource / waste hierarchy: Source reduction; Re-use; Recycling (mechanical, biological, energy); landfill
4. Encourage sustainable investment in infrastructure, processing aligned with market development for optimized domestic recovery
5. Support recovery investment opportunities with suitable research and development programs including for material and product performance applications, processes, cost-efficiency, value-adding and market development
6. Leveraging, optimizing and establishing product stewardship programs along value-chains
7. Sharing good practice examples of product stewardship programs, technologies, and information through a range of sector, product, policy and geographic networks