# INTERNATIONAL STANDARD

# ISO 15270

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# Plastics — Guidelines for the recovery and recycling of plastics waste

*Plastiques — Lignes directrices pour la valorisation et le recyclage des déchets plastiques*

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ISO 15270:2008(E)

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# Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15270 was prepared by Technical Committee ISO/TC 61, *Plastics*.

This second edition cancels and replaces the first edition (ISO 15270:2006), which has been technically revised.

# Introduction

This International Standard has been developed to assist all plastics industry stakeholders in the development of

— a sustainable global infrastructure for plastics recovery and recycling;

— a sustainable market for recovered plastics materials and their derived manufactured products.

For the reduction of plastics waste and in support of the objectives of sustainable development, top priority should be given on a product life-cycle basis to

— general reduction of material and energy resource use;

— specific optimization of the use of plastics raw materials.

Options involving the beneficial re-use of plastics products and the integration of plastics recovery processes are important downstream components of sustainable development.

The selection of methodologies and processes for the management of plastics waste available from pre-consumer sources and end-of-life products may be approached using various strategies, all of which should include a preliminary analysis of the available recovery options. In general, plastics recovery technologies can be divided into two classes:

a) material recovery (mechanical recycling, chemical or feedstock recycling, and biological or organic recycling);

b) energy recovery in the form of heat, steam, or electricity generation using plastics waste as substitutes for primary fossil fuel resources.

As the optimal recovery option depends on many prevailing circumstances, life-cycle analysis should be applied to decide, depending on the type and composition of the plastics waste, which options are environmentally more favourable and sustainable. In the case of commingled or composite plastics waste, energy recovery and some feedstock recycling processes often represent the optimal choice. Moreover, plastics waste may be managed utilizing a hierarchical framework comprising life-cycle strategies for prevention and minimization both of the volume of waste and of its potentially adverse environmental impact as described in ISO 17422. The potential occurrence of regulated substances in plastics waste requires particular attention.

NOTE 1 Efficient and discriminatory collection procedures are essential if the operational objective is recovery of monomers or other feedstocks. For mechanical recycling, and indeed all plastics recovery operations, proper process monitoring and control procedures are required. These procedures should include the establishment of specific guides and specifications covering recovered plastics, including, where appropriate, rules for traceability and assessment of conformity.

NOTE 2 This International Standard is intended to provide a valuable resource that is globally relevant, no matter which particular legislative or regulatory framework for plastics recovery and recycling governs its application. In order to facilitate adoption of the standard within the contexts of diverse national and regional legislative and regulatory environments, the following considerations are emphasized:

a) The subject of plastics recovery and recycling, being often presented within the perspective of solid-waste management, frequently applies terminology, technology, economics and infrastructure that are based on solid-waste management concepts. These concepts have consequently tended to define the legislative and regulatory environments referred to above.

b) Alternative perspectives for plastics recovery and recycling that are more comprehensive than those inherent to the solid-waste management model are available based on the concepts of integrated resource management (see Annex B) and sustainable development. Integrated resource management focuses on more extensive systems than solid-waste management. It applies life-cycle analysis to achieve better understanding of the resource conservation and eco-efficiency implications of resource management strategies and policies. In this approach, the management of both energy and material resources are viewed within an integrated perspective. The concept of sustainable development, while also applying life-cycle thinking to waste and resource management, is more comprehensive than integrated resource management in that it requires consideration of the so-called three pillars of sustainable development, viz. ecological benefit, economic growth and social progress.

NOTE 3 Although the plastics recovery and recycling sector is a relatively new and emerging industry, significant national and regional efforts have been undertaken to provide legislative and regulatory frameworks applicable to one or more market sectors. The existence of such legal and regulatory frameworks must be kept in mind by users of this International Standard. In the interest of ensuring global relevance, an effort has been made to avoid terminology and definitions that appear to promote one legislative or regulatory framework over another. The intent is that terminology and definitions included in this International Standard embrace, rather than exclude, differing interpretations. A specific example is the question of whether or not a material must be defined as waste before it can be recovered. There is no universal agreement on this point and the standard attempts to accommodate a range of current and possible future definitions and interpretations of the term “waste”.

# Plastics — Guidelines for the recovery and recycling of plastics waste

## 1 Scope

This International Standard provides guidance for the development of standards and specifications covering plastics waste recovery, including recycling. The standard establishes the different options for the recovery of plastics waste arising from pre-consumer and post-consumer sources as illustrated diagrammatically in Annex A. The standard also establishes the quality requirements that should be considered in all steps of the recovery process, and provides general recommendations for inclusion in material standards, test standards and product specifications. Consequently, the process stages, requirements, recommendations and terminology presented in this International Standard are intended to be of general applicability.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 472:1999, *Plastics — Vocabulary*

ISO 14021, *Environmental labels and declarations — Self-declared environmental claims (Type II environmental labelling)*

ISO 17422, *Plastics — Environmental aspects — General guidelines for their inclusion in standards*

ASTM D 7209, *Standard Guide for Waste Reduction, Resource Recovery, and Use of Recycled Polymeric Materials and Products*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472 and the following apply.

**3.1**
**agglomerate**
shredded and/or granulated plastics material in the form of particles which cling together

**3.2**
**baling**
process in which plastics waste is compacted and secured as a bundle to facilitate handling, storage and transportation

**3.3**
**batch**
quantity of material regarded as a single unit, and having a unique reference

NOTE Batch is primarily a processing term.

**3.4**
**biodegradation**
degradation caused by biological activity, especially by enzymatic action, leading to a significant change in the chemical structure of a material

[ISO 16929:2002]

**3.5**
**biological recycling**
aerobic (composting) or anaerobic (digestion) treatment of biodegradable plastics waste under controlled conditions using micro-organisms to produce, in the presence of oxygen, stabilized organic residues, carbon dioxide and water or, in the absence of oxygen, stabilized organic residues, methane, carbon dioxide and water

**3.6**
**collection**
logistical process of moving plastics waste from its source to a place where it can be recovered

**3.7**
**commingled plastics**
mixture of materials or products consisting of different types of plastic

NOTE The term “mixed plastics” is used synonymously.

**3.8**
**contaminant**
unwanted substance or material

NOTE The term “impurity” is a deprecated synonym of contaminant and should not be used.

**3.9**
**converter**
specialized operator capable of shaping plastics raw material to make a usable semi-finished or finished product

**3.10**
**depolymerization**
chemical reversion of a polymer to its monomer(s) or to a polymer of lower relative molecular mass

[ISO 472:1999]

**3.11**
**energy recovery**
production of useful energy through direct and controlled combustion

NOTE Solid-waste incinerators producing hot water, steam and/or electricity are a common form of energy recovery.

**3.12**
**environmental aspect**
element of an organization's activities or products or services that can interact with the environment

[ISO 14001:2004]

**3.13**
**environmental impact**
any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects

[ISO 14001:2004]

**3.14**
**feedstock recycling**
conversion to monomer or production of new raw materials by changing the chemical structure of plastics waste through cracking, gasification or depolymerization, excluding energy recovery and incineration

NOTE Feedstock recycling and chemical recycling are synonyms.

**3.15**
**flake**
plate-like regrind

NOTE The shape of regrind depends both on the plastics being processed and the manner of processing.

**3.16**
**fluff**
filament-like regrind

NOTE Common usage of the term "fluff" also includes shredder residue fractions produced in the commercial recycling of durable goods such as automobiles.

**3.17**
**homogenizing**
processing to improve the degree to which a constituent and/or property is uniformly distributed throughout a quantity of plastics material

[EN 14899:2005]

**3.18**
**landfill**
waste disposal site for the deposit of waste on to or into land under controlled or regulated conditions

**3.19**
**lot**
definite quantity of some commodity manufactured or produced under conditions that are presumed uniform

[ISO 472:1999]

NOTE Lot is primarily a commercial term.

**3.20**
**material recovery**
material-processing operations including mechanical recycling, feedstock (chemical) recycling and organic recycling, but excluding energy recovery

**3.21**
**mechanical recycling**
processing of plastics waste into secondary raw material or products without significantly changing the chemical structure of the material

NOTE Plastics secondary raw material is a synonym of recyclate.

**3.22**
**micronizing**
process by which a plastics material is ground into a fine powder

**3.23**
**organic recycling**
controlled microbiological treatment of biodegradable plastics waste under aerobic or anaerobic conditions

NOTE The term "biological recycling" is used synonymously.

**3.24**
**post-consumer**
descriptive term covering material, generated by the end-users of products, that has fulfilled its intended purpose or can no longer be used (including material returned from within the distribution chain)

NOTE The term “post-use” is sometimes used synonymously.

**3.25**
**pre-consumer**
descriptive term covering material diverted during a manufacturing process

NOTE 1 This term excludes re-utilized material, such as rework, regrind or scrap that has been generated in a given process and is capable of being reclaimed within that same process.

NOTE 2 The term “post-industrial material” is sometimes used synonymously.

**3.26**
**purge material**
material resulting from the passing of polymer through plastics processing equipment for the purpose of cleaning the equipment, or when changing from one polymer to another, or when changing from one colour or grade of polymer to another

**3.27**
**recovered material**
plastics material that has been separated, diverted or removed from the solid-waste stream in order to be recycled or used to substitute virgin raw materials

NOTE See ISO 14021.

**3.28**
**recovery**
processing of plastics waste material for the original purpose or for other purposes, including energy recovery

**3.29**
**recyclate**
plastics material resulting from the recycling of plastics waste

NOTE 1 The terms “plastics secondary raw material”, “recycled plastics” and “regenerate” are sometimes used synonymously.

NOTE 2 As soon as the used plastics material has been treated in such a way that it is ready to replace a virgin product, material or substance in a production process, it loses its characteristics as waste.

**3.30**
**recycling**
processing of plastics waste materials for the original purpose or for other purposes, excluding energy recovery

**3.31**
**regrind**
shredded and/or granulated recovered plastics material in the form of free-flowing material

NOTE The term “regrind” is frequently used to describe plastics material in the form of scrap generated in a plastics processing operation and re-used in-house. This term is also used to describe fine plastics powder used as filler in the recovery of plastics.

**3.32**
**re-use**
use of a product more than once in its original form

NOTE In view of the fact that a re-used product has not been discarded, re-use does not constitute a recovery option.

**3.33**
**shredding**
any mechanical process by which plastics waste is fragmented into irregular pieces of any dimension or shape

NOTE Shredding usually signifies the tearing or cutting of materials that cannot be crushed by fragmentation methods applicable to brittle materials, as typically carried out in a hammer mill.

**3.34**
**waste**
any material or object which the holder discards, or intends to discard, or is required to discard

# 4 Sources

## 4.1 General

Plastics material for recovery may be obtained from various sources, including the following:

## 4.2 Pre-consumer sources of materials

a) Plastics producers:

— off-grade materials.

b) Plastics processors:

— processing purge material and scrap;

— scrap products, parts and semi-finished products.

c) Others:

— industrial and commercial products made of, or containing, plastics, including packaging and containers.

## 4.3 Post-consumer sources of materials

a) Disposables:

— personal goods;

— packaging films and containers.

NOTE Such disposables may be recovered by sorted municipal collection systems or by specific consumer-incentive systems involving cash deposits on containers or by any other organized/unorganized individual or group of individuals for economic benefits.

b) Durable goods:

— domestic appliances;

— electronic equipment;

— transportation equipment;

— construction products;

— industrial equipment.

NOTE End-of-life products such as electronic equipment or automobiles may be returned by the consumer to specialized operators for recovery. Similarly, during building demolition operations, plastics materials and products may be segregated and recovered.

# 5 Recovery

## 5.1 General

Selection of the appropriate recovery option will depend on many factors, such as the quality, quantity and availability of the plastics waste, the availability and capability of existing technologies and equipment, and the relevant recovery targets in terms of material or energy content requirements. Relevant selection criteria include the relative costs, competitiveness and environmental performance of the available options (see Annex A). Access to markets for recovered materials or energy is an important consideration.

NOTE Concepts and definitions of recovery are continually evolving. The basic principle of recovery lies in the transformation of an input (waste) into an output (product). Recovery is considered to be complete when secondary materials, fuels or products have been manufactured, or energy has been generated, in accordance with consensus-standardized criteria. Plastics recyclate with specified properties (secondary raw material) is a product, and recovery is considered to be accomplished when this product has been produced and has become commercially available, or energy has been generated (see Annex A and Annex B).

## 5.2 Material recovery

### 5.2.1 General

Material recovery of plastics waste encompasses three distinct recycling routes: mechanical recycling, feedstock or chemical recycling, and biological or organic recycling.

### 5.2.2 Mechanical recycling

#### 5.2.2.1 Sequence of operations

The mechanical recycling option generally comprises the following sequence of unit operations, some of which may occur simultaneously, that are carried out as part of the recyclate preparation and production process:

For plastics: collection → identification → sorting → grinding → washing → drying → separating → agglomerating → extruding/compounding → pelletizing

For reinforced plastics: collection → identification → sorting → grinding → washing → separating

NOTE 1 In practice, many plastics compounders use plastics recyclates in the form of flake as feedstock, eliminating the need for a prior pelletization step.

NOTE 2 In the case of ground plastics waste used as a secondary raw material as aggregate in mortar or cement, the sequence of unit operations is: collection → identification → sorting → grinding → product.

NOTE 3 In some cases where the sorting process is able to group the same type of plastics waste together, the “separating process” after washing and drying may not be necessary.

Plastics waste for mechanical recycling may be offered for sale in the form of bulk waste as collected, or in an added-value, sorted grade. The wide range of possible forms and compositions of such commercially available plastics waste highlights the crucial importance of consensus standards covering these materials. As a general rule, manufacturers and users of plastics materials and derived products are advised to provide mechanical recyclers with the necessary thermal-stability, reactivity and other data in material safety data sheets or other appropriate documentation.

#### 5.2.2.2 Pre-treatment

Depending both on the intended application of the recyclate and on the characteristics of the waste stream, a preparatory step may be used to decontaminate as far as practically possible the collected materials and products, and to optimize their handling characteristics for shipping, processing and other downstream operations. In the absence of homogeneous plastics waste consisting of materials of similar grade or type, material identification, sorting and separation steps become essential, such as in specialized sorting centres for household packaging or end-of-life electrical and electronic equipment. Wherever possible, these pre-selective operational steps should be carried out prior to any downstream mixing (commingling) with other waste streams. In some cases, particularly affecting post-consumer sources, attainment of this objective will require automated separation and sorting unit operations. In the absence of such automatic process control, precise identification of the sources of the components of the waste may be of crucial importance.

NOTE In order to optimize the recovery efficiency of plastics products and component parts, it is desirable to design for ease of disassembly and material identification as well as for minimization of variety in the types of plastic used in their manufacture. Such criteria may evolve as a function of the future development and implementation of technical options for resource recovery.

**a) Identification**

Various in-line analytical methods using techniques such as infrared analysis and trace-element tracking are available for the identification of specific types of plastic and associated additives, thus permitting their efficient downstream separation and segregation.

NOTE In some cases, identification codes, moulded into or printed on to plastics parts or products (see ISO 1043-1, ISO 1043-2, ISO 1043-3, ISO 1043-4 and ISO 11469 in the Bibliography), will also provide a means of separating materials, by type of plastic, at any point in the process, including the post-consumer stage, during manual or automatic sorting at the collection facility, and during disassembly of durable goods. In addition, other methods are often used to identify specific types of plastic, for example by the part shape or geometry, or acoustically by impact noise, or by combustion odour and copper wire corrosion test procedures.

**b) Separation and sorting**

Plastics separation and sorting operations, which are generally required in all material recovery processes, may be carried out manually or automatically using appropriate means of identification. The more accurate and efficient the means of identification, sorting and separation, the better is the quality of the recovered product obtained. Depending on specific circumstances, a compaction process such as crushing or baling, or a size reduction process such as grinding or shredding, may be necessary to ensure easier handling.

Due to the fact that manual sorting can give rise to a number of workplace environment problems, which may be chemical or microbiological in nature, it is not recommended. Ergonomic problems due to repetitive work and stereotyped movements are also a risk. If manual sorting cannot be avoided, the workplace shall be designed to minimize such problems.

NOTE 1 Pre-consumer products can generally be sorted by type of plastic, in order to permit their re-use in the production process. Re-use of post-consumer products is generally rendered more complex as a result of their contamination by adventitious heterogeneous plastics waste.

NOTE 2 Some post-consumer materials may consist of the same basic plastic containing fractions with different material properties such as in the case of PE-HD bottles having different melt flow rates, densities or colours. This may lead, as output of the next regenerating step, to recyclates with distinct, controlled levels of physical characteristics. In some cases, it may not be practically or commercially viable to achieve the desired levels of separation or cleanliness, with the result that the output consists of recyclates suited only for applications with lower requirements, as in the case of certain commingled plastics. Standards for the characterization of recyclates may be efficient tools for assessing the fit with the requirements of market outlets.

NOTE 3 Recycling of reinforced plastics may be carried out in some cases without separating the polymeric matrix from fibre reinforcements (e.g. as in raw materials for the manufacture of cement).

When sufficiently efficient separation, as required for the desired property profile of the recyclate, is not feasible at this preparatory process stage, appropriate preliminary operations should be conducted at the next regenerating step.

#### 5.2.2.3 Recyclate production process

The commercial production of plastics recyclate comprises various unit operations, including the separation of materials, efficient removal of contaminants by washing or other methods, drying where appropriate, handling, constitution of lots, storage, packaging and shipment. In addition, other processes, such as grinding, additional sorting, homogenizing, extruding, pelletizing, micronizing or dissolution in solvent, may be necessary in order to regenerate the plastics material.

Recyclates are usually conditioned as agglomerate or regrind in the form of fluff, flake, chips, pellets or powder. Addition of modifiers or stabilizers may also be carried out in order to enhance the value of recyclates for subsequent use.

NOTE All separated contaminants, such as those entrained in waste water, should be taken into account and handled properly during these preparatory steps.

### 5.2.3 Feedstock or chemical recycling

Using various processes, well-known within the petrochemical industry, it is possible to convert some plastics into their basic monomeric chemical constituents or into hydrocarbon fractions. These chemicals can then be used either as polymerization feedstock or in other chemical processes.

NOTE 1 The depolymerization technique has already been demonstrated, e.g. for PET obtained from post-consumer packaging sources such as collected commingled plastic bottles where the PET is sorted and subsequently depolymerized, generating monomer feedstock for polymerization and the subsequent manufacture of products such as bottles and fibres. In the case of some acrylic polymers, such as methyl methacrylate, monomer obtained by depolymerization also provides feedstock for commercial polymerization processes.

NOTE 2 Suitable plastics wastes, as well as their derivative hydrocarbon fractions, have been used as reducing agents in blast furnaces and can be used in metal-smelting operations.

### 5.2.4 Biological or organic recycling

Biodegradation is a viable option for the treatment of certain types of plastics waste in what is referred to as organic or biological recycling. Such plastics may be treated by aerobic or anaerobic decomposition processes, after collection and separation of non-biodegradable contaminants. There is generally no need to separate biodegradable contaminants such as foodstuffs or vegetable matter residues from plastics that meet the biodegradability and compostability requirements of standards such as ISO 17088, ASTM D 6400, ASTM D 6868 or EN 13432 (see the Bibliography). In the context of mechanical recycling, however, such plastics may themselves constitute contaminants if they are likely to be subject to thermal degradation and decomposition at the prevailing recycling operating temperatures.

## 5.3 Energy recovery

Energy recovery is a viable option for consideration with plastics materials in the same way as the other recovery options discussed in this International Standard. The direct combustion or co-combustion of plastics wastes in systems such as municipal solid-waste incinerators operating in compliance with regulatory requirements for emissions and ash are notable examples of energy recovery.

NOTE Since most plastics waste is hydrocarbon in nature, it possesses an inherently high calorific value. Because of this, the final utilization of the recovered plastics stream as a fuel can be very effective, provided that adequate attention is given to the control of factors such as combustion by-products. This is demonstrated by the successful application of this recovery option in industrial processes and systems for steam generation, in electricity co-generation as well as in lime and cement kilns.

# 6 Quality requirements

## 6.1 General

Selection of any one of the available recycling options should be based on compliance with the following requirements:

a) the need to minimize adverse environmental impact;

b) prior demonstration of sustainable commercial viability;

c) secure access to viable systems for collection and quality control.

NOTE A suitable traceability system for the target market may be set up based on appropriate standards from the ISO 9000 and ISO 14000 series. If relevant, provisions of ISO 14021 concerning self-declared environmental claims should also be met.

## 6.2 Contamination

Contaminants in recyclates may be polymeric in nature (e.g. the inclusion of different polymers or of different grades and compounds of the same polymer) or non-polymeric (e.g. the presence in the original polymers of various functional additives, reinforcements or fillers such as are defined in ISO 1043-2, ISO 1043-3 or ISO 1043-4). They may also be undefined as in the case of adventitious contaminants such as labels, closures, metal inserts, dirt and residual contents of plastics containers or packaging.

NOTE Relevant information about composition, additives, colorants, fillers and reinforcing materials are also summarized in the material designation standards of ISO/TC 61.

Excessive levels of contamination may degrade the quality of recyclates to the extent of rendering the recovered materials useless because of problems such as deterioration of their physical properties, incompatibility and unacceptability of odour.

Contamination levels may be minimized by a number of means, including the following:

— clear identification and efficient sorting of materials and products;

— careful handling in the collection, separation and sorting phases;

— effective separation and washing processes;

— the use of melt filtering or other filtering systems, where appropriate.

NOTE In some cases, contaminants, if present in airborne dust for example, may necessitate special treatment during recovery operations in order to ensure observance of industrial health and safety requirements.

## 6.3 Visual and aesthetic aspects

In most cases, provided adequate controls and good manufacturing practices are employed, visual and aesthetic properties such as colour, transparency and cleanliness should not be a problem when dealing with recyclate generated from industrial sources of pre-consumer material.

In the case of recovered material obtained from post-consumer sources, however, visual and aesthetic aspects often present major difficulties, especially when the recovered materials or products consist of a wide variety of containers and disposables from diverse sources and applications. Consequently, even if effective separation is accomplished, efficient sorting of the various streams on the basis of colour or other characteristics may be problematical.

### 6.4 Properties of recyclates

The properties of plastics recyclate may be affected by previous exposure to a wide variety of service environments as well as by other factors such as the presence of contaminants, and chemical or structural changes occurring during processing and recycling.

Application of proper sorting techniques, minimization of contaminant levels as well as the observance of appropriate recovery practices will minimize adverse effects on the properties of the recyclate. This may be monitored by conducting tests appropriate to the requirements of the intended application.

Specific material properties of plastics recyclates may be enhanced by the addition of property-modifying additives, including virgin plastics material. Any compounded additives that are present should be disclosed in material specifications as well as in the material safety data sheets required by the relevant local legislation.

### 6.5 Criteria for acceptance

The criteria for the acceptance of recyclate for a specific application are governed by the requirements of the application and by the agreement between the supplier and the user. These may include such information as:

a) proper identification, including the batch numbers of the identified polymer;

b) data on additives, fillers, reinforcements and composition, such as the nature and concentration of contaminants and the content of identified polymers and recyclates;

c) mechanical, physical and chemical properties and packaging requirements.

NOTE The performance-based properties of specified recyclates will have to satisfy the requirements of any specific application. This requirement is of critical importance in order to promote and develop the use of recycled plastics.

## 7 Material standards and product specifications

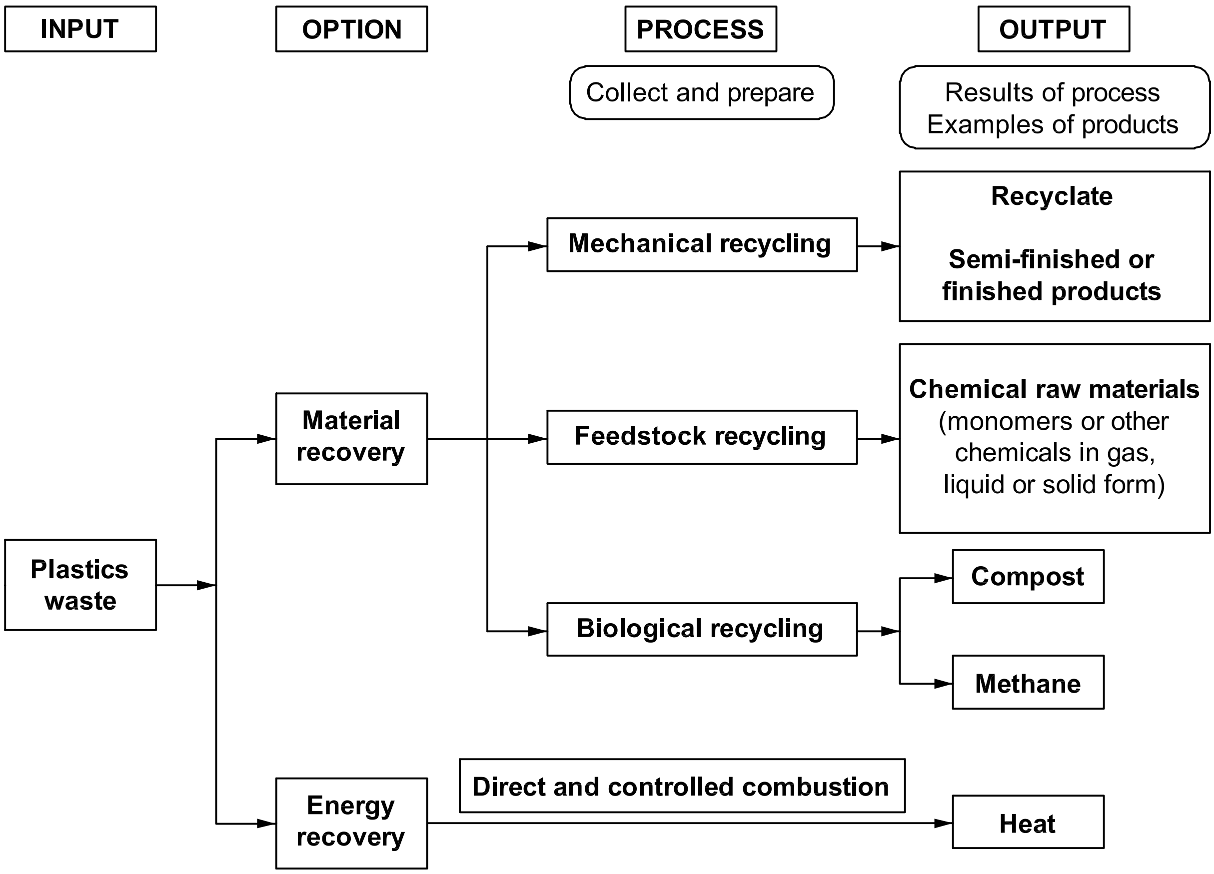
Plastics material standards (including recyclate standards) and product specifications should, wherever possible, be based on performance standards and not on design standards that specify material sources (see ASTM D 7209). Plastics material and product specifications and standards should not prohibit the use of recyclate as an alternative to virgin materials, provided that the recyclate meets or exceeds the specified minimum material and end-use performance criteria. In general, plastics material standards and product specifications should not be compromised to accommodate the use of recyclate. In addition, an adequate and transparent traceability system should be in place in order to guarantee the origin, history and quality consistency of the recyclate.

ISO 17422 should be referred to when any ISO/TC 61 material standards and product specifications relevant to recyclates are developed or revised.

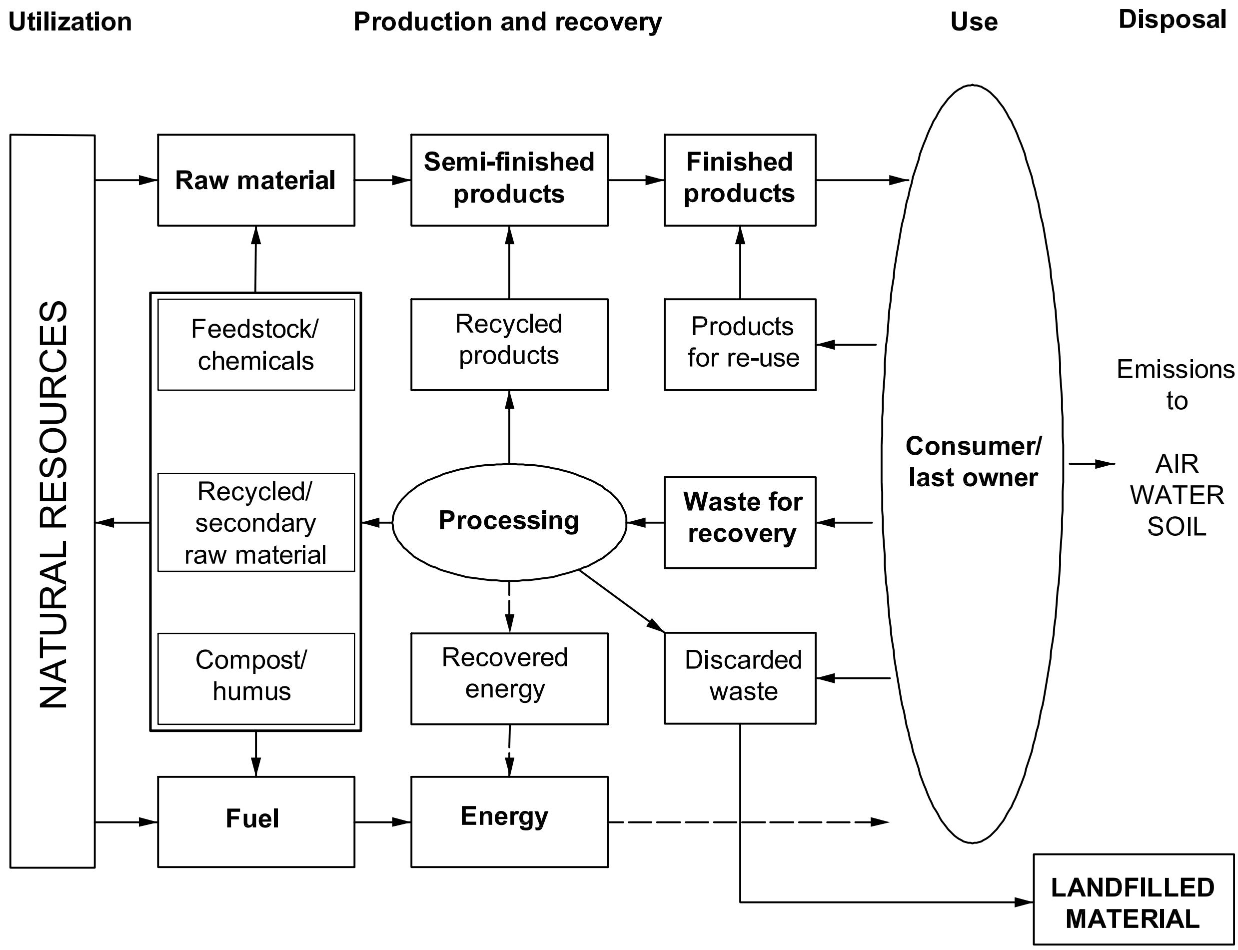
# Annex A
(informative)

## Schematic diagram of some plastics recovery options



# Annex B
(informative)

## Plastics recovery and integrated resource management



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[23] ASTM D 6400, *Standard Specification for Compostable Plastics*

[24] ASTM D 6868, *Standard Specification for Biodegradable Plastics Used as Coatings on Paper and Other Compostable Substrates*

[25] Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste

[26] Council Directive 2000/53/EC of 18 September 2000 on end-of-life vehicles (definition of energy recovery)

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