

Guidelines on “bio-based plastics” in the Eco Mark certification criteria

Eco Mark Office, Japan Environment Association

1. Background of discussion

In 2006, the “Plant-based Plastics and Biodegradable Plastics Study Group” concluded that it was premature to create product categories of bio-based plastics (also referred to as “plant-based plastics,” the same applies hereafter) in the Eco Mark certification criteria because there remained open issues including the unclarified effects of bio-based plastics for reduction of environmental impacts from the results of life cycle assessment (LCA), establishment of sustainable production practices and competing demands for biomass between foods and bio-based plastics. Bio-based plastics became a topic of discussion again in October 2013, when Eco Mark Office had called for a proposal for new product categories of the Eco Mark certification criteria and received a proposal to add “plant-based (non-biodegradable) plastic products and synthetic fiber products” as a new product category. At the time, various types of bio-based plastics were put into practical use, such as bio-based polyethylene (PE, produced mainly from sugar cane) and bio-based polyethylene terephthalate (PET, produced mainly from sugar cane) following bio-based polylactic acid (PLA, produced mainly from corn) that had already moved into volume production. Furthermore, some LCA results of bio-based plastics were published to the public. These drastic changes in the circumstances surrounding bio-based plastics increased consumer awareness and bio-based plastics came into wide use as packaging material, etc. In response to the situations, Eco Mark Office conducted survey on the market trend and a hearing from relevant industries and experts and, in 2015, developed the first guidelines on bio-based plastics through discussions at the Eco Mark Planning and Strategy Committee and the Criteria Deliberation Committee. Then in 2017, the guidelines were applied to polytrimethylene terephthalate (PTT) additionally.

As development and commercialization of various types of bio-based plastics (plastics mixed directly with biomass material in the manufacturing process¹) is

¹ In the context of the guidelines, bio-based plastics mean plastics which are classified into the “identity preserved model (in which the materials or products originate from a single source and their specified characteristics are maintained throughout the supply chain)” or the “segregated model (in which specified characteristics of a material or product are maintained from the initial input to the final output)” specified in ISO 22095 “Chain of custody - General terminology and models” and whose bio-based carbon content can be determined by 14C content measurement specified in ISO16620-2 or ASTM D6866.

gaining momentum in recent years, Eco Mark Office has received several inquiries about the addition of new types of bio-based plastics to the Eco Mark certification criteria. With the establishment of the “Guidelines on ‘bio-attributed plastics’ in the Eco Mark certification criteria” under the mass balance approach on September 1, 2022, Eco Mark Office reviewed and revised the guidelines based on the latest knowledge obtained at the discussion on the bio-attributed plastics guidelines and the recent technological trends.

2. Scope of the guidelines

(1) Products subject to the guidelines

The guidelines apply to the product categories (certification criteria) of finished products produced from bio-based plastics.

Note) The guidelines also cover bio-based synthetic fiber. The word “bio-based plastics” in the guidelines shall be read as “bio-based synthetic fiber” (or “plant-based synthetic fiber”).

The guidelines cover plastics whose bio-based carbon content can be determined by ¹⁴C content measurement. Bio-attributed plastics managed under the mass balance approach are exempt from the application of the guidelines. Biodegradable plastic products are classified into Eco Mark Product Category No.141 “Biodegradable Plastic Products Version 1” (materials for agriculture and forestry, materials for horticulture and plantation, and materials for composting (biodegradable materials that are difficult to recover in the soil, etc., in other words, materials that are installed outdoors intentionally and continue to exhibit their functions in the environment for a certain period)).

(2) Types of plastics subject to the guidelines

A wide variety of bio-based plastics are commercially available or under development. As a first step at the first issuance in 2015, the guidelines covered bio-based polylactic acid (PLA), bio-based polyethylene (PE) and bio-based polyethylene terephthalate (PET) that had been available on a certain size of market with potential for growth, that had data from life cycle assessment and that had been confirmed through quantification analysis to have effects for reducing environmental impacts. Then in February 2017, polytrimethylene terephthalate (PTT) was added to the scope of application of the guidelines.

The first edition of the guidelines issued in 2015 stated that “the application of the guidelines to other types of bio-based plastics (such as partial revision of certification criteria) will be discussed in consideration of the trends of technological development and market and the needs of industries if a scheme to obtain verifiable

data such as LCA is established and sufficient information on supply chains, from cultivation of plant materials to manufacturing of raw material plastics, is obtained.” With the rapid progress in development of bio-based plastics, the guidelines were revised in 2022 to allow for certification of products containing any types of bio-based plastics, in addition to the four mentioned above, if they meet the certification criteria items.

3. Terms and definitions

The terms and definitions of bio-based plastics used in the guidelines are drawn from the definitions in the “Roadmap for Bioplastics Introduction” developed jointly by Ministry of the Environment (MOE), Ministry of Economy, Trade and Industry (METI), Ministry of Agriculture, Forestry and Fisheries (MAFF), and Ministry of Education, Culture, Sports, Science and Technology (MEXT); ISO 16620-3“Plastics - Biobased content - Part 3: Determination of biobased synthetic polymer content”; the definition of BP mark of Japan BioPlastics Association; and the definition of Biomass Mark of Japan Organics Recycling Association.

Biomass	Biomass is a term originally used in ecology to describe the amount (mass) of living organisms (bio). In this Guideline, it refers to resources that are organic matter-derived from plants and animals, excluding fossil fuels. (source: Roadmap for Bioplastics Introduction, January 2021 (Ministry of the Environment, Ministry of Economy, Trade and Industry, Ministry of Agriculture, Forestry and Fisheries, Ministry of Education, Culture, Sports, Science and Technology))
Bio-based plastic	Plastics that are produced from bio-based synthetic polymer derived from renewable organic resources such as plants. In particular, plant-derived plastics are also called plant-based plastics. For example, polyethylene (PE), polyethylene terephthalate (PET), polylactic acid (PLA) and polytrimethylene terephthalate (PTT) are offered in the form of bio-based plastics. *Bio-based plastic means plastic whose bio-based carbon content can be determined by 14C content measurement specified in ISO 16620-2 or ASTM D6866.
Bio-based synthetic polymer	Polymer obtained through chemical and/or biological industrial process(es) wholly or partly from biomass resources. It refers bio-based synthetic polymer defined in ISO 16620-1 3.1.4.
Biobased synthetic	Amount of biobased synthetic polymer present in the

polymer content	product(or a part designated in the certification criteria) Not including natural polymers such as starch, etc.). It refers biobased synthetic polymer content defined in ISO 16620-1 3.1.5.
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As for the definition of “bio-based plastic,” specific types of bio-based plastics may be designated as certification criteria for product categories in which limited types of bio-based plastics can be used in products or those which have any special reasons, for example, as required by the “Designated PET Bottle Voluntary Design Guideline (developed by the Council for PET Bottle Recycling)” stated in Eco Mark Certification Criteria D. “PET Bottles,” Product Category No.140 “Containers and packaging for food, beverages, cosmetics, household goods, etc.”

(Explanation)

The first edition of the guidelines issued in 2015 used the term “plant-based plastic.” At the time of revision in 2022, the term was revised to “bio-based plastic” in line with the definition used in the “Roadmap for Bioplastics Introduction” developed jointly by MOE, METI, MAFF and MEXT. The Roadmap uses the term “bioplastics” as a collective designation of “bio-based plastic” and “biodegradable plastic.” Caution should be exercised to avoid confusion in writing. For plastics produced from bio-based synthetic polymer derived from plants, a kind of bio-based plastics, the term “plant-based plastic” (or “plant-based synthetic fiber) can continue to be used as a correct designation.

4. Certification criteria and Certification Procedure

4-1. Background of definition of environmental criteria and certification procedure

4-1-1. Criteria for the bio-based synthetic polymer content

(1) The bio-based synthetic polymer content in bio-based plastic (raw resin) shall be XX percent or more.

(Or the bio-based synthetic polymer content in a product shall be XX percent or more.)

[Certification Procedure]

Certificates indicating the calculated biobased synthetic polymer content in the product (FormX) shall be submitted. For the bio-based plastic (raw resin) thereof, measurement results of the biobased synthetic polymer content calculated with the method specified in ISO 16620-3, using measurement results of the biobased carbon content and element composition by the 14C method specified in ISO 16620-2 or ASTM D6866 shall be mentioned. Should there be any deviation of 10% or higher between the measurement results and the biobased synthetic polymer content in the standard, a description of a reason(s) therefor shall also be included. The measurement results of the

biobased carbon content shall be submitted as an attached document. In addition, for appropriate maintenance of the biobased synthetic polymer content after certification, any of the following certificates shall be submitted.

- An explanatory document stating that measurements of the content of biobased carbon will be regularly carried out, and that measurement results can be disclosed as per a request of the Eco Mark Office; and
- A certificate that the Applicant has been audited or certified by a third party for management of the biobased synthetic polymer content.

(Explanation)

The criteria for the bio-based synthetic polymer content in a product influences the characteristics of product. The “Criteria Development Committee” and the “Criteria Deliberation Committee” of individual product categories discuss the criteria based on the principles below:

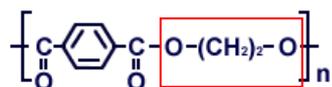
(1) Specifying types of bio-based plastics that are expected to be used in the product categories

PE, PET, PLA, PTT and other types of bio-based plastics are expected to be used as described in Section 2.(2).

(2) Methods to calculate the bio-based synthetic polymer content

The bio-based synthetic polymer content is determined by calculating the organic carbon content per unit molecular weight in accordance with ISO 16620-3. 14C content measurement is conducted in accordance with ISO 16620-2 to provide supplementary information to claim that the plastic is produced from biomass material.

PE and PLA are 100-percent bio-based plastics that are produced from a single type of bio-based monomer. Bio-based PET, on the other hand, is produced through polymerization of two types of monomers, fossil-based terephthalic acid (TPA) and bio-based ethylene glycol (EG) (partially bio-based) or bio-based TPA and bio-based EG (100-percent bio-based). As shown in the chemical structural formula shown below, if all ethylene glycol monomers are derived from biomass source in partially bio-based PET, the part of structural formula enclosed in the red box corresponds to biomass material. Accordingly, the bio-based synthetic polymer content in bio-based PET is 31%, a ratio of molecular weight of EG (C₂H₄O₂: 60) to PET, the basic unit (C₁₀H₈O₄: 192).



(3) Defining the criteria for the bio-based synthetic polymer content in a product

It is necessary to define the criteria for the bio-based synthetic polymer content in view of various factors unique to each bio-based plastic.

The effects of bio-based plastics for reducing environmental impacts are seen most apparently in mitigation of global warming. According to an LCA calculation of bio-based plastics, it was estimated that GHG emissions were reduced by 70-74 percent by bio-based PE and 27 percent by bio-based PET in comparison with fossil-based ones. Another report said that bio-based PLA had the energy consumption of 42.2 MJ/kg to 20.57MJ/kg in the manufacturing process and that produced GHG emissions of 1.24kg-CO₂eq./kg.

It is desirable to define the bio-based content criteria based on LCA results which substantially claim the effects for reducing GHG emissions. Practically, it is necessary to take technological limitations, the market trend (the existing bio-based synthetic polymer content) and the political intent into consideration in the discussion on the criteria with the effects for reduction of GHG emissions in mind.

As an example of technological limitations, it is possible to produce nearly 100-percent bio-based PE bottles (molded products) while some bio-based LDPE films contain merely about 15 percent of biomass material. Even for products with general chemical composition such as school uniforms, it is necessary to discuss a technologically-feasible range of bio-based content criteria.

The criteria defined by domestic and international laws and regulations (the Act on Promoting Green Procurement, etc.) can serve as reference (the Eco Mark certification criteria are stricter than the judgment criteria of the Act on Promoting Green Procurement).

(4)Other considerations

To maintain the reliability of certification, Eco Mark Office conducts conformance test on certified products randomly chosen under contract with third-party testing laboratories. Eco Mark Office will also conduct similar test on bio-based plastic products to ensure the reliability of certification.

The table below shows the criteria for the bio-based synthetic polymer content defined for individual product categories as of 2022 based on the principles (1) to (3) above (the table shows typical examples of product categories):

Product categories		Criteria
No.112 “Stationery/Office Supplies” No.128 “Household commodity” No.130 “Furniture”		25% or more
No.101, No. 103-105 “Textile products” (assuming that they are produced from bio-based PET)		10% or more
No.140 “Containers and packaging material”	Molded product, etc.	25% or more
	Molded product, etc. (produced from bio-based PET)	10% or more

	Laminated packaging material	10% or more
	Laminated packaging material (produced from bio-based PET)	3% or more

Under the Eco Mark certification scheme, the criteria for the bio-based synthetic polymer content are defined as 25% or more with the “evaluation criteria” of the Act on Promoting Green Procurement and the criteria of other domestic schemes as a guide. For the product categories that are usually produced from partially bio-based PET, the criteria are defined as 10% or more (3% or more for laminated packaging material), approximately 30 percent of the general criteria of 25% or more.

With the revision of the guidelines in 2022, products produced from any types of bio-based plastics, in addition to PE, PET, PLA and PTT, may be applied for Eco Mark certification. For product categories for which the bio-based content criteria have been defined, the existing criteria continue to be applied. If it is deemed inappropriate to apply the same bio-based content criteria as those for PE and PET (for reasons of technological limitations, etc.), the Criteria Development Committee and the Criteria Deliberation Committee may discuss partial change of the existing criteria and/or establishment of different criteria.

4-1-2. Sustainability criteria for biomass supply chains

- (2) Sustainability of biomass mixed into plastic as raw material shall meet the requirements of [Appendix 1\(a\)](#) “Sustainability checklist of bio-based plastics (raw resin)” and the supply chains of the biomass shall be identified. If the biomass material has underwent third-party audit or certification for sustainability (an international sustainability certification for plastics, etc.), the result of audit or certification may be submitted as evidence instead of [Appendix 1\(a\)](#).

[Certification Procedure]

An applicant shall submit documents on the source of biomass material (a cultivation area (country, state, city, etc.), a generation process of waste and residues, etc.), a manufacturing flowchart (of raw resin) (describe the name of manufacturers of fundamental chemicals (monomers), polymers, etc.), and checklists or an evidence of a third-party audit or certification.

To the application for Eco Mark certification of products containing bio-based plastics or biomass materials that have never been certified for use, Eco Mark Office may request the applicant (or the plastic supplier) to provide information on the chemical composition of the products (see [Appendix 1\(b\)](#)).

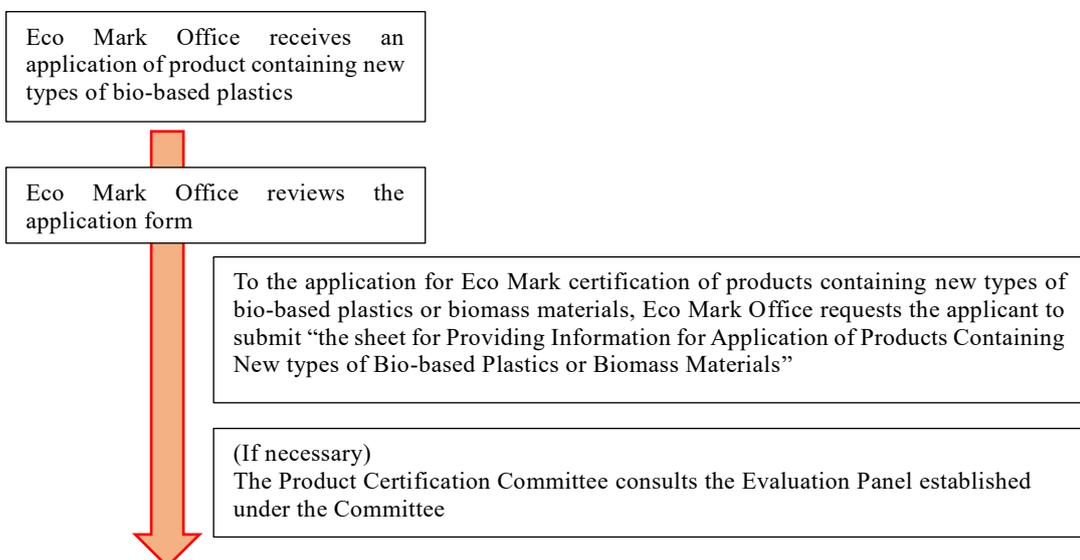
(Explanation)

Bio-based plastics have a potential of reducing the consumption of fossil resources

and GHG emissions while possibly posing more environmental impacts if they have great influences on the ecosystem or consume a great amount of energy in their supply chains from cultivation of plants to production of plastics. Therefore, it is critical to ensure traceability of bio-based plastics (plastic materials). Sustainability considerations in supply chains are listed in [Appendix 1 \(a\)](#) as the checklist.

The guidelines used the sustainability checklist of “bio-attributed plastics” developed in September 2022 as the checklist assumes a wide variety of biomass materials. If an applicant for Eco Mark certification has undergone a third-party audit or certification process for biomass sustainability (an international certification scheme that verifies sustainability of plastics, etc.), the guidelines allow the applicant to submit the result instead of [Appendix 1 \(a\)](#).

For new types of bio-based plastics and biomass materials, any sustainability risks may have not come to the surface yet. To address those risks appropriately, to the application for Eco Mark certification of products containing bio-based plastics or biomass materials that have never been certified for use, Eco Mark Office may request the applicant (or the resin supplier) to provide information on the chemical composition of the products (to submit [Appendix 1\(b\)](#) the Sheet for Providing Information for Application of Products Containing New types of Bio-based Plastics or Biomass Materials). The Product Certification Committee will assess the sustainability of bio-based plastics applied for certification based on the checklist submitted by the applicant. The Product Certification Committee may conduct additional study or consult with the Evaluation Panel established under the Committee as necessary. In this case, a longer assessment period will be taken than usual. If the Product Certification Committee (including the Evaluation Panel) deems it appropriate to revise the checklist after it reviewed the information provided by the applicant, the Criteria Deliberation Committee will discuss and revise the checklist (the review of the application will be put on hold until the checklist is revised).



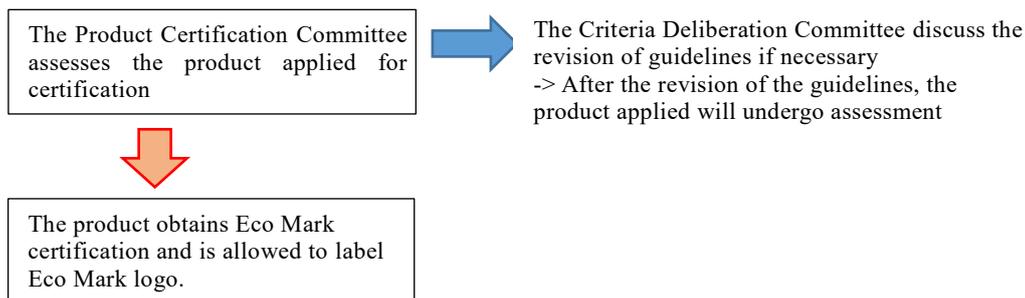


Figure. An assessment flowchart of product containing new types of bio-based plastics

Each requirement of [Appendix 1 \(a\)](#) Sustainability checklist is defined for the following reasons:

- No.1: In addition to the perspectives of preservation of ecosystem, this item is required based on the comment that any changes to the form or nature of land with high biodiversity value or high carbon accumulation (forests or peatlands) may cause an increase in GHG emissions
- No.2: Genetically-modified agricultural products have the advantages of enhancing pest resistance and reducing the use of agricultural chemicals while requiring consideration to the influences on the ecosystem and safety. Japan has signed the Convention on Biological Diversity and the Cartagena Protocol on Biosafety and, in 2004, enacted the “Cartagena Act” that requires prior assessment on the influences of genetically-modified organisms (GMOs) on biodiversity and checking measures to prevent release of GMOs into the environment according to the use. Consideration should be given to countries and regions that have no such schemes. There were no reports stating that genetically-modified sugar cane was used to produce bio-based PE and bio-based PET. On the other hand, corn (dent corn) used to produce PLA is supplied from both GMO and non-GMO sources. Accordingly, the guidelines require safety assessment if GMOs are used as ingredients of bio-based plastics.
- No.3: The guidelines require the monitoring of use of fertilizer as the excessive use and inappropriate management of fertilizer leads to acidization or over-fertilization of soil.
- No.4: Plant cultivation requires additional water consumption. The guidelines require the monitoring of water usage to address competing demands for use between agriculture and drinking water and the use of groundwater. No.8: It is required in view of the environmental effects of wastewater from the fermentation process in sites. It also requires compliance with environmental laws and regulations in monomer/plastic manufacturing processes.
- No.5: The guidelines require the use of recycled material to reduce waste, promote the effective use of resources and avoid competing demands for plants

for use between bio-based plastics and foods (recycled material means valuable used goods and by-products that can be or are likely to be used as raw material as defined by the “Act on the Promotion of Effective Utilization of Resources”). However, it is often difficult to source recycled material due to the domestic situations and the market trend. Recycle material should be used preferentially as long as it can be sourced locally.

- No.6: It is required as biodegradable waste such as fermentation residue (fermentation waste) may cause a significant increase of GHG emissions if it may produce methane, greenhouse gas with a high global warming potential.
- No.7: It is required as the use of non-fossil energy and renewable energy helps reduce environmental impacts in manufacturing processes.

4-1-3. Requirements for the effects for reducing environmental impacts

(3) It shall be confirmed through life cycle assessment (LCA) that the bio-based plastic (raw resin) does not cause an increase of GHG emissions (in terms of CO₂) throughout the product life cycle in comparison with a resin to replace with.

[Certification Procedure]

An applicant shall submit the result of LCA conducted by a third-party. (An applicant shall provide the LCA result and the calculation conditions. If the applicant has underwent LCA under an international sustainability certification scheme for plastics, it may submit the data instead. The applicant may submit an academic paper published on a journal as an evidence as long as the same materials and/or manufacturing processes (sites) are mentioned in the paper as those used for the product applied for certification.)

(Explanation)

Each bio-based plastic is produced from a different plant through a different synthetic process in a different country. The guidelines require the check items mentioned above with the intent of verifying the reduction of fossil resource consumption, energy consumption and GHG emissions through life cycle assessment as the effects of bio-based plastics for reducing environmental impacts. If any minor differences between the bio-based plastic (raw resin) applied for certification and the existing LCA result (including published papers) are found on system boundaries, the gaps in emissions intensity, etc. caused by the differences should be compensated before assessment as necessary. Life cycle assessment is conducted in accordance with ISO 14040 “Environmental management - Life cycle assessment - Principles and framework” and ISO 14044 “Environmental management - Life cycle assessment – Requirements and guidelines.”

With the revision in 2022, the guidelines require life cycle assessment conducted by a third-party organization with the intent of enhancing transparency and reliability of certification. Third-party life cycle assessment includes verification results obtained under international sustainability certification schemes and joint studies and reviews

with third-parties. An academic paper published on a journal may be used instead of those evidences as long as the same materials and/or manufacturing processes (sites) are mentioned in the paper as those used for the product applied for certification. If a bio-based plastic product undergoes the same production scenario after the point of production of plastic material as that for a fossil-based plastic product, an LCA result up to the point may be submitted instead. LCA results of products that has obtained Eco Mark certification by November 2022 are accepted as evidences even if the LCA results do not meet the requirement of third-party assessment.

As of 2015, the guidelines allowed a carbon offset scheme to offset an increase of carbon emissions. With the revision in 2022, however, it was deleted from the guidelines as it was not in line with the intent of life cycle assessment.

4-1-4. Requirements for Restriction and Control of Hazardous Substances

Out of the plastics covered by the guidelines issued in 2015, bio-based PE and PET have the same chemical composition and properties as those of fossil-based one, and therefore, they are subject to the existing guidelines on plastics in Eco Mark certification. Bio-based PLA, on the other hand, has different properties from fossil-based PLA as a single substance. According to the survey on five product categories including “Stationery/Office Supplies” conducted in 2015, bio-based PLA is used in a similar manner to fossil-based PLA and produced with additives that are used commonly in general fossil-based plastics. Therefore, bio-based PLA is assessed in the same manner as fossil-based PLA in the five product categories.

Any existing guidelines on plastics are applied to product categories in which the certification criteria for bio-based plastics will be defined.

If no existing guidelines on plastics are defined, the criteria for chemical components of plastic products defined for product categories such as “Plastic Products”, “Stationery/Office Supplies” and “Household Commodity” are applied.

If it is inappropriate to apply the existing guidelines on plastics in Eco Mark certification, it is possible to apply the criteria for BP mark of Japan BioPlastics Association or the criteria for Biomass Mark of Japan Organics Recycling Association. In both cases, plastic products in contact with food, food packaging material, etc. are subject to the requirements for hazardous substances defined by the “Specifications and Standards for food and food additives, etc.” (Notification of Ministry of Health and Welfare No. 370, 1959).

Bio-based plastics (plastic material) used in fiber products are not subject to the existing guidelines on plastics mentioned above. They are subject to the guidelines on fiber products in Eco Mark certification.

4-1-5. Requirements for recyclability after use

It is necessary to verify if bio-based plastics do not inhibit recycling of products in the existing collection and recycling process.

Out of the plastics covered by the guidelines issued in 2015, bio-based PE and PET have the same chemical composition and properties as those of fossil-based one and cause no problems in the existing collection and recycling process. Bio-based PLA has chemical composition and properties different from those of fossil-based PLA, but can undergo material recycling, chemical recycling and thermal recovery as with fossil-based PLA. To perform advanced recycling, it is critical to separate bio-based PLA from other types of plastics by possible means such as specific gravity and infrared spectroscopy. To this end, it is important to provide the information on chemical composition on a product label as with fossil-based plastics. To apply for Eco Mark certification for products containing new types of bio-based plastics or biomass material, it is required to submit the information provision sheet as shown in [Appendix 1 \(b\)](#). The sheet includes a question about “Disposal after use – Issues in disposal and recycling in comparison with fossil-based plastics to replace with (possible disposal method, etc.)” If the Product Certification Committee finds any serious issues in disposal and recycling from the answer to the question and considers that the product under application may cause environmental protection issues, the Committee may not give an Eco Mark certification to the product in accordance with the provision of Chapter III “7. Requirements for Eco Mark Product Certification,” Regulations for Eco Mark Program Implementation.

The “Criteria Development Committee” for individual product categories discusses the need of certification criteria and evidences as each product category has different collection and recycling systems.

4-1-6. Requirements for labeling of biodegradable plastics produced from biomass material

Biodegradable plastics produced from biomass material shall be provided with a statement on biodegradability that “the plastic product was certified as bio-based plastic and not assessed for biodegradability.” This labeling requirement does not apply to those which have obtained certification under the product category No.141 “Biodegradable Plastic Products Version 1.”

4-1-7. Competing demands for use between foods and bio-based plastics

Plants and crop used to produce bio-based plastics account for an extremely small portion of the total production (sugar cane and corn are used to produce bio-based PE, PET and PLA). There are no competing demands for use between bio-based plastics and foods, but this is an important viewpoint for future discussion. If production of bio-based plastics increases rapidly in the future, it will be necessary to discuss

indirect influences such as the conversion of land used to produce edible plants and crop.

To address these issues, research and development is underway on the second generation bioethanol (bioethanol produced from non-edible biomass (cellulose material such as wood and straw) that does not compete directly against foods for raw material. However, there remain issues toward commercial use such as technological development and price competitiveness. It is desired to secure stable sugar sources that meet the demands for both food supply and production of bio-based plastics at the earliest possible time.

Revision history

April 1, 2015: Established the guidelines

February 1, 2017: Added PTT to the types of plastics subject to the guidelines

December 15, 2022: Revised the guidelines (the change of term from “plant-based plastics” to “bio-based plastics, changes made with the expanded scope of plastics covered by the guidelines, etc.)

Appendix1(a) Sustainability checklist of Bio-based Plastic (Raw Resin)

No	Purpose	Request (Item that must be realized)	Subject	Realized	Implementation Method (Check off all relevant items.)
1	Prevention of global warming, conservation of the natural ecosystem	Hasn't the farm land where plants are cultivated been converted from valuable land in biodiversity or land with high carbon storage (forests, peatland, etc.) since 2008?	Farm land	<input type="checkbox"/> Not converted <input type="checkbox"/> Converted <input type="checkbox"/> Not applicable due to residues or waste	<input type="checkbox"/> Confirmed the laws and regulations concerning the land conversion for the site. <input type="checkbox"/> Gained the understanding of the actual condition of the site through on-site investigation or hearings. <input type="checkbox"/> Defined and released the guideline for procurement of plants. Alternatively, conforming to the guideline of an independent third party. - Name of the guideline: - Location of release: <input type="checkbox"/> Also using the certification system of an independent third party, regarding the procurement of plants. -Name of certification system: <input type="checkbox"/> Others (Describe specifically):
2	Conservation of the ecosystem	If the Applicant uses the genetically modified crop as a raw material, has the Applicant assessed ensuring of safety?	Farm land	<input type="checkbox"/> Yes/ <input type="checkbox"/> No/ <input type="checkbox"/> Not applicable (GM crops Not used) <input type="checkbox"/> Not applicable due to residues or waste	<input type="checkbox"/> Confirmed the laws and regulations concerning genetically engineered crop on the site. <input type="checkbox"/> Gained the understanding of the actual condition of the site through on-site investigation or hearings. <input type="checkbox"/> Defined and released the guideline for procurement of plants. Alternatively, conforming to the guideline of an independent third party. - Name of the guideline: - Location of release: <input type="checkbox"/> Also using the certification system of an independent third party, regarding the procurement of plants. -Name of certification system: <input type="checkbox"/> Others (Describe specifically):

Appendix 1 (b) Sheet for Providing Information for Application of Products Containing New types of Bio-based Plastics or Biomass Materials

Month/Day/Year

Submit to: Eco Mark Office, Japan Environment Association

Company name: _____

Department: _____

Name: _____

E-mail: _____

1. Information on bio-based plastic used in a product applied for Eco Mark certification

Item	Description
Type of plastic (PE, etc.)	
Chemical structural formula	
Major use (molded product, fiber)	
Launch onto the market and production volume of bio-based plastic	<input type="checkbox"/> Already put on the market (<input type="checkbox"/> Japan/ <input type="checkbox"/> Overseas)
	<input type="checkbox"/> Not yet (the scheduled time of launch Month/Year)
	Production volume (actual, planned or estimated) tons (Year)
Manufacturer of bio-based plastic (and the URL of website) (Describe the name of manufacturer of bio-based plastic proposed in the form in addition to the applicant)	
Fossil-based plastic to be replaced with the bio-based plastic	
Manufacturing process chart from raw material to production of plastic (Description of processes from acceptance of raw material to production of monomer and plastic, with or without of fermentation process, etc.)	May be described in an attached sheet
100-percent bio-based/ Partially bio-based	<input type="checkbox"/> 100-percent bio-based (the bio-based synthetic polymer content is 100 percent) <input type="checkbox"/> Partially bio-based -> The maximum bio-based synthetic polymer content that can be mixed into the bio-based plastic [%]
Management under the mass balance (MB) approach	<input type="checkbox"/> Plastic directly mixed with biomass/ <input type="checkbox"/> MB approach *Bio-based plastics managed under the MB approach are not covered by the guidelines.
Biodegradability	<input type="checkbox"/> Yes / <input type="checkbox"/> No
Disposal after use Issues in disposal and	

recycling in comparison with fossil-based plastics to replace with (possible disposal method, etc.)	
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2. Information on biomass material

Item	Description
Type of biomass material (name of plant, etc.)	
Cultivation area (country, state, city, etc.) or the generation process of waste and residues, etc.	
Production or generation volume of biomass material	
Main use of biomass material (principal product or by-product)	
State of cultivation land (for plants, describe type of land such as peatland)	
Possible influences on biomass material if production of bio-based plastic increases in the future (Influences on other uses of the biomass, influences caused by rapid expansion of production of the biomass, etc.)	
Competing demand against foods	
Use of recycled material in production of bio-based plastic (If recycled material can be used, describe the source, collection methods, management under EU RED, etc.)	

3. Information on sustainability of biomass material

Item	Description
Sustainability certificates and initiatives of biomass material (RSPO, ISCC, etc.) and acquisition (If acquired, describe the name and detailed criteria)	
Any sustainability issues pointed out by NGOs or researchers regarding the cultivation of biomass material (If any, describe the details and the URL of website of NGOs or researchers)	
Any other concerns about the biomass material	

4. Others

Item	Description
Other bio-based plastics produced from the same biomass material (if any, describe the name of bio-based plastics)	
Others	

* Attach relevant documents such as company profile of manufacturer.

The information provided in this form will be used as reference for examination of Eco Mark certification by Eco Mark Office and relevant committees only. The Certification Committee will assess the sustainability of bio-based plastic based on the information provided in the form. The Certification Committee may conduct additional study or consult with the Evaluation Panel established under the Committee as necessary. In this case, a longer assessment period will be taken than usual.