



MARKET STUDY REPORT ON THE RECYCLING OF USED PLASTIC BOTTLES

Japan Fair Trade Commission

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Chapter 1. Purpose of Survey

1. Purpose of Survey

Plastic bottles are widely used as containers for beverages and other products, and so are a familiar material to consumers. In addition, the used plastic bottles are recycled after being separately collected in most municipalities, and recycling efforts are also a part of consumers' daily lives.

Recycled plastic resins are produced from used plastic bottles, which are used as raw materials for sheets, films, fibers, plastic moldings, and other products. In Japan, since the Law for Promotion of Sorted Collection and Recycling of Containers and Packaging (Law No. 112 of 1995) (hereinafter referred to as the "Containers and Packaging Recycling Law") came into effect, the recycling of used plastic bottles has made great progress. The recycling rate of used plastic bottles in 2021 is estimated to be as high as 86%.

In recent years, there has been a growing focus on efforts to realize a green society (a society that balances economic growth with a reduction in environmental impacts). In the context of global issues¹ to promote recycling, efficiently use resources, and reduce the environmental impacts associated with used plastic bottles, bottle-to-bottle² measures are expanding to recycle used plastic bottles back into plastic bottles to contribute to the further reduction of environmental impacts and to raise awareness among local residents. Specifically, when municipalities decide where to sell the used plastic bottles they collect on their own, there has been a trend toward designating how bottles will be used after selling them through bottle-to-bottle measures, including as a way to educate residents. In addition, beverage manufacturers that produce and sell products using plastic bottles are also working with municipalities and other entities to implement bottle-to-bottle measures, along with recyclers that produce recycled plastic resin using used plastic bottles as raw materials.

¹ The Sustainable Development Goals (SDGs) adopted at the UN Summit in 2015 includes a target under Goal 12 to "Ensure sustainable consumption and production patterns," specifying plans to, "By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse." Another target under Goal 9, "Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation," states to, "By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes."

² Manufacturing new plastic bottles from used plastic bottles as raw materials. See Chapter 3-2 below (page 24) for details.

In the past, used plastic bottles were disposed of on consignment by paying a fee. However, many are currently traded via onerous contracts. In other words, distribution channels seem to be changing and diversifying due to a shift toward selling plastic bottles as a resource and new initiatives such as those described above. Also, it is not always clear how the plastic bottles not collected by the municipalities are traded or recycled.

In light of this situation, the Japan Fair Trade Commission (JFTC) decided to survey transactions related to the recycling of used plastic bottles in order to grasp the actual status of transactions pertaining to recycling used plastic bottles as well as to show its approach under the Antimonopoly Act and competition policies to support the realization of a green society.

2. Method of Survey

The survey was conducted from February to September 2023 using the methods described below.

(1) Questionnaire Survey

A. Municipalities

A questionnaire was conducted to survey 1,741 organizations³ in all municipalities (1,391 of the 1,741 organizations responded⁴; the response rate was 79.9%).

B. Beverage Manufacturers (Specified Business Operators)

Beverage manufacturers are defined as specified business operators who use or manufacture plastic bottles (specified business operators⁵ are defined in the

³ "Municipalities" in this report include special wards and exclude six villages in the northern territories. The same applies hereinafter.

⁴ Since the disposal and other tasks of general waste including the used plastic bottles (see Chapter 4-1 (1) (page 29) below) are affairs of the municipalities, there are some municipalities that have established administrative associations or wide-area unions to jointly handle some or all of the said affairs. Therefore, in cases where the municipalities subject to the questionnaire survey partially conduct the administrative work related to the disposal and other tasks of used plastic bottles in the administrative associations or the wide-area unions, there may be cases where responses are partially obtained from such administrative associations (the number of respondents, partially including such administrative associations, is 1,496 organizations).

⁵ For example, beverage manufacturers that sell beverages in the plastic bottles fall into this category. See Chapter 3-1 (3) (page 14) below for details.

Containers and Packaging Recycling Law, hereinafter referred to as "beverage manufacturers"). The questionnaire surveyed 1,139 persons⁶ in the following (749 persons responded; the response rate was 65.8%).

C. Recyclers

The questionnaire was conducted to survey 47 business operators⁷ that manufacture recycled plastic resin from used plastic bottles (hereinafter referred to as "recyclers") (42 persons responded; the response rate was 89.4%).

(2) Voluntary Interviews

Voluntary interviews were conducted with a total of 106 persons as listed below:

- Municipalities⁸: 50 entities
- Collection and transport services/intermediate treatment business operators: 5 entities
- Recyclers: 27 entities
- Beverage manufacturers: 8 entities
- Generators of used plastic bottles⁹: 6 entities
- Business operator associations and similar: 5 entities
- Experts: 5 entities

⁶ Business operators that are publicized on the website of the JCPRA as obligated recyclers of the plastic bottles in FY2021 (business operators that have concluded a recycling consignment contract with the JCPRA and paid the consignment fee in full through the designated juridical person route described in Chapter 3-1 (4) A (page 15) below).

⁷ Business operators that have been registered as a business operator for recycling the used plastic bottles by the JCPRA during the period from the first half of FY2019 to the first half of FY2023.

⁸ Hereinafter, the term, "municipality" in this report partially includes administrative associations or wide-area unions.

⁹ Business operators that generate and discharge used plastic bottles as a result of business activities, for example, a railroad company that acquires plastic bottles discarded by passengers at the station. Hereinafter, the term "generator" is simply used to refer to a business operator that discharges used plastic bottles.

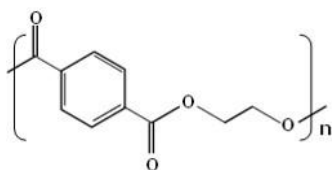
Chapter 2. Overview of Plastic Bottles

1. Overview

A plastic bottle is a container whose body is made of polyethylene terephthalate ($(C_{10}H_8O_4)_n$ ^[10] (hereinafter referred to as "plastic resin") as a single raw material.

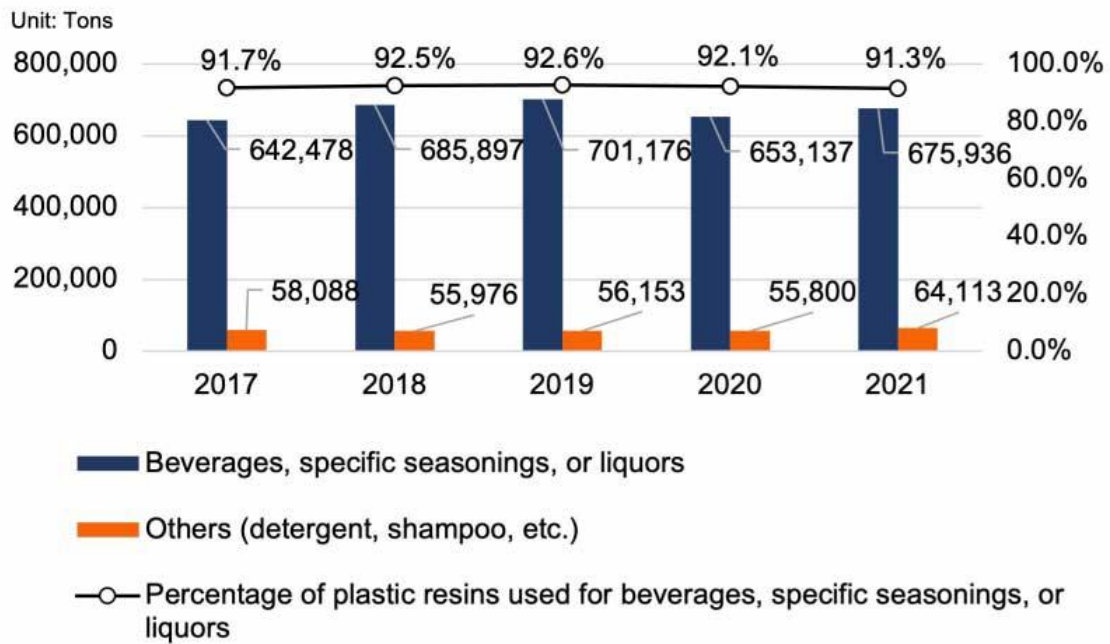
Plastic bottles came to be used as containers for soy sauce in Japan in 1977 and have since become widely utilized for products containing food such as soft drinks, fruit juices, milk and milk beverages, alcoholic beverages, and seasonings, as well as non-food products such as detergents, shampoos, cosmetics, and pharmaceuticals. Such widespread applications result from plastic bottles being lighter than glass bottles for equivalent volumes, not being prone to breaking when dropped, and because they are easily processed and come in a wide variety of shapes and sizes. In fact, as illustrated by the percentage of demand for plastic resins by product in Figure 1, the demand for plastic resins used in plastic bottles for beverages, specific seasonings, and alcoholic beverages^[11] accounted for about 91.3% of the total demand in 2021.

¹⁰ Made from terephthalic acid, which is made from plasticoleum, and ethylene glycol, which is chemically reacted under high temperature and high vacuum. The structural formula is as shown below.



¹¹ As described in Section 3 (1) (page 7) below, plastic bottles for these purposes are usually stamped or marked with the identification mark shown in Figure 4 (page 7) and are subject to recycling obligations under the Containers and Packaging Recycling Law.

Figure 1: Percentage of plastic resin used in plastic bottles by application



Source: Prepared by the JFTC based on "Annual Report on Recycling Plastic Bottles 2022" by the Council for PLASTIC Bottle Recycling

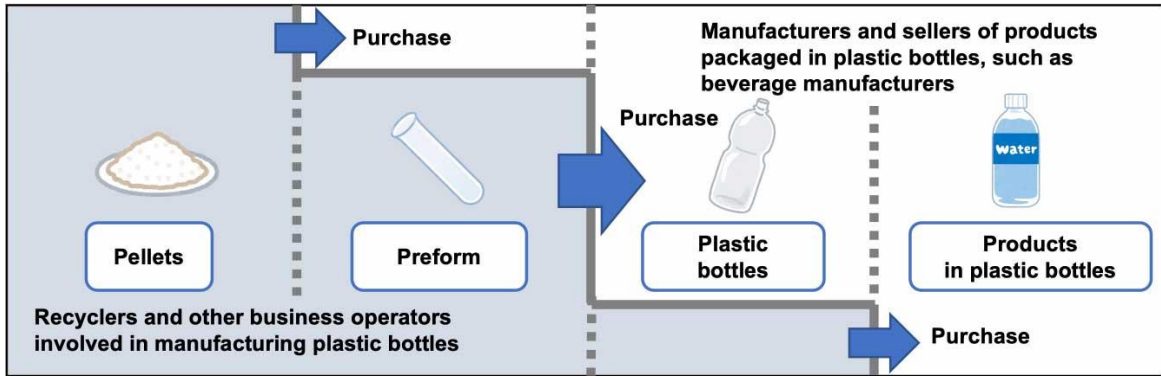
2. Manufacturing of Plastic Bottles

Plastic bottles are ultimately used as containers to be filled with contents produced by manufacturers or sellers of bottled products. In some cases, such manufacturers and sellers purchase plastic bottles themselves from plastic bottle manufacturers and sellers. In other cases, they purchase preforms¹² or pellets¹³, which precede plastic bottles, and use them to manufacture plastic bottles at their own factories and other facilities to increase efficiency in terms of transportation costs.

¹² An intermediate product manufactured by injecting and molding plastic resin, which precedes plastic bottle in the manufacturing process.

¹³ A granulated form of plastic resin.

Figure 2: Procurement channels of plastic bottles in manufacturers and sellers of products contained in plastic bottles



Source: Prepared by the JFTC based on interviews with beverage manufacturers and other businesses that use or manufacture plastic bottles

Figure 3: Examples of pellets and preforms



3. Standards and Other Requirements for Plastic Bottles

(1) Act on the Promotion of Effective Utilization of Resources

The Act on the Promotion of Effective Utilization of Resources (Act No. 48 of 1991) was enacted to strengthen recycling measures, such as implementing the collection and reuse of products by business operators. The act was also enacted with aims to establish a recycling-oriented economic system by newly taking measures to reduce the generation of waste through saving resources, extending the service life of products and other means, and measures to reuse parts and other materials from recovered products, as well as by reducing the generation of byproducts and by promoting recycling as a measure against industrial waste.

Under the act, "specified labeled products" are specified by cabinet order as products that require product labels for sorted collection (collecting products by sorting them by type; same applies hereinafter) to use the product, either in whole or in part, as recyclable resources (Article 2, Paragraph 11 of the act), in accordance with the Enforcement Order of the Act on the Promotion of Effective Utilization of Resources (Cabinet Order No. 327 of 1991). Therefore, plastic bottles filled with beverages, specified seasonings¹⁴, or alcoholic beverages are designated as specified labeled products (Article 5 and Appended Table 5 of the cabinet order). Plastic bottles containing specified labeled products are required to have the identification mark, shown in Figure 4, imprinted on the bottle or displayed on the label (Article 25 of the act).

Figure 4: Identification mark for plastic bottles containing specified labeled products



On the other hand, even if the bottles are manufactured using plastic resin as raw material, plastic bottles filled with edible oils and fats (cooking oil, dressing containing

¹⁴ Soy sauce, products processed from soy sauce, alcohol fermented seasonings, mirin-like seasonings, vinegar, seasoning vinegar, and dressing-type seasonings are specified in the Ministerial Ordinance on Seasonings prescribed in the upper column of Appended Table 5-4 of the Enforcement Order of the Act on the Promotion of Effective Utilization of Resources (Order of the Ministry of Agriculture, Forestry and Fisheries and Ministry of Economy, Trade and Industry No. 1 of 2008).

oil components, etc.), strongly spiced products (sauce, yakiniku sauces, etc.), and general non-food uses (detergent, shampoo, cosmetics, medicines, etc.) are classified as "specified containers and packaging" under the cabinet order, and so the identification mark indicated in the above Figure is not imprinted or displayed on the bottles. As described in Chapter 3-1 (2) (page 11) below, plastic bottles subject to the recycling obligation under the Containers and Packaging Recycling Law are also excluded from these uses, similarly to plastic bottles that contain specified labeled products.

(2) Standards for Safety and Recyclability

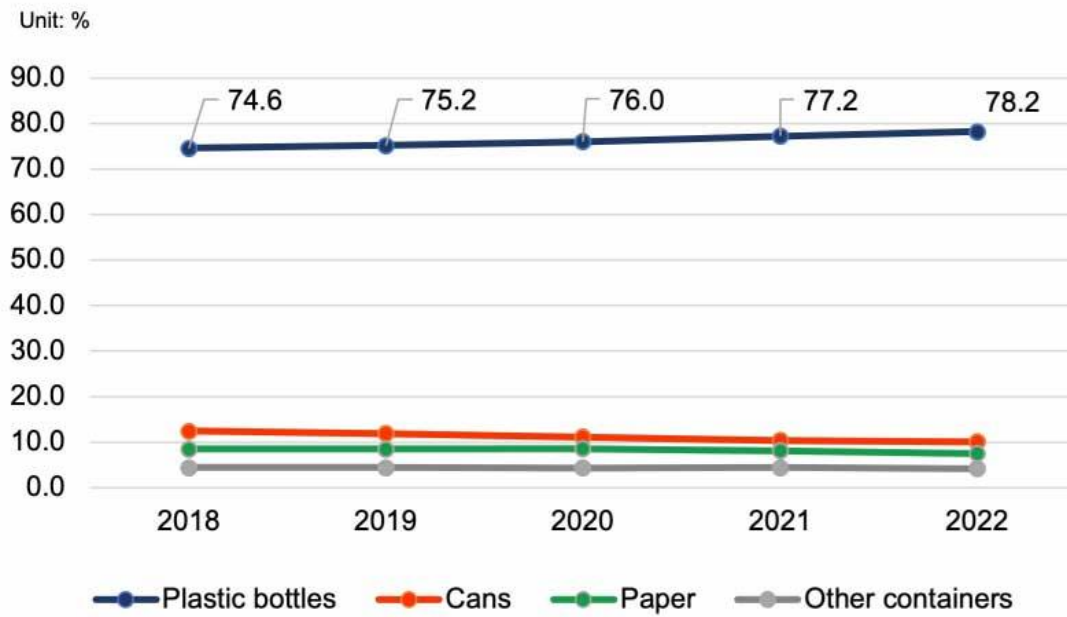
Plastic bottles that contain food products must conform to standards based on the Food Sanitation Act (Act No. 233 of 1947) in order to ensure the safety of such bottles. Such plastic bottles generally also meet voluntary standards set by industry associations.

In addition, the Council for PLASTIC Bottle Recycling, which is a voluntary organization established by business associations formed by manufacturers of plastic bottles and business associations consisting of manufacturers and sellers of beverages and other items and other organizations, has established "Voluntary Design Guidelines for Designated Plastic Bottles" to ensure that plastic bottles used for specified labeled products are suitable in terms of recyclability, including from the standpoint of reprocessing and sanitation after use. The guidelines include the following criteria: the body of plastic bottles must not be colored; caps must be made of polypropylene or polyethylene to allow separation by specific gravity; labels must be perforated, or the area and amount of adhesive must be reduced so that labels can be easily removed by hand; and no label pieces or adhesive are to remain on the bottle.

4. Production Share of Containers Used for Soft Drinks

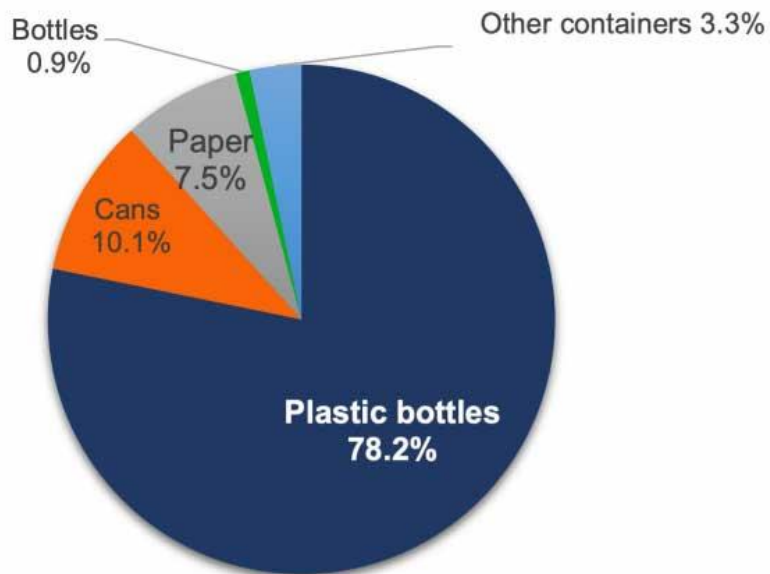
The production share of soft drinks by container is shown in Figure 5. In 2022, plastic bottles were used as containers for approximately 78.2% of all soft drinks.

Figure 5: Trends in production share of soft drinks by container



Source: Prepared by the JFTC based on the "JSDA Activity Report 2023" and the "JSDA Activity Report 2022" by the Japan Soft Drink Association (JSDA)

Figure 6: Production share of soft drinks by container in 2022



Source: Prepared by the JFTC based on the "JSDA Activity Report 2023" by the Japan Soft Drink Association (JSDA)

Plastic bottles are widely used as containers for soft drinks, and according to voluntary interviews, they offer several advantages: they are lightweight, contents are visible to the consumer, and they can be reclosed with included caps even after opening once. In addition, it is believed that plastic bottles used as soft drink containers will not be replaced by other containers for the time being, owing to the ease of recycling.

Chapter 3. Outline of the Recycling of Used Plastic Bottles

1. Containers and Packaging Recycling Law System

(1) Enactment of the Containers and Packaging Recycling Law and its Objectives

In June 1995, the Containers and Packaging Recycling Law was enacted and promulgated to promote the recycling of containers and packaging, which account for a large proportion of general waste (approximately 60% of household waste) that can be used as recyclable resources through technical means, when the strain on the capacity of final disposal sites for general waste¹⁵ became an issue. The provisions of the law pertaining to the recycling of plastic bottles have been in effect since April 1997.

The Containers and Packaging Recycling Law aims to reduce the volume of general waste and promote effective use of resources by establishing a recycling system for containers and packaging discharged as general waste from households. The law regulates certain matters, such as that (i) Businesses and consumers must make efforts to reduce waste containers and packaging discharged, and promote recycling, etc., (ii) Municipalities must take necessary measures for sorted collection, (iii) Consumers must properly sort and discharge containers and packaging waste, and (iv) Business operators that use or manufacture containers and packaging (specified business operators as described in Section (3) below) must recycle containers and packaging.

(2) Containers and Packaging Subject to the Recycling Obligation

Containers and packaging waste subject to sorted collection under the Containers and Packaging Recycling Law are categorized into eight types of general waste as shown in the Figure 7 below, of which four types: plastic bottles, plastic containers and packaging, glass bottles, and paper containers and packaging (hereinafter collectively referred to as “items conforming to the specified sorting standards”) are subject to the recycling¹⁶ obligation by specified business operators.

¹⁵ Waste is defined as those not falling under the category of industrial waste (waste such as cinders, sludge, waste oil, waste acid, waste alkali, waste plastics generated in the course of business activities), such as used plastic bottles discharged from households. The same applies hereafter.

¹⁶ “Recycling” refers to the recycling of materials that conform to the sorting standards collected by municipalities under the Containers and Packaging Recycling Law, and is defined as follows:

- Using waste as raw materials for products by the municipality
- Using waste materials unmodified as products for purposes other than as fuel

This obligation applies to plastic bottles used to fill beverages, soy sauce, vinegar, seasonings, non-oil dressings, and other items¹⁷, which generally correspond to those with the plastic bottle identification mark (Figure 4 (page 7)) stamped or displayed¹⁸.

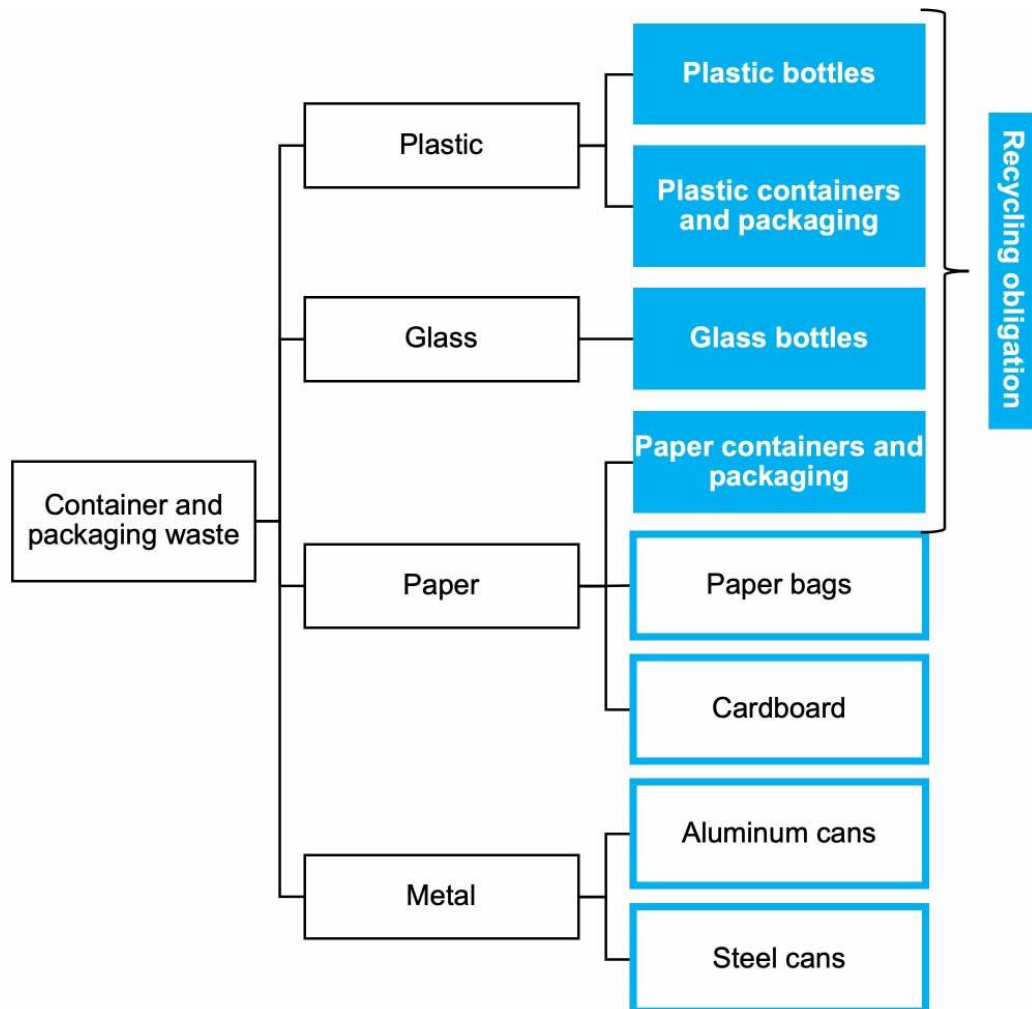
-
- Making waste materials available for transfer to those who use them as raw materials for products for a fee or free of charge
 - Making waste materials available for transfer to those who use them as products as-is for a fee or free of charge.

In this report, however, this term is used for the overall treatment of used plastic bottles for reuse as raw materials for plastic products, regardless of whether they are general waste or industrial waste.

¹⁷ Under Article 2, Paragraph 2 of the Containers and Packaging Recycling Law, Article 1 and Appended Table 1 of the Ordinance Concerning the Promotion of Sorted Collection and Recycling of Containers and Packaging (Ordinance of the Ministry of Finance, the Ministry of Health, Labor and Welfare, the Ministry of Agriculture, Forestry and Fisheries, and the Ministry of Economy, Trade and Industry, No. 1 of 1995) (hereinafter referred to as the “Enforcement Rules of the Law Concerning Sorted Collection and Recycling of Containers and Packaging”), and Article 4, No.5 and Appended Table 1, Paragraph 7 of the Ordinance for Enforcement of the Act on the Promotion of Sorted Collection and Recycling of Containers and Packaging (Ordinance of the Ministry of Finance, Ministry of Health, Labour and Welfare, Ministry of Agriculture, Forestry and Fisheries, Ministry of Economy, Trade and Industry, and Ministry of the Environment No. 3 of 2017), substances such as beverages, soy sauce and other substances that do not include edible oils and fats, and those with odors that can be removed from plastic bottles with simple washing are included, such as processed soy sauce products, mirin-like seasonings, vinegar, seasonings, and dressing-type seasonings.

¹⁸ For example, plastic bottles with a capacity of less than 150 ml are subject to the recycling obligation, although they are not obliged to display an identification mark.

Figure 7: Containers and packaging subject to sorted collection and recycling



Source: Prepared by the Committee based on “About the Containers and Packaging Recycling System” by the JCPRA

Among containers and packaging waste, paper packs, cardboard, aluminum cans, and steel cans have had high resource values ever since the Containers and Packaging Recycling Law was enacted, and recyclers would pay money to municipalities to pick them up (this is referred to as an “onerous contract,” same applies hereinafter) and would recycle them. Therefore, there was no need to make them subject to recycling obligations by specified business operators under the Containers and Packaging Recycling Law. On the other hand, since items that conform to the specified sorting standards, including plastic bottles, have low resource values and have been disposed of without being recycled, it was necessary to establish a system

where the duty of recycling was imposed on specified business operators. In turn, designated juridical persons (see Section (5) below (page 19) below) would pay money to recyclers to take them back (hereinafter referred to as an “inverse onerous contract”).

(3) Specified Business Operators

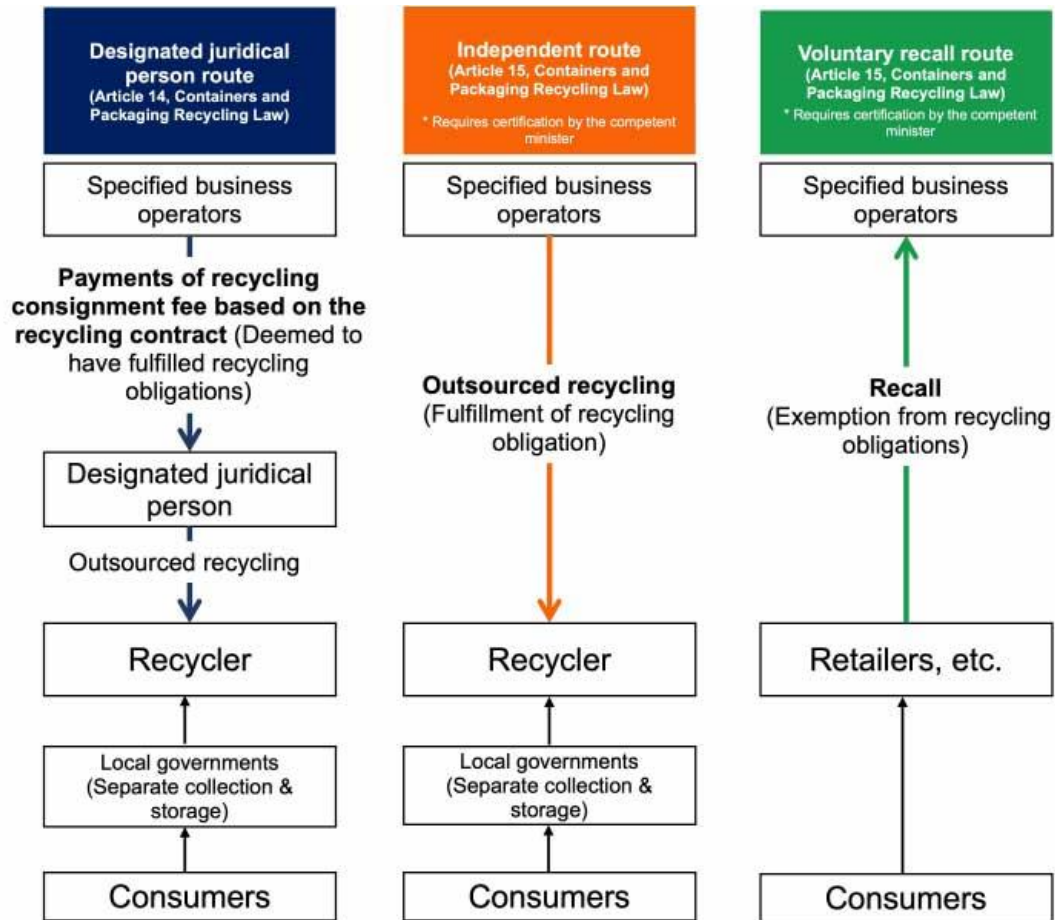
A feature of the Containers and Packaging Recycling Law is its introduction of “extended producer responsibility,” under which business operators that use or manufacture containers and packaging (including importers) bear the obligations and costs of recycling items that conform to the specified sorting standards¹⁹. Under the law, these business operators are defined as “specified business operators,” and each specified business operator is obliged to recycle the amount calculated based on the calculation method prescribed in the Containers and Packaging Recycling Law with regard to containers and packaging that conform to the specified sorting standards (Articles 11 to 13 of the Containers and Packaging Recycling Law).

(4) Method of Fulfilling or Being Exempted from the Obligation to Recycle

The law stipulates the following three methods, A through C, for specified business operators to fulfill their recycling obligations under the Containers and Packaging Recycling Law or to be exempted from the obligation. However, as described in D, there are some initiatives called “independent processing.”

¹⁹ However, small business operators that are below a certain threshold with respect to both the number of full-time employees and annual sales are exempt.

Figure 8: Methods of fulfillment of recycling obligations



Source: Prepared by the Committee based on “About the Containers and Packaging Recycling System” by the JCPRA

A. Designated Juridical Person Route

The designated juridical person route is a system under which, when a specified business operator concludes a recycling consignment contract with a designated juridical person (see Section (5) below (page19) below) to consign the recycling of waste that conforms to the sorting standards to the designated juridical person and fulfills its obligations under the contract, it is deemed to have recycled the amount equivalent to the consignment (Article 14 of the Containers and Packaging Recycling Law). In other words, the specified business operator is deemed to have fulfilled its own obligations under the Containers and Packaging Recycling Law when it fulfills its obligations under the recycling consignment contract with the designated juridical person.

Currently, all specified business operators fulfilling their recycling obligations for used plastic bottles are utilizing this designated juridical person route. However, since some used plastic bottles, which are general waste, are processed independently, as described in D below, about two-thirds of the total volume is traded through the designated juridical person route.

B. Independent Route

The independent route is a method where a specified business operator consigns recycling to a recycler without going through a designated juridical person (Article 15 of the Containers and Packaging Recycling Law). In order to adopt this method, the specified business operator must be certified by the competent minister²⁰ that the recycler, to which the specified business operator entrusts the recycling, meets the conditions to appropriately conduct recycling. However, currently, there are no specified business operators that have been accredited by the competent minister.

C. Voluntary Collection Route

The voluntary collection route exempts the obligation to recycle specified containers²¹ by having the specified business operator collect specified containers that it uses or manufactures by itself or entrusts to another party (distributor, etc.) (Article 18 of the Container Packaging Recycling Law). In order to use this method, it is necessary to obtain certification from the competent minister²² in the same manner as the independent route described in B above. Certification requires the method to be capable of achieving a collection rate of approximately 90% or more of the containers and packaging used (Article 20 of the Enforcement Regulations of the Containers and Packaging Recycling Law). Most business operators that have received certification are distributors of products using returnable containers, such as milk bottles and beer bottles. Currently, no specific business operators have been

²⁰ Minister of the Environment, Minister of Economy, Trade and Industry, and the Minister with jurisdiction over the business concerned.

²¹ Containers and packaging specified by the ordinance of the competent ministry as containers for commodities (Article 2, Paragraph 2 of the Containers and Packaging Recycling Law). The same applies hereinafter.

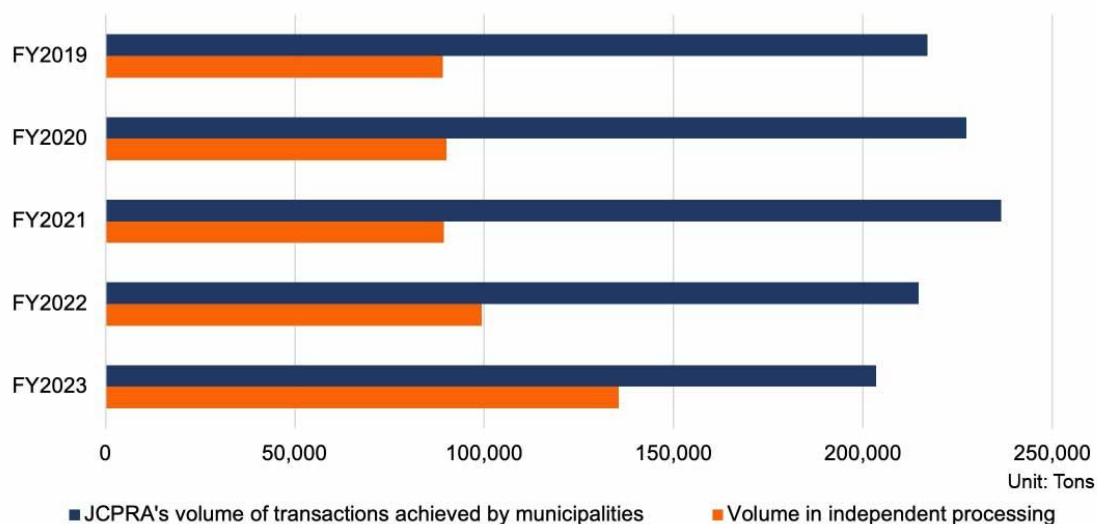
²² Refer to footnote 20.

certified for plastic bottles.

D. Independent Processing Route

The methods of fulfillment or exemption from the recycling obligation specified in the Containers and Packaging Recycling Law are as described in A to C above. However, there are also efforts by municipalities to conduct “independent processing” that is not based on the framework of the Containers and Packaging Recycling Law. The recycling obligation under the Containers and Packaging Recycling Law is an obligation imposed on specified business operators and not on municipalities. Therefore, some municipalities deliver waste to recyclers without going through designated juridical persons. Regarding used plastic bottles, which are general waste, about one-third is traded through “independent processing” (hereinafter, such a processing route by municipalities that forgo designated juridical persons is referred to as the “independent processing route”). Figure 9 below shows the transition of transaction volumes between the designated juridical person route and the independent processing route. Particularly in recent years, the volume of transactions through the independent processing route has been growing.

Figure 9: Comparison of designated juridical person route and independent processing²³



Source: Prepared by the Committee based on “Comparison of Designated Juridical Person Routes and Independent Processing of Plastic Bottles”²⁴ and “Actual Transactions in Previous Years”²⁵ on the Japan Container and Packaging Recycling Association website

In the calculation of the estimated emissions to be used for the calculation of the amount of recycling obligation borne by each specified business operator, the amount of used plastic bottles collected in the previous fiscal year, either by the specified business operators themselves or by an entrusted entity, shall be deducted. Therefore, if the specified business operator can be evaluated as having collected plastic bottles by itself or through an entrusted entity without necessarily following the routes A through C above, in principle, the obligatory recycling amount for the fiscal year will be reduced in proportion to the amount collected in the previous fiscal year. As a result, the specified business operator will not be obliged to recycle the amount corresponding to the amount collected.

²³ The Figures for “independent processing volume” in FY2022 and “actual volume of transactions by the JCPRA from municipalities” and “independent processing volume” in FY2023 refer to the contracted or estimated volume between municipalities and the JCPRA.

²⁴ https://www.jcpa.or.jp/municipality/municipality_data/tabid/404/index.php

²⁵ https://www.jcpa.or.jp/municipality/municipality_data/tabid/400/index.php

(5) Designated Juridical Person System

A. Details of the Designated Juridical Person System

Under the Containers and Packaging Recycling Law, the competent minister²⁶ designates a designated juridical person as an entity that conducts recycling operations (Article 21, Paragraph 1), and the designated juridical person is to recycle items that conform to the sorting standards upon entrustment from a specified business operator (Article 22). The designated juridical person shall conduct the recycling operations after establishing the recycling operations regulations that prescribe the implementation methods and other matters of the recycling operations and obtaining the approval of the competent minister for them (Article 24, Paragraph 1).

Currently, the Japan Containers and Packaging Recycling Association, a public interest incorporated association (hereinafter referred to as the “JCPRA”), is the only designated juridical person that conducts recycling operations²⁷. In its Recycling Operation Regulations, the JCPRA stipulates that it shall conduct recycling operations by entrusting them to a recycler selected by a fair method. Based on this, in principle, the recycler is selected through competitive bidding²⁸, and a recycling implementation contract is concluded with the relevant recycler (see “Recycling Implementation Contract” below).

Thereafter, the JCPRA shall collect the amount obtained by multiplying the quantity of waste items that conform to the specified sorting standards taken from storage facilities²⁹ designated by the competent minister under the Containers and Packaging Recycling Law (hereinafter referred to as “designated storage facilities”) by the bid price (unit price per bid) (in the case of onerous contracts, see “Payments Based on Onerous Contract Bids” in the Figure below), or shall pay the amount (in the case of inverse onerous contracts, see “Recycling Consignment Fee” in the Figure below), between the recycler to which the recycling operations have been entrusted.

In the case of an onerous contract bid, the JCPRA contributes the money collected

²⁶ Minister of the Environment, Minister of Economy, Trade and Industry, Minister of Finance, Minister of Health, Labor and Welfare, and Minister of Agriculture, Forestry and Fisheries.

²⁷ Since the enactment of the Containers and Packaging Recycling Law, only one corporation, the JCPRA, has been designated as a designated juridical person, but the number of designated juridical persons is not limited under the law.

²⁸ In the event that the relevant recycler is unable to pick up the waste for any reason, the JCPRA will promptly transfer the waste to another recycler so that pickup by the municipality will not be delayed.

²⁹ Over 900 storage facilities for plastic bottles have been designated nationwide.

from the recycler to the municipality that delivered the waste conforming to the specified sorting standards (“Contribution for Onerous Contract Bids” in the Figure below). Among the waste that conforms to the specified sorting standards, plastic bottles are delivered to recyclers via onerous contracts in many cases, except in some remote areas, such as remote islands, since the resource value of plastic bottles has recently been increasing. In addition, paper containers and packaging also tend to be delivered via onerous contracts³⁰. On the other hand, even in recent years, most glass bottles and all plastic containers and packaging are delivered via inverse onerous contracts³¹.

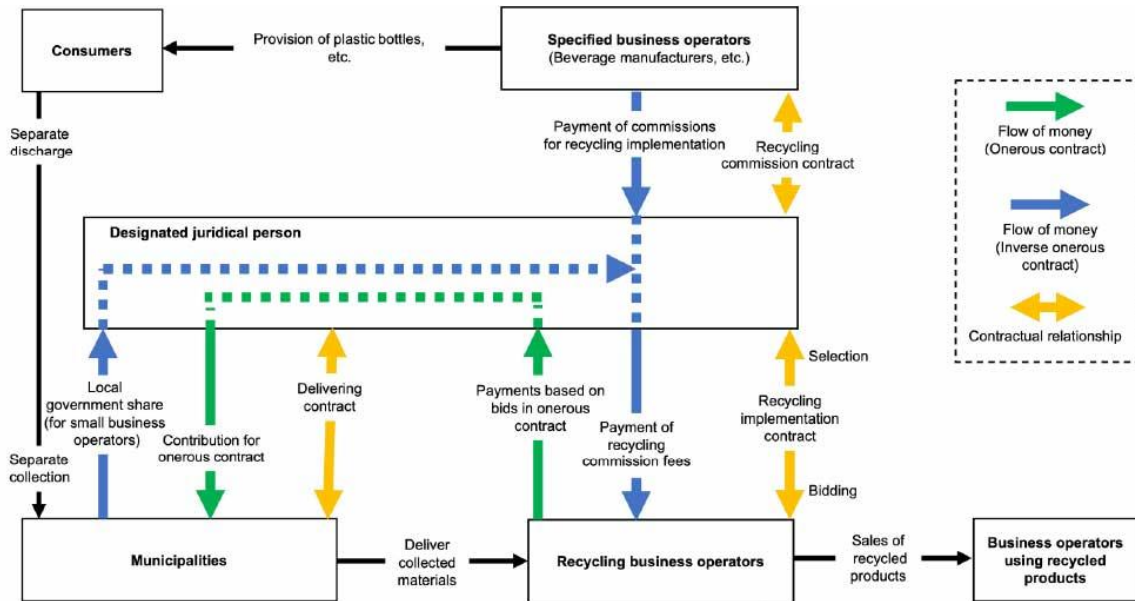
In addition, based on the “Recycling Consignment Agreement” concluded with the specified business operator, the JCPRA collects a recycling implementation consignment fee from the specified business operator (“Payment of Recycling Implementation Consignment Fee” in the Figure below). The consignment fee is the source of the recycling consignment fee paid by the JCPRA to the relevant recycler when the recycler is asked to recycle by inverse onerous contract for waste that conforms to the specified sorting standards³².

³⁰ In the first half of FY2022, the average unit price of successful bids was -64,196 yen/ton for plastic bottles and -2,805 yen/ton for paper containers and packaging. As described in B below (page 22), in the case of a negative bid price, the transaction is conducted through an onerous contract.

³¹ The average unit price of successful bids in the first half of FY2022 was 55,501 yen/ton for plastic containers and packaging, and 6,980 yen/ton (no color), 7,859 yen/ton (brown), and 15,844 yen/ton (other colors) for glass bottles. As described in B below (page 22), a positive bid price is conducted through an inverse onerous contract transaction.

³² The amount equivalent to the costs incurred by the JCPRA in conducting their operations is also included.

Figure 10: Outline of recycling operations involving designated juridical persons



Source: Prepared by the Committee based on “About the Containers and Packaging Recycling System” by the JCPRA

Figure 11: Formula for calculating the contribution of onerous contract bids to each municipality for used plastic bottles

$$\begin{aligned}
 &\text{Amount of Contribution to each municipality for onerous contract bids} = \\
 &\text{Total amount paid based on onerous contract bids in the first half of the year} \times (\text{each} \\
 &\text{municipality's [unit price for the first contract in the first half of the year} \times \text{volume of JCPRA} \\
 &\text{pickup in the first half of the year]} \div \text{Total amount of each municipality's [unit price for the} \\
 &\text{first contract in the first half of the year} \times \text{volume of JCPRA pickup in the first half of the} \\
 &\text{year]}) + \text{Total amount paid based on onerous contract bids in the second half of the year} \times \\
 &(\text{each municipality's [unit price for the first contract in the second half of the year} \times \text{volume of} \\
 &\text{JCPRA pickup in the second half of the year]} \\
 &\div \text{Total amount of each municipality's [unit price for the first contract in the second half of the} \\
 &\text{year} \times \text{volume of JCPRA pickup in the second half of the year]}) - \text{transfer fee}
 \end{aligned}$$

Source: Prepared by the Committee based on publicly available information on the JCPRA website

B. Bidding System of the JCPRA

As described in A above, in its Recycling Operation Regulations, the JCPRA stipulates that the recycling operation of waste transferred from municipalities that conform to the specified sorting standards shall be implemented by entrusting it to a recycler selected by a fair method. As the method of selection, it is stipulated that the designated storage facility shall be selected as a unit through general competitive bidding.

Since FY2013, bidding for plastic bottles has only been conducted twice a year: once in the first half of the year and once in the second half. As mentioned above, a general competitive bidding is conducted, and the recycler with the lowest bid price for each designated storage facility is selected as the successful bidder. If the bidding price (bidding unit price) is positive, the amount obtained by multiplying the quantity delivered from the designated storage facility³³ by the bidding price (bidding unit price) is paid as a recycling consignment fee by the JCPRA to the recycler (i.e., inverse onerous contract). On the other hand, there is no minimum bid price, and if the bid price (bidding unit price) is negative, the recycler pays the amount equivalent to the recycling consignment fee calculated similarly to the JCPRA (i.e., onerous contract).

In the bidding process, there are restrictions on the bid amounts that can be won based on the recycling capacity assessed for each recycler's plant, as well as the exclusion of bids with exceedingly unreasonable prices that are considered problematic from a socially accepted perspective. However, although the implementation of recycling is entrusted to the recycler, there are no specific conditions regarding the type of product that should be made through recycling, such as the intended use after recycling.

C. Scale of Business of Designated Juridical Persons for the Recycling of Waste Items Conforming to Specified Sorting Standards

The recycling implementation consignment fee paid by the designated juridical persons to the JCPRA and the recycling consignment fee paid by the JCPRA to the recyclers are as shown in the Figure below.

³³ In practice, the calculation is based on the amount of recycling produced and the amount of conversion to be taken back from the municipality, which is determined from the ratio (rate) of the amount of such production to the amount taken back from the municipality.

Figure 12: Recycling implementation consignment fees, recycling consignment fees, etc., in FY2022

	Payment based on bidding [Recyclers ⇒ JCPRA] (onerous contract portion)	Recycling implementation consignment fee ³⁴ [Specified business operators ⇒ JCPRA] (inverse onerous contract portion)	Recycling Consignment Fee [JCPRA ⇒ Recyclers] (inverse onerous contract portion)
(i) Plastic bottles	Approx. 20 billion yen	Approx. -1.9 billion yen ³⁵	Approx. 300 million yen
(ii) Plastic containers and packaging	0 yen	Approx. 41.9 billion yen	Approx. 41.2 billion yen
(iii) Glass bottles	0 yen	Approx. 3.8 billion yen	Approx. 3.9 billion yen
(iv) Paper containers and packaging	Approx. 100 million yen	Approx. 400 million yen	Approx. 50 million yen
Total	Approx. 20.1 billion yen	Approx. 44.1 billion yen	Approx. 45.5 billion yen

Source: Prepared by the Committee based on the “Annual Report 2023” and other sources by the JCPRA

³⁴ Also includes the costs associated with the implementation of the operation of the JCPRA.

³⁵ After the end of a fiscal year, the excess or deficiency between the total cost required for the recycling implementation consignment business for the fiscal year and the total amount of the recycling implementation consignment fee (scheduled fee) borne by the specified business operator is settled. There are cases where a refund is issued, and cases where a surcharge is added. If the amount refunded exceeds the amount borne by the specified business operator, the amount is a negative value. The amount of plastic bottles in FY2022 is negative mainly due to the year-end adjustment of consumption tax on paid-in revenues for the next fiscal year.

2. Recycling Methods for Used Plastic Bottles

In this report, “recycling” refers to the processing of used plastic bottles for reuse as raw materials for plastic products. This corresponds to the process generally referred to as recycling³⁶. There are two types of recycling of used plastic bottles: horizontal recycling (bottle-to-bottle) and cascade recycling. The former is the process of transforming old plastic bottles into new plastic bottles, while the latter is the process of transforming them into various products, such as food trays, food pouches, and clothing. Generally, the latter is considered difficult to make into plastic bottles again after being remade into various products due to decreased material purity and other reasons.

In the case of horizontal recycling, there are reportedly two types of processing methods: mechanical recycling (physical recycling method) and chemical recycling (chemical recycling method). It is considered to be mostly the same up to the point where foreign substances, such as colored bottles, are removed, crushed into flakes³⁷, separated by wind power, washed, and separated by specific gravity. In mechanical recycling, however, the bottles are then exposed to high temperatures to diffuse contaminants that remain inside the resin and decontaminate it, which is considered the typical processing method³⁸. On the other hand, in the chemical recycling process, the raw or intermediate material of plastic resin is decomposed and purified by depolymerization, and then polymerized to synthesize new plastic resin again.

While chemical recycling has the advantage of obtaining plastic resin of the same quality as virgin resin, mechanical recycling is said to be more advantageous in terms of the scale of facilities and amount of energy required. While many domestic recyclers use mechanical recycling for plastic resin, only about one entity in Japan currently uses chemical recycling as a business operator to recycle plastic resin.

Figure 13: Classification of recycling methods for used plastic bottles

Recycling	Horizontal recycling	Mechanical recycling
		Chemical recycling
	Cascade recycling	

³⁶ In contrast, there is a process called thermal recovery, which recovers the thermal energy produced by burning waste.

³⁷ Plastic bottles are cut into approximately 8 mm squares.

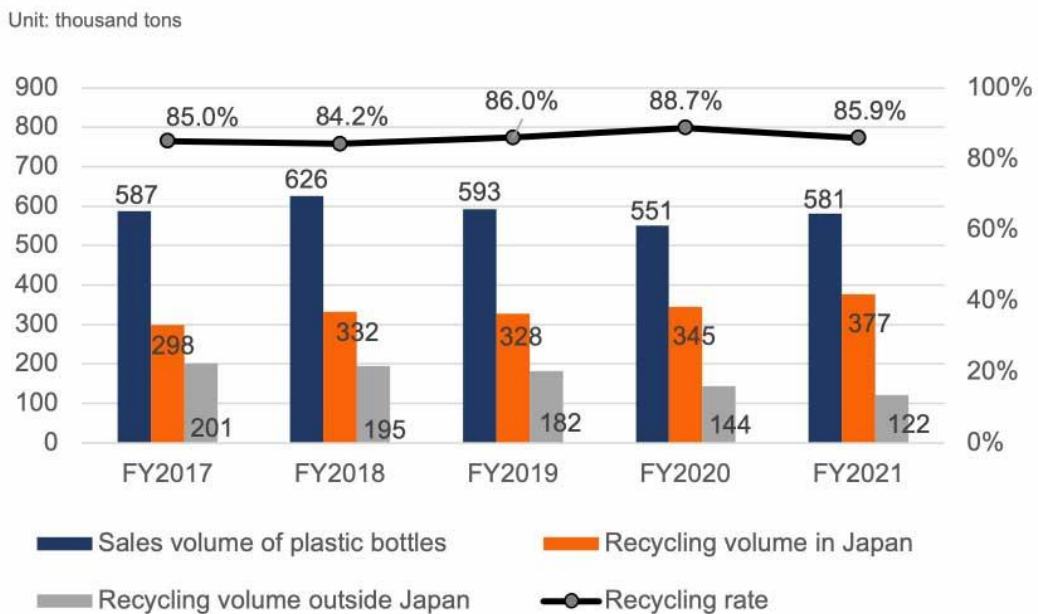
³⁸ It is reported that pelleting (flakes heated and melted to granular form) may be performed before or after decontamination.

3. Recycling Volume and Recycling Rate Trends and Recent Bottle-to-bottle Initiatives

(1) Trends in Recycling Volume and Recycling Rate

In fiscal year 2021, the domestic recycling volume was approximately 377,000 tons, while the overseas recycling volume was approximately 122,000 tons for a total sales volume of 581,000 tons of plastic bottles, which are designated labeled products. This resulted in a recycling rate (recycled volume/sales volume) of approximately 86%. Changes in the sales volume of plastic bottles, domestic recycling volume, and overseas recycling volumes from FY2009 to FY2021 are shown in Figure 14 below.

Figure 14: Domestic sales volumes of plastic bottles, domestic recycling volumes, and overseas recycling volumes



Source: Prepared by Committee based on the “Plastic Bottle Recycling Annual Report 2022” by the Council for Plastic Bottle Recycling

Since the Containers and Packaging Recycling Law came into effect, the recycling rate for plastic bottles has significantly increased. Plastic bottles are considered an “honor student” of recycling as the recycling rate for plastic bottles was approximately

86% in 2021, exceeding the 73% rate³⁹ for glass bottles, which also have a high recycling rate.

Moreover, comparing the recycling rate in Japan with that of other countries, the U.S. recycling rate for plastic bottles was about 18% in 2020 and about 43% in 2021 in Europe⁴⁰, making Japan's recycling rate one of the highest in the world along with other environmentally advanced countries⁴¹.

(2) Recent Bottle-to-bottle Initiatives

Municipalities are now aiming for “visible recycling,” “horizontal recycling,” and “local circulation recycling” to educate residents, raise environmental awareness for the used plastic bottles they collect, and specify the post-sale use of used plastic bottles as implementing “bottle-to-bottle” as a requirement when deciding where to sell the product. In addition, beverage manufacturers that manufacture and sell products using plastic bottles are also collaborating with municipalities to implement bottle-to-bottle initiatives, along with recyclers that produce recycled plastic resin from used plastic bottles. Moreover, there is a trend among generators of used plastic bottles toward collaborating with beverage manufacturers and recyclers to implement bottle-to-bottle initiatives for bottle-to-bottle recycling.

Figure 15: Example of a bottle-to-bottle initiative

- Examples of Agreements Concluded by Municipalities With Beverage Manufacturers
 - Hakone, Kanagawa Prefecture (Agreement with Suntory Group in July 2022)

The town of Hakone in Kanagawa Prefecture is promoting horizontal recycling of plastic bottles in the Hakone area in cooperation with private business operators, the Hakone Tourism Association, and the Ministry of the Environment under the plan “Fuji-Hakone Izu National Park Enjoyment Step-up Program 2025” formulated by the Fuji-Hakone Izu National Park Enjoyment Project Regional Council. The town has also endorsed the “Kanagawa Zero Plastic Waste Declaration” issued by Kanagawa

³⁹ Based on the “Annual Report 2023” by the JCPRA.

⁴⁰ Based on “Plastic Bottle Recycling Annual Report 2022” by the Council for PLASTIC Bottle Recycling Promotion.

⁴¹ For example, according to Forum PLASTIC, a business association of business operators that manufacture or use PLASTIC resin in Germany, 98% of plastic bottles are collected and recycled in Germany (see: <https://www.forum-plastic.de/en/recycling-cycle/>).

Prefecture and the “Zero Plastic Waste Declaration of Two Cities and Eight Towns in the Western Area of the Prefecture,” and is promoting the reduction and recycling of plastic waste in accordance with the Hakone’s Third Basic Environmental Plan. In such background, Hakone, Suntory Holdings Limited, and Suntory Foods International Limited concluded the “Agreement on Horizontal Plastic Bottle Recycling” in July 2022. Based on this agreement, horizontal recycling of used plastic bottles collected by Hakone began in August of the same year.

According to the town, the Ministry of the Environment⁴² introduced the town to horizontal recycling initiatives through business operators in the private sector, which led the town to start considering the agreement. During the discussion process, the town cited the advantages of the agreement, including the fact that residents’ understanding of recycling would increase as a result of the bottle-to-bottle initiatives. They also noted that Hakone attracts many tourists from Japan and overseas, which would allow the town’s initiative to serve as a message to the nation and the world.

- Yoshimi, Saitama Prefecture (Agreement with Coca-Cola Bottlers Japan Holdings Inc. signed in April 2022)

In April 2022, the town of Yoshimi, Saitama Prefecture, concluded a “Comprehensive Collaboration Agreement” with Coca-Cola Bottlers Japan Holdings Inc. concerning a wide range of cooperative projects, including those for child-raising, sports promotion, and disaster response. One of the initiatives included was a bottle-to-bottle initiative. According to the town, the bottle-to-bottle initiative is being promoted as an initiative related to the “Yoshimi Zero Carbon City Declaration,” announced in December 2021 to reduce carbon dioxide emissions to virtually zero by 2050.

- Examples of Agreements Concluded by Municipalities With Beverage Manufacturers and Recyclers
 - Himeji City, Hyogo Prefecture (Agreement concluded in August 2021 with Ito En, Endo Ishizuka Green Plastic, and Kinki Sign Co.

⁴² Fuji-Hakone-Izu National Park Management Office, Kanto Regional Environment Office, Ministry of the Environment.

The city of Himeji, Hyogo Prefecture, announced the “Zero Carbon City Declaration” in 2021. As part of its initiatives to achieve this goal, in August 2021, the city concluded a “Business Collaboration Agreement on Plastic Bottle Resource Recycling” regarding bottle-to-bottle recycling with four parties, including Ito En, Endo Ishizuka Green PLASTIC, and Kinki Sign Co. Based on this agreement, the city has been horizontally recycling used plastic bottles discharged in the city since April 2022. According to the city, the benefits of the agreement are wide-ranging, including the ability to recycle resources within the community and the comprehensiveness for the residents through the visible recycling process.

- Example of Municipalities Conducting General Competitive Bidding With Bottle-to-bottle Implementation Requirements

- Minato Ward, Tokyo (in operation since FY2022)

Minato Ward, Tokyo, has been conducting restricted general Competitive bidding since FY2022 on the condition that it implements the bottle-to-bottle initiative.

- Examples of Cooperative Efforts Among Business Operators

- The Odakyu Electric Railway Co., Ltd. (In January 2022, (one corporation) Japan Soft Drink Association (hereinafter referred to as the “JSDA”)⁴³ implemented the initiative in cooperation with the Kanagawa Prefecture)

From January to February 2022, Odakyu Electric Railway Co., Ltd. conducted a demonstration experiment for the bottle-to-bottle initiative by installing a collection box at the ticket gate of Hon Atsugi Station on the Odakyu Line, where plastic bottles, caps, and labels can be collected separately from used plastic bottles while excluding leftover drinks from the bottles.

Source: Prepared by the Committee based on published information and interviews with municipalities and beverage manufacturers

⁴³ A business association whose members include soft drink manufacturers and distributors, including most of the major beverage manufacturers.

Chapter 4. Activities and Initiatives of Each Entity Related to Recycling Used Plastic Bottles

1. Municipalities

(1) Collection

The Waste Management and Public Cleansing Act (Act No. 137 of 1970) (hereinafter referred to as the "WMPCA") stipulates that municipalities must collect, transport, and dispose of general waste (Article 6-2). Therefore, municipalities collect used plastic bottles⁴⁴, which are general waste generated within their areas, either by themselves or by commission.

Although the method by which residents need to separate and dispose of used plastic bottles differs depending on the municipality, the Containers and Packaging Recycling Law stipulates that municipalities must endeavor to take necessary measures for separate collection (Article 6, Paragraph 1).

(2) Intermediate Treatment

Municipalities often carry the collected used plastic bottles to intermediate treatment facilities owned by themselves or private business operators for intermediate treatment, either on their own or by consignment. At facilities, caps and labels that affect the quality of recycled PLASTIC resin after recycling are removed, plastic bottles that contain contents or foreign objects are processed, and other foreign objects are removed before being compressed and packaged into bales, among other processes. However, some municipalities do not perform intermediate treatment and deliver plastic bottles in the collected state, so-called "round bottles," to recyclers.

In addition, under the designated juridical person route, the JCPRA has established the "Quality Guidelines for Acceptance from Municipalities" regarding the quality of bales and other materials to be accepted as a condition for receiving consignment from municipalities. The guidelines set certain standards for the size and weight of bales, the material used for bundling, whether caps and contents can be left in bales, and how much foreign substance other than plastic bottles can be contained in bales.

⁴⁴ Some municipalities may treat collected used plastic bottles as valuable resources rather than waste, based on a comprehensive judgment based on the properties and trade value of the plastic bottles. In this report, "used plastic bottles as general waste" includes used plastic bottles collected by municipalities that are treated as non-waste.

Figure 16: Example of a bale



Source: Materials submitted by the Council for PLASTIC Bottle Recycling

(3) Delivery

After collection and intermediate treatment of used plastic bottles, the municipality delivers them to a processor. The delivery methods can be roughly classified into the two types described below⁴⁵.

A. Designated Juridical Person Route

Under the designated juridical person route, the municipality enters into a single-year contract with the JCPRA to deliver used plastic bottles that have been collected, undergone intermediate treatment, and are stored at a designated storage facility. Used plastic bottles are then handed over to recyclers selected through a bidding process by the JCPRA, following which bottles are recycled.

The JCPRA conducts a quality survey of used plastic bottles at each designated storage facility to confirm the quality of used plastic bottles sorted and collected by municipalities and to improve the quality of bottles in the future. In principle, this is conducted at least once a year at a recycler's recycling plant. Specifically, the survey is conducted by randomly selecting a bale to be used as a sample and inspecting the degree of external stains on the bale, the stability of the bale when stacked, and the ease of disassembling the bale, as well as inspecting for any plastic bottles with caps or contents remaining in the bale and any foreign

⁴⁵ As described in Chapter 3-1 (4) B (page 16) above, independent routes also exist. However, they are not currently used for used plastic bottles.

substances other than plastic bottles, and the percentage of foreign substances in the bale weight. As a result of the inspection, a rank is determined from among A, B, and D ranks based on an overall evaluation⁴⁶. The JCPRA publishes the quality survey results of each designated storage facility on its website and encourages municipalities to improve the quality of used plastic bottles they collect and subject to intermediate treatment⁴⁷.

B. Independent Processing Route

Under the Containers and Packaging Recycling Law, municipalities are only responsible for taking necessary measures for sorted collection and are not obligated to use the designated juridical person route. Therefore, some municipalities do not hand over waste to designated juridical persons but rather deliver it to other entities, such as recyclers, on their own.

In addition, the “Basic Policy on Promoting the Reduction of Waste Containers and Packaging Discharged, Sorted Collection, and Recycling of Waste Containers and Packaging that Conform to the Sorting Standards”⁴⁸ (hereinafter referred to as the "Basic Policy"), formulated by the competent minister based on the Containers and Packaging Recycling Law, the following has been established:

- Municipalities are required to smoothly deliver waste containers and packaging that conform to sorting standards obtained through sorted collection to designated juridical persons or other such parties.
- Even in cases where waste containers and packaging are not delivered to the designated juridical persons, according to the actual conditions of the municipality, the municipality needs to take into account the facility capacity of the recycling facilities and confirm that the sorted collection of waste containers and packaging is properly processed while taking all possible measures for

⁴⁶ If the municipality does not conduct intermediate treatment and the recycler takes used plastic bottles in round bottles, the quality of such used plastic bottles is considered to be rank D, regardless of the inspection results.

⁴⁷ Since recyclers must refer to the previous quality survey when entering into the bidding, the results of the analysis of the impact of the previous year's rank on the unit price of successful biddings are also available on the JCPRA's website. In the first half of FY2023, the average unit price (yen/ton) for bids for designated storage facilities that ranked A in the FY2022 quality survey was -62,725 yen, and -53,887 yen for those ranked B, indicating that the A ranks were sold at a higher price.

⁴⁸ Ministry of Finance, Ministry of Health, Labor and Welfare, Ministry of Economy, Trade and Industry, and Ministry of the Environment Notification No. 10 of 2006.

environmental protection.

- At the same time, municipalities need to make efforts to provide residents with information on the status of such treatment of waste containers and packaging.

In light of this, if municipalities can confirm that sorted and collected waste containers and packaging are properly processed while taking all possible measures for environmental protection measures, as well as taking into account the facility capacity of recycling facilities, the Containers and Packaging Recycling Law system can be considered as an option for municipalities to take other than the designated juridical person route.

As mentioned in Chapter 3-3 (2) (page 26) above, there is a trend for municipalities to conclude agreements with beverage manufacturers and other business operators to conduct independent processing in order to implement bottle-to-bottle initiatives. As mentioned in Chapter 3-1 (4) D (page 17) above, the amount of processing under the independent processing route has been increasing relatively in recent years. (See Chapter 5-2 (3) A (page 64) below for the results of a survey on the reasons why municipalities use the independent processing route.)

2. Collection and Transport Services/Intermediate Treatment Business Operators

As described in Section 1 above, municipalities may outsource collection or intermediate treatment operations for used plastic bottles generated within their areas. In addition, as described in Section 5 below, generators may outsource the collection or intermediate treatment of used plastic bottles generated during business activities. Business operators entrusted with such operations collect, transport, or perform intermediate treatment on used plastic bottles from places of discharge or generators based on contracts with municipalities or by purchasing or taking back the bottles themselves⁴⁹. Moreover, since the facilities required for intermediate treatment and flaking for recycling are different, recyclers generally purchase used plastic bottles in a baled state⁵⁰.

⁴⁹ Some business operators manage the entire process from collection and transportation to intermediate treatment, while others manage only individual operations, and there are a variety of ways in which each business can be involved.

⁵⁰ There are also cases where a recycler purchases the materials without intermediate treatment, or similar procedures, and then consigns intermediate treatment to another business operator.

3. Recyclers

Recyclers purchase or accept used plastic bottles, which are general or industrial waste, through onerous or inverse onerous contracts with JCPRA, municipalities, generators of used plastic bottles, and intermediate treatment business operators that receive waste from generators and recycle said plastic bottles.

(1) Recyclers Registered With the JCPRA

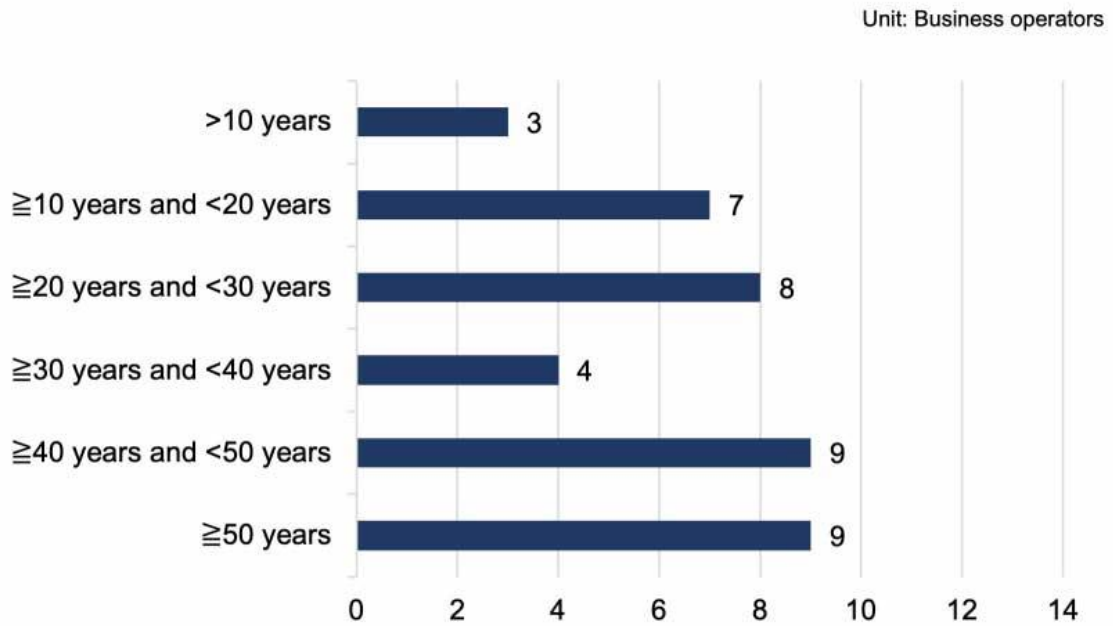
Recyclers are required to participate in the JCPRA's bidding process when procuring used plastic bottles through the designated juridical person route. Registering as a recycler for plastic bottles with the JCPRA is part of the qualifications for participation in the bidding process. According to the "Business Operator Registration Regulations" set by the JCPRA, a recycler must have sufficient facilities, personnel, and financial fundamentals to conduct recycling as a business under consignment from the JCPRA.

The number of business operators registered as a recycling business for used plastic bottles was 60 in FY2009. However, this has been decreasing yearly and was 44 in FY2023.

Many of the recyclers registered with the JCPRA adopt multiple procurement methods, such as procuring used plastic bottles not only from the designated juridical person route but also from the municipalities' independent processing route and procuring plastic bottles as industrial waste.

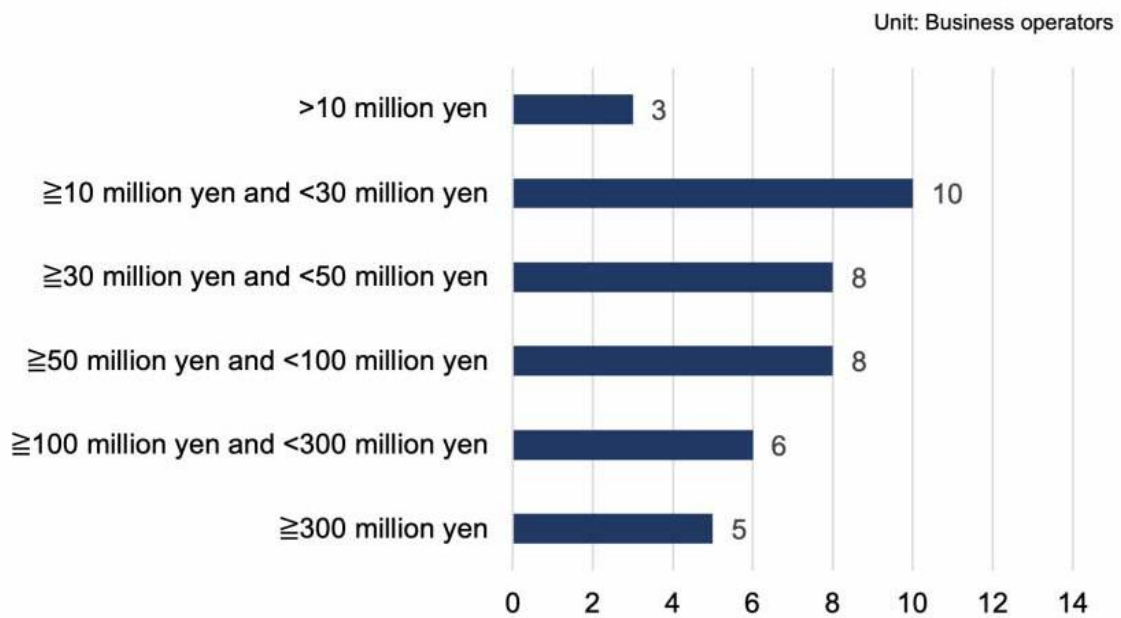
Of the 44 business operators registered with the JCPRA as recyclers of used plastic bottles in the first half of FY2023, 40 responded to the written survey. Among the 40 business operators, the number of business operators based on the years since their establishment, capital, number of employees, or processing capacity for used plastic bottles (for companies that have multiple processing facilities, the total processing capacity of the relevant processing facilities) is as follows:

Figure 17: Number of business operators by number of years since establishment



Source: Prepared by the JFTC based on responses to a written survey (for recyclers)

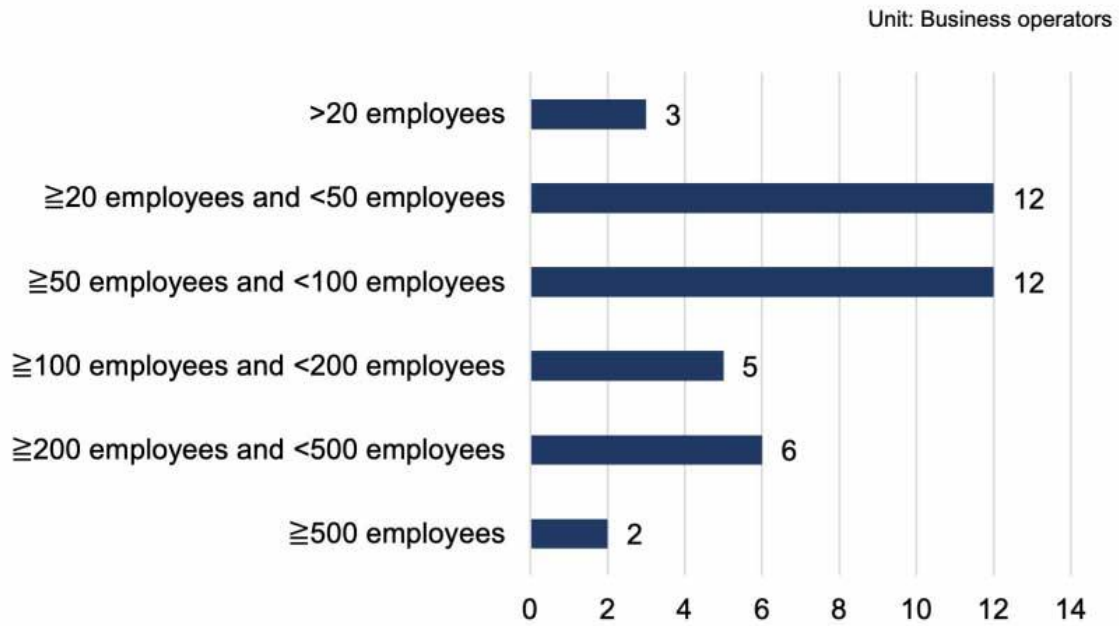
Figure 18: Number of business operators by capital amount⁵¹



Source: Prepared by the JFTC based on responses to a written survey (for recyclers)

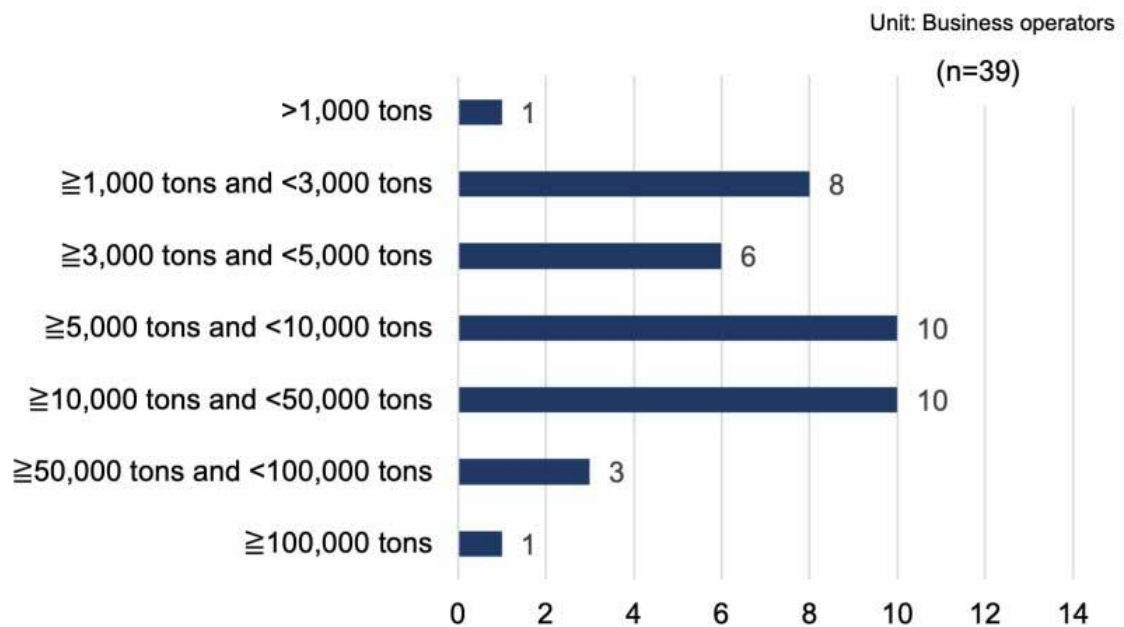
⁵¹ The eligible 40 business operators include social welfare corporations, and the Figures for social welfare corporations are the amount of basic capital.

Figure 19: Number of business operators by number of employees



Source: Prepared by the JFTC based on responses to a written survey (for recyclers)

Figure 20: Number of business operators by processing capacity⁵²



Source: Prepared by the JFTC based on responses to a written survey (for recyclers)

⁵² Of the 40 eligible business, one business did not respond on the processing capacity, and therefore it does not appear in this Figure.

(2) Recyclers Not Registered With the JCPRA

As described in (1) above, recyclers must register with the JCPRA to recycle used plastic bottles under the designated juridical person route. However, since recyclers that do not recycle under the designated juridical person route do not need to register with the JCPRA, some recyclers are not registered with the JCPRA. According to the interview survey results, there are (or were) several hundred recyclers, including business operators that simply shred used plastic bottles⁵³.

In addition, in response to bottle-to-bottle trends in recent years, some existing recyclers have been implementing recycling business jointly with other parties, such as trading companies. Some business operators that were not previously engaged in the recycling business of plastic bottles have newly entered the recycling business. Some of them are not registered with the JCPRA since they do not conduct the recycling business under the designated juridical person route but only recycle used plastic bottles through the municipalities' own independent processing route or only recycle used plastic bottles that are industrial waste.

Figure 21: Opinions of recyclers not registered with the JCPRA

- As part of our business decision, we have not registered as a recycler with the JCPRA. Some generators of used plastic bottle industrial waste export used plastic bottles to overseas recyclers whose purchases are stable, rather than domestic recyclers⁵⁴ who may or may not place orders depending on the JCPRA's bidding results. Since we want to conduct the recycling business domestically that is being outsourced overseas, we made this business decision to clearly demonstrate our stance of aiming to be the first choice for domestic business operators.

Source: Prepared by the JFTC based on responses to the interview survey (for recyclers)

4. Beverage Manufacturers and Other Business Operators That Use or Manufacture Plastic Bottles

Since beverage manufacturers use plastic bottles as containers for the beverages they

⁵³ It is said that some of these business operators export crushed used plastic bottles to other countries. However, the number of such business operators is believed to be decreasing due to recent restrictions on waste imports in various countries.

⁵⁴ The same as recyclers in this report. The same applies hereinafter.

manufacture and sell, they are obligated to recycle used plastic bottles as a specified business operator under the Containers and Packaging Recycling Law. Beverage manufacturers are fulfilling their obligations through the designated juridical person route as described in Chapter 3-1 (4) A (page 15) above⁵⁵.

Some beverage manufacturers not only fulfill their recycling obligations under the Containers and Packaging Recycling Law but also set and publicly announced targets for the percentage of recycled plastic resin out of the entire plastic resin used as raw material in the plastic bottles for beverages in plastic bottles they manufacture and sell. Some beverage manufacturers have also set targets for the percentage of sustainable materials used in their plastic bottles, including plant-derived raw materials as well as recycled plastic resin. In addition, the JSDA, a business association of beverage manufacturers and others, has declared a target of 50% bottle-to-bottle ratio by 2030 for the soft drink industry.

As mentioned in Chapter 3-3 (2) (page 26) above, some beverage manufacturers are collaborating with municipalities and business operators to recycle used plastic bottles collected by municipalities and business operators to achieve the aforementioned goal.

The JSDA is also adopting new initiatives, such as placing recycling bins next to vending machines designed to make it difficult for foreign objects to enter, or placing orange or transparent recycling bins so that consumers can see the contents and avoid giving the impression that they are garbage bins. Through these initiatives, the JSDA is working to reduce the amount of foreign matter mixed in with the recycling bins and to collect used plastic bottles of good quality.

5. Generators of Used Plastic Bottles

In addition to those discharged from households and collected by municipalities, some used plastic bottles are collected at recycling bins next to vending machines, business operators' factories and offices, retail stores, transportation facilities, and recreational facilities. Under the WMPCA, these items are generally industrial waste⁵⁶, and business operators that manage collection sites are responsible for their disposal. On the other

⁵⁵ The relationship between the independent processing route and the recycling obligation is as described in Chapter 3-1 (4) D (page 17) above.

⁵⁶ It is reported that some business operators do not treat the used plastic bottles they discharge as waste since they are valuable or for other reasons. In this report, "used plastic bottles that are industrial waste" includes used plastic bottles discharged by business operators that are not treated as waste.

hand, the Containers and Packaging Recycling Law applies to general waste collected by municipalities, and there is no obligation to recycle other used plastic bottles.

Generally, generators hand over used plastic bottles generated during their business activities to collection and transport services/intermediate treatment business operators. They may also outsource the intermediate treatment process to collection and transport services/intermediate treatment business operators, which bale the bottles and sell them to recyclers. In some cases, the waste is handed over to a recycler after the generator has specified a bottle-to-bottle approach.

Used plastic bottles, which are industrial waste, are thought to account for about half of all used plastic bottles generated in Japan.⁵⁷

⁵⁷ According to the Council for PLASTIC Bottle Recycling's Annual Report 2022, of the 641,000 tons of plastic bottles collected in FY2021, 326,000 tons were from municipalities (equivalent to general waste) and 315,000 tons were from business operators (equivalent to industrial waste).

Chapter 5. Current Status of Transactions Along With Their Practices and Other Matters on Recycling Used Plastic Bottles

1. Collection and Intermediate Treatment of Used Plastic Bottles Emitted as General Waste

As explained in Chapter 4-1 (1) (page 29) and Chapter 4-5 (page 37) above, the legal position of used plastic bottles differs depending on whether they are general waste or industrial waste, and used plastic bottles that are general waste are mainly collected by municipalities.

The results of the survey on the current status of transactions related to collection, intermediate treatment, and others in municipalities are as follows below.

(1) Collection

A. Status of Collection

As shown in Chapter 4-1 (1) (page 29), collection, disposal, and other matters related to general waste are considered to be undertaken by municipalities under the Waste Management and Public Cleansing Act, and most municipalities collect used plastic bottles.

Questions were posed to municipalities regarding their implementation of collecting used plastic bottles, and the responses were as follows below.

In cases where municipalities do not collect used plastic bottles (including cases where municipalities do not collect bottles in certain areas within the municipality), regarding details on collection method, responses included community associations and management companies of multi-unit housing collecting waste and delivering it to waste disposal business operators, and private business operators such as retail stores collecting waste at their stores and delivering it to waste disposal business operators.

Figure 22: Collection of used plastic bottles in municipalities

Responses		Respondents (persons)	Percentage
a	Local governments collect all used plastic bottles discharged from households and other such	1,239	87.8%

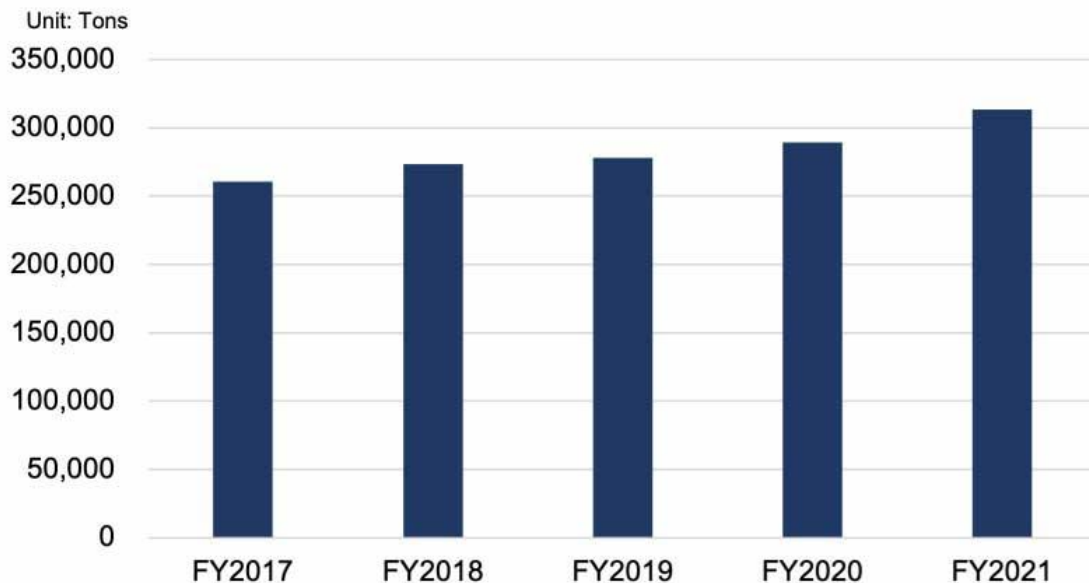
	locations.		
b	Local governments collect certain used plastic bottles discharged from households or other such locations while they do not collect certain other used plastic bottles.	152	10.8%
c	Not implemented by local governments.	20	1.4%
Total (respondents)		1,411	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

B. Volume Collected

Questions were posed to municipalities regarding the volume of their used plastic bottles to be collected each fiscal year, and the responses were as follows below, which show an increasing trend.

Figure 23: Volumes of used plastic bottles to be collected by municipalities

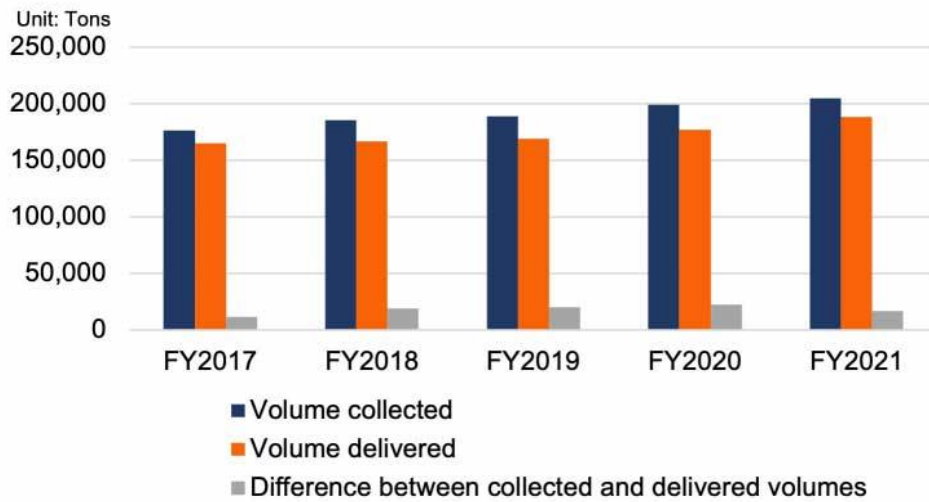


Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

From the volumes of used plastic bottles to be collected per fiscal year (Figure 23), Figure 24 below compares the differences between the volumes of used plastic bottles that were collected and those that were delivered to recyclers during the relevant fiscal year when the responses were received⁵⁸.

This difference in the volumes is thought to be mainly due to foreign matters removed in intermediate treatment and other procedures.

Figure 24: Difference between the volumes of used plastic bottles to be collected and to be delivered by municipalities



Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

C. Status of Separation

As described in Chapter 4-1 (1) (page 29) above, in accordance with Article 6, Paragraph 1 of the Containers and Packaging Recycling Law, municipalities must strive to take necessary measures for the sorted collection of used plastic bottles.

Questions were posed to municipalities⁵⁹ that had collected used plastic bottles regarding the implementation status of the sorted collection, and the responses

⁵⁸ In cases where municipalities responded that all or part of the operations related to the collection or disposal of used plastic bottles are carried out partially by the administrative association, such responses are excluded because the correspondence between the volumes collected and delivered is not clear.

⁵⁹ Municipalities that selected "a" or "b" in Figure 22 (Collection of Used Plastic Bottles in Municipalities). The same applies hereinafter.

were as follows below.

Figure 25: Status of implementation of sorting and collecting used plastic bottles in municipalities (multiple answer)

Responses		Respondents (persons)	Percentage
a	Collect only plastic bottles to be separated into their own category.	1,279	91.4%
b	Collect plastic bottles to be mixed with cans and glass bottles.	93	6.6%
c	Collect as plastic waste (with other plastic waste mixed in).	28	2.0%
d	Collect as non-burnable waste.	11	0.8%
e	Collect as burnable waste.	64	4.6%
f	None of the above ⁶⁰ .	36	2.6%
Respondents		1,400	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

Questions were posed to municipalities that have implemented a sorted collection of their used plastic bottles (municipalities that selected "a" or "b" in Figure 25) regarding their specific method of discharging bottles.

Figure 26: Specific method used to discharge used plastic bottles in municipalities (multiple answer)

Responses	Respondents (persons)	Percentage
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⁶⁰ The following are the main responses received in the free-text field regarding the specific method of collection (in some cases, two or more responses received in the free-text field are listed together. The same applies below for the main responses received in the free-text field):

- Collected with certain items such as food trays, paper cartons, and used paper. However, residents are asked to discharge the waste in separate bags.
- Collected as burnable or non-burnable waste if the waste is soiled so badly that it is difficult to turn into resources.

a	Remove caps.	1,355	98.9%
b	Remove labels.	1,255	91.6%
c	Wash the contents.	1,332	97.2%
d	Crush bottles.	366	26.7%
e	Discharge into containers (containers, baskets, nets, etc.) set up by local governments or similar entities.	647	47.2%
f	Discharge into a visible bag.	459	33.5%
g	Other ⁶¹ .	234	17.1%
Respondents		1,370	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

The following opinions regarding the separate collection of waste were obtained in the interview survey of municipalities.

Figure 27: Municipalities' opinions on separating and collecting used plastic bottles

- Quality will be higher if plastic bottles are cleanly sorted during collection. High-quality plastic bottles are collected in this municipality and are highly ranked in the quality survey conducted by the JCPRA. Recyclers also recognize that used plastic bottles collected by this municipality are of high quality.
- This municipality collects used plastic bottles together with other resources. From the standpoint of recycling, it is better to collect separately, but it is difficult to gain the understanding of residents who have become accustomed to collecting together with other materials.
- Regarding the separation of used plastic bottles, this municipality does not require residents to remove labels, considering the time and effort required, and bottles are separated at the intermediate treatment plant by blowing them away with wind. Labels are recycled as labels.

⁶¹ The following are the main responses received in the free-text field regarding the specific method of sorting:

- Disposed in garbage bags designated by the municipality.
- Discharged in buckets or other containers prepared by residents themselves (only plastic bottles are collected).

- Used plastic bottles are collected as round bottles without being crushed. There is a significant amount of foreign materials mixed in, and if used plastic bottles are easily crushed, it is difficult to tell at the time of sorting. In recent years, with the expansion of home medical care, there have been an increasing number of cases where injection needles and other dangerous items are packed inside to dispose of them, and if used plastic bottles are crushed after being filled with such items, it is rather difficult to take them out.
- Although the sorting rules are left to the decision of each municipality, it would be more effective to promote recycling if the national government sets standards for sorting rules. Since each municipality has different sorting rules, there may be an aspect of increasing the amount of garbage that is not sorted each time people move in and out of where they live.

Source: Prepared by the JFTC based on responses to the interview survey (for municipalities)

(2) Intermediate Treatment

A. Status of Intermediate Treatment

As described in Chapter 4-1 (2) (page 29) above, used plastic bottles to be collected are often treated in an intermediate process before being handed over to recyclers, and when municipalities use the bidding process of the JCPRA to deliver used plastic bottles, municipalities are required to carry out intermediate treatment.

Questions were posed to municipalities that collect used plastic bottles (limited to those that do not hand over used plastic bottles to business operators that are entrusted with collection) regarding the status of implementing intermediate treatment of used plastic bottles. The following table shows the status.

Figure 28: Status of intermediate treatment of used plastic bottles in municipalities

Responses		Respondents (persons)	Percentage
a	Intermediate treatment is conducted for all used plastic bottles to be collected.	1,154	85.4%
b	Some used plastic bottles to be collected are	30	2.2%

	given intermediate treatment.		
c	Intermediate treatment is not implemented.	167	12.4%
Total (respondents)		1,351	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

In addition, questions about specific details of intermediate treatment for used plastic bottles were posed to municipalities that have implemented such treatment (municipalities that selected "a" or "b" in Figure 28; the same applies hereafter), and their answers were as follows below.

Figure 29: Specific intermediate treatment of used plastic bottles in municipalities (multiple answer)

Responses		Respondents (persons)	Percentage
a	Remove foreign contaminants other than plastic bottles.	1,019	83.5%
b	Remove bottles made from plastics (PVC bottles, polyethylene bottles, bottles without material identification marks, etc.) other than plastic bottles.	1,040	85.2%
c	Remove colored plastic bottles.	805	65.9%
d	Remove or clean plastic bottles that still have product contents or foreign materials inside.	1,032	84.5%
e	Remove caps.	938	76.8%
f	Remove labels.	764	62.6%
g	Compress and package (baling).	1,146	93.9%
h	Other ⁶² .	71	5.8%

⁶² The following are the main responses received in the free-text field regarding the specifics of the process:

- Removal of plastic bottles that have been cut off.
- Selection of only plastic bottles because they are collected together with bottles, cans, etc.
- Crush and flake.

Respondents	1,221	100.0%
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Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

The following opinions regarding intermediate treatment were obtained in the interview survey of municipalities.

Figure 30: Opinions of municipalities on intermediate treatment of used plastic bottles

- We have no complaints about the JCPRA, but we have heard through intermediate processors to whom we deliver bales that the JCPRA has strict quality standards for picking up bales.
- The amount that can be transferred to the JCPRA after baling is reduced by approximately 2 to 4 tons compared to the amount that is brought to the intermediate treatment facility (approximately 900 tons). The yield rate is not bad, but there is a slight difference in the quality of used plastic bottles depending on the district due to municipal mergers, and we believe that residents have not caught up with the way they are supposed to dispose of their garbage.
- The first step for plastic bottles collected in this municipality is to manually remove the caps from plastic bottles as an intermediate process. Although labels were not removed even if attached, the rank given by the JCPRA for baling plastic bottles collected in this municipality was almost an "A" rank.
- The business operator to which this municipality outsources intermediate treatment cannot accommodate large machinery because its plant is located in a residential area, and its treatment capacity is limited to approximately 700 tons. This is the maximum amount that can be delivered to the JCPRA.

Source: Prepared by the JFTC based on responses to the interview survey (for municipalities)

B. Types of Reasons Why Intermediate Treatment Is Not Implemented

As described in Section A above, there are a certain number of municipalities that do not implement intermediate treatment of used plastic bottles (including cases where used plastic bottles to be collected are not partially provided intermediate

treatment).

Municipalities that have not implemented intermediate treatment in whole or in part (municipalities that selected "b" or "c" in Figure 28) were asked the reason for not doing so, and the answers were as follows below.

Figure 31: Reasons for municipalities not to implement intermediate treatment of used plastic bottles (multiple answer)

Responses		Respondents (persons)	Percentage
a	There are no intermediate treatment facilities nearby.	51	22.7%
b	Intermediate treatment is too costly.	22	9.8%
c	The processing or storage capacity of the intermediate treatment facility is exceeded.	27	12.0%
d	There is no need for intermediate treatment of used plastic bottles when they are handed over to waste disposal business operators, or other similar reasons.	100	44.4%
e	Other ⁶³ .	62	27.6%
Respondents		225	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

Thus, when municipalities do not implement intermediate treatment, the reasons can be divided into two main categories: cases where intermediate treatment cannot be implemented (see "a," "b," and "c" in Figure 31) and cases where intermediate treatment is not necessary (see "d" in Figure 31).

⁶³ The following are the main responses received in the free-text field regarding specific reasons:
 - It is implemented in other municipalities, partially administered associations, or outsourced to business operators or other such entities.
 - There is no need to do so for plastic bottles that have been soiled as much as they cannot be recycled.

(3) Contract Administration for Collection and Intermediate Treatment Services

A. Method of Conducting Collection Operations

Some municipalities have their own employees performing collection operations for used plastic bottles, while other municipalities outsource to outside business operators.

Questions regarding how to implement collection operations were posed to municipalities that collect used plastic bottles, and the answers were as follows below.

Figure 32: Methods used to collect used plastic bottles in municipalities (multiple answer)

	Responses	Respondents (persons)	Percentage
a	Collected by local government officials.	217	15.7%
b	Outsourced only collection operations to private business operators and other entities (the same contract does not cover the outsourcing of intermediate treatment to such business operators).	1,052	76.1%
c	Outsourced collection operations, intermediate treatment, and other services to private business operators and other entities as a single package (under the same contract).	122	8.8%
d	Outsourced collection operations and other services to private business operators and other entities and delivering used plastic bottles to them (local governments are not involved in the business operations beyond collection).	82	5.9%
e	Other ⁶⁴ .	92	6.7%

⁶⁴ The following are the main responses received in the free-text field regarding the specific method of implementation:

- Outsourcing collection operations to residents.
- Residents bring used plastic bottles to storage facilities.

Respondents	1,383	100.0%
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Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

Of these, questions were posed to municipalities that outsource plastic bottle collection operations (municipalities that selected "b," "c," or "d" in Figure 32), and their answers to the question about the contracting method were as follows.

Figure 33: Contracting method for collection operations of used plastic bottles in municipalities (multiple answer)

Responses		Respondents (persons)	Percentage
a	Comprehensive evaluations.	17	1.4%
b	Proposals/competitions.	25	2.0%
c	General competitive bidding other than "a" above.	79	6.4%
d	Designated competitive bidding other than "a" above.	246	20.0%
e	Private contracts (matching quotations).	447	36.3%
f	Special private contracts.	444	36.1%
g	Other.	47	3.8%
Respondents (Respondents who answered "private contracts ("e" or "f")) ⁶⁵		1,231 (881)	100.0% (71.6%)

Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

The following opinions regarding the outsourcing method used for collection operations were obtained in the interview survey of municipalities.

⁶⁵ Since respondents can choose multiple answers, this number differs from the total number of respondents who answered either "e" or "f."

Figure 34: Opinions of municipalities on contract methods used for collection operations of used plastic bottles

- We outsource collection operations from a collection center to two companies. Since these two companies are the only ones who can provide collection operations in this municipality, the operations are conducted under a private contract.
- This municipality outsources to a cooperative within the municipality as a recycler to collect recyclable waste, including used plastic bottles, to carry out intermediate treatment and to deliver them. When we consider the volume of recyclable waste generated in this municipality, the cooperative is practically the only business operator that can handle it, so we have selected them under a private contract.
- In this municipality, collecting household garbage is performed both directly by staff and by contract business operators, with 40% on a direct basis and the remaining 60% by contractors. This municipality covers a wide area, and in order to provide a stable supply of services, we have entered into a private contract with a public-sector corporation, an organization funded by the municipality, as a subcontractor.
- We outsource to private business operators for both collection and intermediate treatment, and we decide on a service provider once every five years through a bidding process.
- We select a business operator through proposals and outsource the entire process from the collection of bottles, cans, and plastic bottles to intermediate treatment and delivery to a recycler.

Source: Prepared by the JFTC based on responses to the interview survey (for municipalities)

B. Method of Conducting Intermediate Treatment Operations

There are some municipalities that implement intermediate treatment of used plastic bottles or outsource to private business operators at municipal facilities they own, while other municipalities outsource to private business operators at facilities other than municipal facilities they own.

Questions regarding the method used to implement intermediate treatment operations of used plastic bottles were posed to municipalities that have implemented such operations, and the responses were as follows below.

Figure 35: Methods used to implement intermediate treatment operations for used plastic bottles in municipalities (multiple answer)

Responses		Respondents (persons)	Percentage
a	Performed by local government officials regarding intermediate treatment at facilities owned by local governments and other entities.	179	14.9%
b	Outsourced to private business operators and other entities for the implementation of intermediate treatment at facilities owned by local governments and other entities.	617	51.2%
c	Outsourced private business operators and other entities for implementing intermediate treatment at facilities owned by local governments and other entities, and deliver used plastic bottles to such private business operators (local governments are not involved in the business after intermediate treatment).	17	1.4%
d	Outsourced to private business operators and other entities for intermediate treatment, and facilities owned by local governments are not used.	278	23.1%
e	Outsourced to private business operators and other entities for intermediate treatment and deliver used plastic bottles to such operators (local governments are not involved in the business after intermediate treatment).	142	11.8%
f	Other.	78	6.5%
Respondents		1,205	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

Of these, questions about the contracting method were posed to municipalities that outsource intermediate treatment of plastic bottles (municipalities that selected

"b," "c," "d", or "e" in Figure 35), and their responses were as follows below.

Figure 36: Contracting method used for intermediate treatment operations of used plastic bottles in municipalities (multiple answer)

Responses		Respondents (persons)	Percentage
a	Comprehensive evaluations.	54	5.4%
b	Proposals/ competitions.	69	6.9%
c	General competitive bidding other than "a" above.	59	5.9%
d	Designated competitive bidding other than "a" above.	155	15.4%
e	Private contract (matching quotations).	308	30.7%
f	Special private contracts.	340	33.9%
g	Other.	62	6.2%
Respondents		1,004	100.0%
(Respondents who answered "private contracts ("e" or "f")) ⁶⁶		(643)	(64.0%)

Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

The following opinions regarding the outsourcing method used for intermediate processing operations were obtained in the interview survey of municipalities.

Figure 37: Opinions of municipalities on the contract method used for intermediate treatment of used plastic bottles

- We outsource intermediate processing to private business operators. Since the company is the only operator near this municipality that can process more than 3,000 tons of used plastic bottles each year, this is conducted under a private contract.
- For intermediate treatment, we have concluded private contracts with three companies in this municipality. These are private contracts for reasons such as equipment, processing capacity, and location.

⁶⁶ Since respondents can choose multiple answers, this number differs from the total number of respondents who answered either "e" or "f."

- The intermediate treatment facility is owned by the municipality, but we outsource its operation, and every five years, we decide who will operate the facility through proposals.

Source: Prepared by the JFTC based on responses to the interview survey (for municipalities)

C. Comparison of Outsourcing Status Between Collection and Intermediate Treatment

As described in Sections A and B above, with regard to the outsourcing of collection and intermediate treatment of used plastic bottles by municipalities, collection operations were more often conducted under private contracts than intermediate treatment operations (the percentages of respondents who answered that operations were under a private contract were 64.0% for intermediate treatment operations and 71.6% for collection operations).

D. Approach Under Competition Policies

As described in Sections A and B above, the results of the survey showed that, in many cases, the outsourcing of collection and intermediate treatment of used plastic bottles by municipalities tends to be carried out under private contracts. In addition, as noted in Section C above, a comparison between the two types of operations shows that collection operations are more often implemented through private contracts than intermediate treatment operations.

Since procurements made by municipalities are funded by taxes, they are generally expected to procure at a lower price. Also, general competitive bidding, which calls for a large number of applicants with no particular qualifications, is generally used as the most transparent and fair method, while designated competitive bidding and private contracts are used in exceptional cases. Further, in general, it is expected that competition will function more effectively if general competitive bidding and other methods are used instead of private contracts. Therefore, it is assumed that it will be possible to contract with more efficient contractors on more favorable terms and conditions. In light of this, it is desirable for municipalities to constantly review their contracting methods from the viewpoint of whether it is appropriate to use general competitive bidding and other methods

instead of private contracts⁶⁷.

For example, as shown in Figure 34 (page 50) and Figure 37 (page 52), there are cases in which municipalities decide who to outsource collection or intermediate treatment depending on what bidding method they take, and such cases may be considered as references.

(4) Costs of Collection and Intermediate Treatment

A. Outsourcing Collection and Intermediate Treatment Prior to Delivery

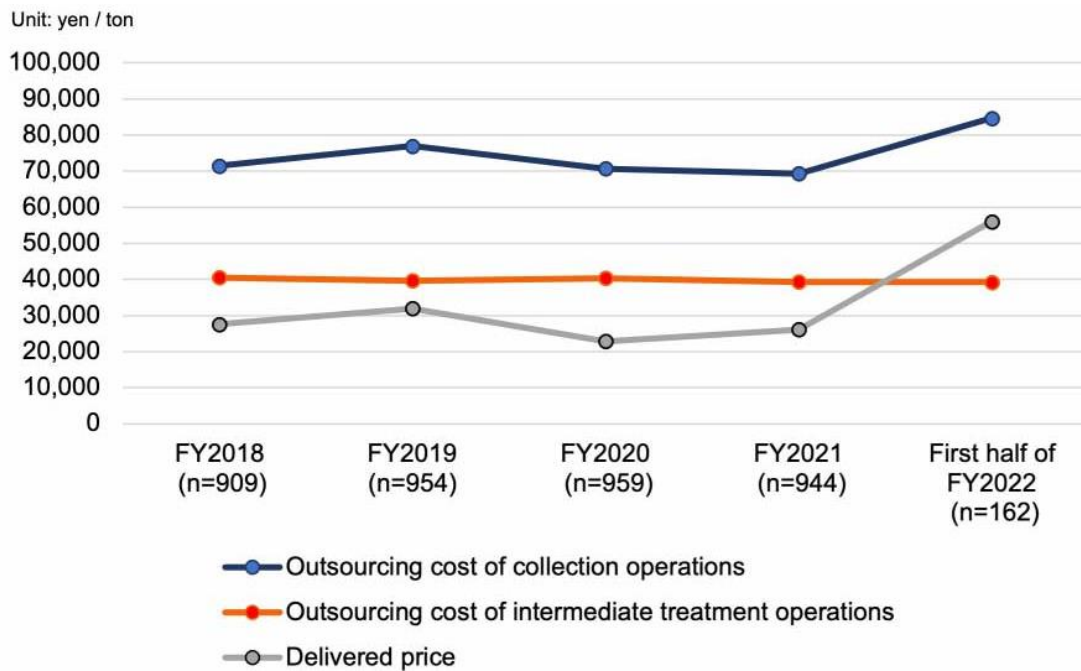
In recent years, most deliveries of used plastic bottles from municipalities to recyclers and other entities have been done under onerous contracts, but in many cases, municipalities pay for collection and intermediate treatment of bottles before delivery.

For this reason, questions about these costs were posed to municipalities that are able to ascertain the costs of collection or intermediate treatment of used plastic bottles (municipalities that are or have been outsourcing these operations to private business operators and other entities that are able to identify the outsourcing costs related to used plastic bottles; the same shall apply hereinafter), and responses were obtained. The delivery price to recyclers and other entities was compared with the costs of collection or intermediate treatment of used plastic bottles from municipalities' responses to the question about the delivery price out of all municipalities that responded about these costs.

The delivery price had been lower than the outsourcing cost on both collection and intermediate treatment, but in the first half of 2022, the delivery price increased, which reversed the outsourcing cost on intermediate treatment.

⁶⁷ However, because general waste disposal operation is licensed by the municipality under the provisions of the Waste Management and Public Cleansing Act, the positioning of such operations in this act should also be taken into consideration. For instance, as noted in the following: "Mayors of municipalities may grant a license for general waste disposal business only when it is difficult for municipalities to dispose of general waste. This is because municipalities should be responsible for general waste treatment by themselves, and therefore, it is understood that the license can be granted only when it is necessary to let someone other than the municipality conduct the treatment due to the limitation of the treatment capacity and other reasons... From the fact that proper treatment is required under the supply and demand situation according to the amount of general waste generated within a certain area and other aspects, it can be said that the general waste disposal industry is not positioned as a business that should be treated exclusively in the context of free competition under the Waste Management and Public Cleansing Act." (Judgment of the Supreme Court of Japan, January 28, 2014.)

Figure 38: Comparison between outsourcing costs for collection and intermediate treatment operations and the delivery price in municipalities



Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

B. Delivering to Outsourced Business Operators for Collection and Intermediate Treatment

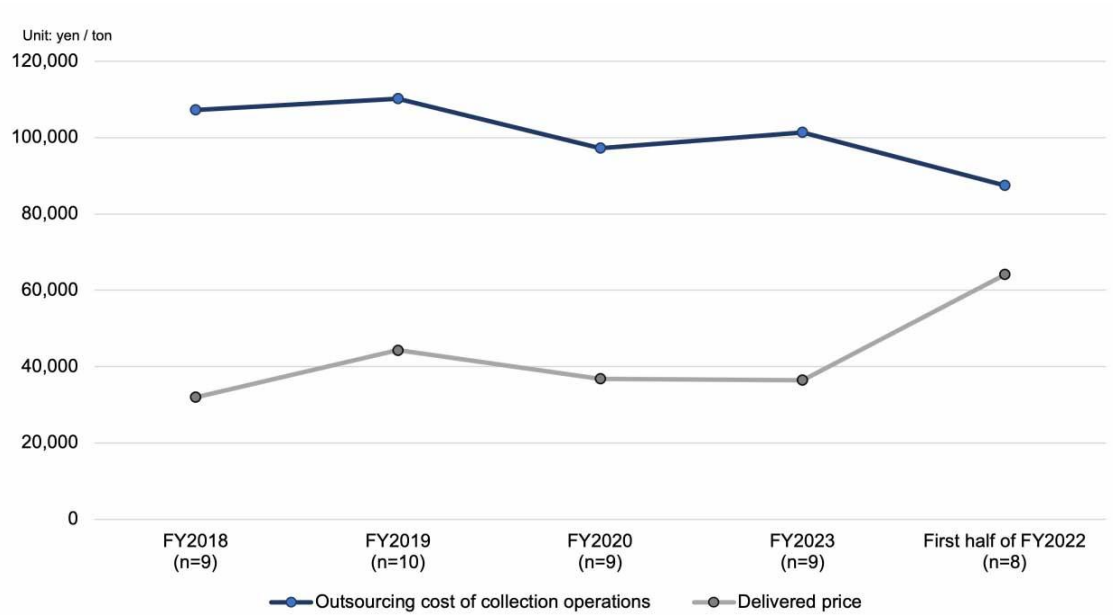
In some municipalities, used plastic bottles are delivered to outsourced business operators for collection or intermediate treatment, and those municipalities do not conduct any operations beyond collection or intermediate treatment.

In light of this, the costs of collection and intermediate treatment were compared with the delivered price in the case of municipalities that responded about the delivered price to recyclers and other entities (municipalities that selected "d" in Figure 32 (page 48) and those that selected "e" in Figure 35 (page 51)) out of all municipalities that both outsource collection or intermediate treatment to private business operators and other entities and deliver used plastic bottles to the said business operators. The results are as follows below.

Since used plastic bottles are delivered directly to outsourced business operators for collection or intermediate treatment, the responses are considered to be from municipalities that independently process bottles, and the cost of collection or

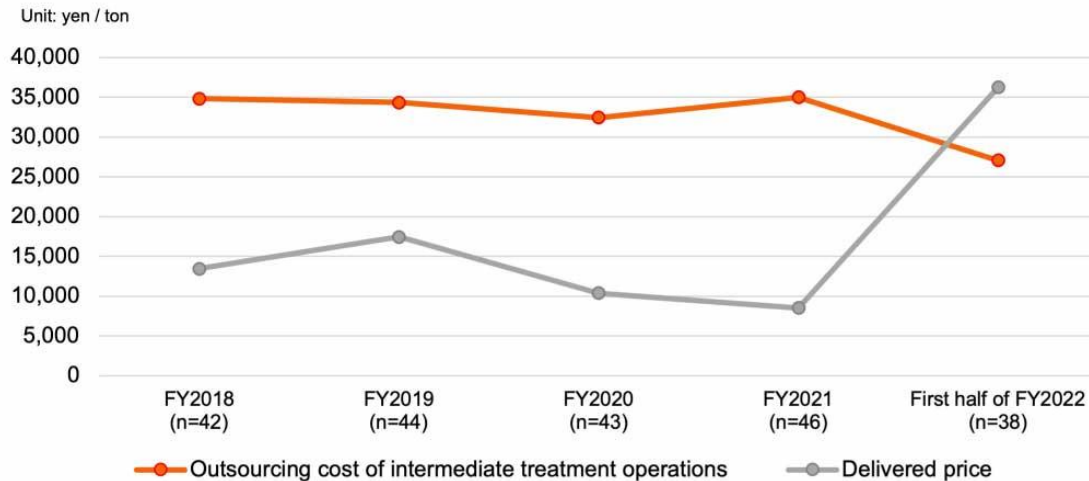
intermediate treatment operations in these municipalities is slightly decreasing. On the other hand, since the delivered price is on an upward trend, the difference between the costs of collection or intermediate treatment and the delivered price is narrowing, or the volume on either of the costs and the delivered price is reversing.

Figure 39: Comparison of outsourcing costs of collection operations with the delivered price in municipalities that deliver used plastic bottles to collectors



Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

Figure 40: Comparison of outsourcing costs of intermediate treatment operations with the delivered price in municipalities that deliver used plastic bottles to intermediate treatment operators



Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

C. Value of Used Plastic Bottles

As described in Sections A or B above, the results of the survey showed that the cost of outsourcing collection operations was considerably higher than the delivered price⁶⁸.

In addition, the following opinions regarding costs of collection operations or intermediate treatment operations were obtained in the interview survey of municipalities, and it seems that the delivered price does not measure up to such costs.

Figure 41: Opinions of municipalities on the costs of collection and intermediate treatment

- Even if we could sell at a slightly higher price, it would not add up to a positive balance in recycling as a whole, considering the labor involved in collection and intermediate

⁶⁸ It should be noted that this is not necessarily a clear indication of the entire market situation because this is based on data from only some municipalities that responded to the relevant questions, and because the business environment and other factors related to collection and intermediate treatment are considered to vary greatly depending on the municipality.

treatment. It is only being purchased at a slightly higher price, while other resources are almost worthless.

- The cost of collection operations is approximately 14 million yen per month, and the cost of intermediate treatment operations is approximately 25 yen per kilogram. The most costly aspect is collecting, which becomes more expensive, especially during the summer season, since the volume of plastic bottles to be disposed of increases and more vehicles are needed to collect them. When we consider the costs, including everything from the collection process, the profit and loss will not be positive even if we sell plastic bottles at a high price.
- Even if we receive a certain amount from sales, it will be far more negative when we offset it with the cost of collection and intermediate treatment. We are concerned that the negative impact will be even greater in the future due to rising labor costs and gasoline prices.
- Intermediate treatment is very costly. It requires manual work to collect and sort used plastic bottles, which incurs labor costs. It is difficult to cut costs in this regard, partly because minimum wages are rising.

Source: Prepared by the JFTC based on responses to the interview survey (for municipalities)

2. Delivery of Used Plastic Bottles Emitted as General Waste

As explained in Chapter 4-5 (page 37) above, the legal status and other details of used plastic bottles differ depending on whether they are general waste or industrial waste, and their transaction structures are also different. Therefore, used plastic bottles emitted as general waste are mainly delivered from municipalities to recyclers and other entities.

The results of the survey on the current status of transactions between municipalities and recyclers or other entities are as follows below.

(1) Use of Delivery Routes

As described in Chapter 4-1 (3) (page 30) above, there are two routes for delivering used plastic bottles to be collected from municipalities to recyclers: the designated juridical person route and the independent route.

Questions were posed to municipalities regarding their current disposal methods,

and their responses were as follows below.

Figure 42: Use of designated juridical person route and independent route in municipalities

Responses		Respondents (persons)	Percentage
a	All used plastic bottles are delivered to the successful bidder of the bidding by the Recycling Association of Japan.	818	60.2%
b	Some used plastic bottles are delivered to the successful bidder of the bidding by the Recycling Association of Japan, while others are delivered to business operators selected by local governments as so-called independent processing.	134	9.9%
c	All used plastic bottles are delivered to business operators selected by the local government for so-called independent processing.	407	29.9%
Total (respondents)		1,359	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

(2) Designated Juridical Person Route

A. Opinions of Municipalities

Questions were posed to municipalities using the designated juridical person route (municipalities that selected "a" or "b" in Figure 42; the same applies below), and their answers were as follows below.

Figure 43: Reasons why municipalities use the designated juridical person route (multiple answer)

Responses	Respondents (persons)	Percentage
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a	We feel that it is consistent with the spirit of the Containers and Packaging Recycling Law to deliver to the JCPRA.	484	49.9%
b	We can ensure recycling properly by using the JCPRA, even if we, the local government, do not check recycling status on our own.	540	55.7%
c	Using the JCPRA enables us to reduce administrative workload.	475	49.0%
d	We can be assured of responses by recyclers and other entities in the event of an accident, withdrawal of business, or other irregularities as long as we utilize the JCPRA.	556	57.4%
e	Bidding conducted by the JCPRA ensures the fairness of contracts.	429	44.3%
f	We can deliver used plastic bottles at a higher price by using the JCPRA rather than by processing them independently.	90	9.3%
g	The bidding conducted by the JCPRA allows for desired designations of use following recycling.	114	11.8%
h	There are no recycling business operators or other entities nearby that are capable of delivering waste through independent processing.	226	23.3%
i	The volume exceeds the capacity for independent processing.	19	2.0%
j	No particular reason.	19	2.0%
k	Other ⁶⁹ .	66	6.8%
Respondents		969	100.0%

⁶⁹ The following are the main responses received in the free-text field regarding the specific reasons:

- The JCPRA is the only corporation designated under the Containers and Packaging Recycling Law.
- It connects many municipalities with many recyclers, and so we can expect stable recycling.
- We feel that we can deliver more stable prices than with the independent processing.
- It is a remote island here, and so it is difficult to process independently.

Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

Also, the following opinions regarding the advantages and disadvantages of using the designated juridical person route were obtained in the interview survey of municipalities.

Figure 44: Opinions of municipalities on using the designated juridical person route

- The primary reason for using the designated juridical person route is stability. In the event a client suddenly stops doing business, the JCPRA will take full responsibility and find another business operator on our behalf. On the other hand, with independent processing, we would have to consider the risks at that time.
- If the delivered price of used plastic bottles suddenly drops, there is a risk that we cannot find a recipient or that we will have to accept an inverse onerous contract. In the case of the designated juridical person route, even if such a situation arises, the municipality can reliably deliver used plastic bottles, and there is no burden on the municipality even under an inverse onerous contract.
- As for the JCPRA, they have a reputation for having stringent acceptance criteria. For example, for a long time, JCPRA did not accept plastic waste from municipalities that did not meet its standards in quality inspections. It is also difficult to own a processing facility capable of providing all collected waste at a sufficient quality to the JCPRA.
- The reason why we don't deliver plastic bottles to the JCPRA is that the designated juridical person route does not allow us to choose the use of bottles for recycling. In this municipality, we have always wanted to recommend bottle-to-bottle, so we have been processing independently ever since. If the designated juridical person route allows us to specify the use of the product, we would consider delivering to the JCPRA.
- When we processed independently, the amount of the sale to delivery business operators was transferred every month, but when we transacted with the JCPRA, the transfer was made twice a year. The second transfer was made in April and May of a different fiscal year, so we cannot easily determine the amount. It is very difficult to deal with such a situation due to budgeting and calculating revenue and expenditure for each fiscal year.

- It costs more to ship to remote islands via sea routes, but the municipality does not have to take on the cost burden of sea routes in the case of the designated juridical person route. In addition, taking the designated juridical person route can simplify administrative procedures on the municipality side.

Source: Prepared by the JFTC based on responses to the interview survey (for municipalities)

B. Opinion of Recyclers

Questions were posed to recyclers on why they registered or used to be registered with the JCPRA, and their responses were as follows below.

Figure 45: Reasons why recyclers use the designated juridical person route (multiple answer)

	Responses	Respondents (persons)	Percentage
a	We feel that it is consistent with the spirit of the Containers and Packaging Recycling Law to perform recycling business under the JCPRA's system.	24	57.1%
b	Being a registered business operator of the JCPRA leads to high credibility as a recycler.	31	73.8%
c	We cannot secure the necessary amount of used plastic bottles to be purchased only by methods other than the bidding process conducted by the JCPRA.	30	71.4%
d	We can purchase used plastic bottles of good quality.	22	52.4%
e	We can purchase used plastic bottles at desirable prices.	4	9.5%
f	It is important to secure multiple routes for purchasing used plastic bottles from the viewpoint of the stability of our business.	25	59.5%

g	We would like to win the bid as a local business operator for the portion that the local government collects that is subject to the bidding of the JCPRA.	16	38.1%
h	It is difficult to find a buyer for used plastic bottles other than the bidding process conducted by the JCPRA.	11	26.2%
i	Using the JCPRA enables us to reduce administrative workload.	9	21.4%
j	No particular reason.	0	0.0%
k	Other ⁷⁰ .	3	7.1%
Respondents		42	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for recyclers)

Regarding the advantages and disadvantages of using the designated juridical person route, the following opinions were observed in the interview survey of recyclers.

Figure 46: Opinions of recyclers about using the designated juridical person route

- Doing business with the JCPRA is beneficial in that we can secure a route to obtain quality bales. It would be preferable if we could continue to secure used plastic bottles from stores and have them processed independently, but since we cannot foresee how the world will change, we would like to maintain our relationship with the JCPRA as a hedge against future risks.
- For large recyclers, it would be advantageous in terms of operational efficiency to win bids for a large number of designated storage facilities in the JCPRA's bidding process since the JCPRA is the only party with which they have a contract.
- Our company has registered with the JCPRA as a recycler of plastic bottles, plastic containers, and packaging. In truth, the persons in charge believe it to be unprofitable

⁷⁰ The following are the main responses received in the free-text field regarding the specific reasons:
- We can recycle plastic bottles by using the JCPRA's system in accordance with the Containers and Packaging Recycling Law, and remote island areas are not left behind.

when they take labor and utility costs into account, but the management may register with the JCPRA for the sake of social relations and being a registered member. Since our company also provides waste collection for municipalities, being registered as a recycling business operator by the JCPRA may serve as branding targeting municipalities.

Source: Prepared by the JFTC based on responses to the interview survey (for recyclers)

(3) Independent Route

A. Opinions of Municipalities

Questions were posed to municipalities that process independently (municipalities that selected "b" or "c" in Figure 42; the same applies hereinafter), and the reasons for this are as follows.

Figure 47: Reasons why municipalities use their own processing routes (multiple answer)

	Responses	Respondents (persons)	Percentage
a	We can recycle as we wish if we process independently.	95	18.1%
b	Processing independently allows us to reduce our administrative workload.	134	25.5%
c	We can deliver to recyclers more stably by processing independently.	62	11.8%
d	Processing independently ensures the fairness of contracts.	20	3.8%
e	Processing independently enables us to select recyclers and other entities freely.	35	6.7%
f	We can deliver a higher price by processing independently.	150	28.5%
g	Processing independently allows us to better stabilize the delivered price.	49	9.3%
h	We can be more flexible in terms of delivery	125	23.8%

	methods (number of deliveries, lots, etc.) and so on by processing independently.		
i	There are fewer quality restrictions with independent processing (e.g., we can deliver round bottles or dirty bottles).	107	20.3%
j	We would like to deliver to local business operators.	124	23.6%
k	It is necessary to continue business relationships with waste disposal business operators and other entities with which we have been doing business.	64	12.2%
l	There are business operators to whom we can outsource entire processes, such as collection or intermediate treatment.	64	12.2%
m	The number of intermediate treatment facilities and other equipment and their processing capacities exceed the volume limits that can be delivered to the JCPRA.	16	3.0%
n	No particular reason.	16	3.0%
o	Other ⁷¹ .	75	14.3%
Respondents		526	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

Also, the following opinions regarding independent processing were obtained in the interview survey of municipalities.

⁷¹ The following are the main responses received in the free-text field regarding the specific reasons:

- When we consider issues such as transportation costs due to remote island circumstances, we think it is best to deliver to business operators from the intermediate treatment phase.
- We agree with the purpose of activities by partners we work with in our independent processing.
- We have concluded an agreement on bottle-to-bottle.
- We aim to raise residents' awareness of recycling.
- We intend to standardize unit selling prices by using both the JCPRA and the independent processing routes, as well as to continue stable operations by having multiple options.
- We independently process used plastic bottles that do not meet the standards of the JCPRA due to soiling or other reasons.

Figure 48: Opinions from municipalities on using independent processing routes

[Price aspects]

- The advantage of independent processing is related to revenue.
- The fact that we do not own an intermediate treatment and storage facility operated by municipalities is the main reason why we cannot use the designated juridical person route. If we have business operators store bales until we deliver them to the JCPRA, we will have to bear the cost of storing them. When we considered not simply the contrast in disposal costs but also the storage costs, we had no choice but to process used plastic bottles independently.
- In cases of delivery through the designated juridical person route, it is difficult to estimate revenue because the unit price is determined by bidding. However, in cases of the independent route, being able to accurately foresee revenue since we can determine unit selling prices earlier is a clear advantage.
- In this municipality, we currently deliver used plastic bottles free of charge, although we can specify in the agreement with business operators whether we will deliver for free or for a fee. Indeed, it seems that delivering free of charge would reduce the revenue more than the designated juridical person route, but the agreement stipulates that business operators cooperate in raising public awareness regarding the recycling of plastic resources, and in light of this, it does not have a negative impact as a whole.

[Quality aspects]

- In order to deliver to the JCPRA, it is necessary to comply with the "Quality Guidelines for Delivery from Municipalities" for baling, but there are no facilities in the municipality to bale used plastic bottles. Since it takes 30 minutes to reach the facilities one way, we cannot afford to keep up with collecting if we try to also bale bottles. Currently, we collect them at certain locations in municipalities and sell them as round bottles to business operators, who bale and sell them to recyclers.
- We can have them taken by recyclers under the agreement even if they are not as clean as the quality required to be delivered to the JCPRA. In this regard, we think that more used plastic bottles will be recycled because more of them are available for recycling, and municipalities will be able to discharge them in a manner that matches the capacity of such recyclers.

[Recycling applications]

- The advantage of independent processing is that it reflects the recycling methods requested by municipalities. In addition, the disadvantage of independent processing is that the unit price for delivery to recyclers is lower than that of the JCPRA.

[Approaches to contractual default risks]

- Our municipality also processes independently, but what is important in waste disposal administration is stability. In independent processing, we have to understand that we are taking the risk of having to deal with issues when used plastic bottles cannot be delivered, such as when the contracted recyclers are not able to continue their business due to problems.
- In cases of independent processing based on an agreement, there is a risk that the contract will not be fulfilled due to deterioration or other reasons in the business performance of the recyclers to whom waste is delivered. However, we reduce risk by stipulating in agreements with large business operators that, in the event of a problem, they will find alternative recyclers.

Source: Prepared by the JFTC based on responses to the interview survey (for municipalities)

B. Opinions of Recyclers

Questions were posed to recyclers that procure used plastic bottles by methods other than the JCPRA's bidding process in order to learn why they purchase used plastic bottles through such methods, and their answers were as follows below⁷².

Figure 49: Reasons why recyclers purchase used plastic bottles from routes other than the designated juridical person route (multiple answer)

	Responses	Respondents (persons)	Percentage
a	Bidding conducted by JCPRA alone is not sufficient to secure the necessary amount of	32	80.0%

⁷² This question asked about the reasons for purchasing used plastic bottles by methods other than JCPRA's bidding and could include reasons for purchasing used plastic bottles emitted as industrial waste. Therefore, it should be noted that the responses do not necessarily indicate only the reason why respondents use their independent processing route for used plastic bottles emitted as general waste.

	used plastic bottles to be purchased.		
b	We can purchase used plastic bottles of good quality.	13	32.5%
c	Even if used plastic bottles do not meet the JCPRA's sorting standards in terms of the rate of impurities, they can be used as raw materials for recycled plastic resin by using the company's own technologies and facilities.	11	27.5%
d	We can purchase used plastic bottles at a lower price compared to the bidding conducted by the JCPRA.	10	25.0%
e	We can purchase used plastic bottles at stable prices.	9	22.5%
f	It is important to secure multiple routes for purchasing used plastic bottles from the viewpoint of the stability of our business.	30	75.0%
g	We can reduce administrative workload by purchasing used plastic bottles through methods other than the bidding process conducted by the JCPRA.	5	12.5%
h	We can transact more flexibly by adjusting the frequency of picking up used plastic bottles, the settlement method, and other details if we purchase through methods other than the bidding process conducted by the JCPRA.	10	25.0%
i	We would like to purchase from local governments and local business operators.	18	45.0%
j	It is necessary to continue business relationships with local governments and business operators with whom we have done business so far.	13	32.5%
k	We were asked to purchase used plastic bottles	8	20.0%

	from local governments and business operators.		
l	No particular reason.	0	0.0%
m	Other.	1	2.5%
Respondents		40	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for recyclers)

In addition, the following opinions regarding the advantages and disadvantages of procuring used plastic bottles through routes other than the designated juridical person route were obtained from the interview survey of recyclers.

Figure 50: Opinions of recyclers on using independent routes

- The order of priority, from greatest to least, for purchasing used plastic bottles is as follows: (1) Successful bids at the JCPRA, (2) Municipalities' independent disposal, and (3) Businesses' emissions. The first step is to go to the JCPRA for bids, and if we cannot secure a large volume there, we will go for our independent processing. In some cases, we perform intermediate treatment when we process independently, while in other cases, we purchase bales that are processed by another company, which is outsourced by the municipality for performing intermediate treatment.
- As for used plastic bottles that we obtain through successfully bidding at the JCPRA, they must be processed within a certain time frame, and if we were to purchase them to the limit of the processing capacity, we could be in violation of the regulations in cases where the equipment breaks down.

Source: Prepared by the JFTC based on responses to the interview survey (for recyclers)

C. Types of Reasons for Performing Independent Processing

Based on the results of the survey described in Section A above, it can be said that there are four general types of reasons for municipalities to choose the independent route.

The first reason is the price (see "f" in Figure 47 (page 64)). Municipalities may choose to use the independent route if they judge that they can deliver used plastic bottles at a higher price by using the independent route compared to using the

designated juridical person route⁷³.

The second reason is that there are fewer quality restrictions and that local business operators are given priority (see Figure 47 (page 64), "i," "j," "k," etc.). Municipalities may choose the independent route if they cannot meet the quality standards of the designated juridical person route or have a desire to deliver to local business operators⁷⁴.

The third reason is related to factors including convenience (see Figure 47 (page 64) "b," "c," "h," etc.). Municipalities sometimes choose the independent route if they wish to conduct transactions in a stable manner, with less administrative burdens, or with more flexibility in terms of delivery⁷⁵.

The fourth reason is the designation of use after recycling (see Figure 47 (page 64) "a"). As described in Chapter 3-1 (5) B (page 22) above, in the JCPRA bidding process, municipalities are not allowed to specify post-recycling usage, although they may choose their own processing route if they wish to use a particular recycling method or a certain recycled product⁷⁶.

The first three of the above reasons for independent processing have been

⁷³ Similar trends have been suggested by past studies and surveys. According to "Key Findings of the Survey on Used Plastic Bottle Recycling in Municipalities" (Ministry of Environment, April 2017) (<https://www.jcpa.or.jp/Portals/0/kaigi/plastic/20170411/do03.pdf>)

A material presented by the Ministry of Environment: "Study Group on Plastic Bottle Recycling" (1st meeting) of the JCPRA; hereinafter referred to as the "survey results by the Ministry of the Environment"), the reason for independent processing is that 38.8% of municipalities stated that they can sell their products at a higher price than through the designated juridical person route. In addition, according to "Analysis of the Actual Condition of Independent Processing Used Plastic Bottles" (Ikuma Kurita, Journal of the Japan Society of Material Cycles and Waste Management, Vol. 22, No. 1, pp. 61-70, 2011; hereinafter referred to as the "Kurita paper in 2011"), 60% of municipalities similarly said that the reason is "because sales income can be expected from the independent route." Both answers represent the biggest reasons, which are similar to the results of the current survey. It should be noted, however, that the latter survey was conducted before the JCPRA introduced a system that allowed bidding under the onerous contract.

⁷⁴ Similar trends have been suggested by past studies and surveys. According to the survey results by the Ministry of the Environment, for example, 34.2% of municipalities stated that the reason for independent processing was "because conventional recycling routes have been established," and 21.3% stated that the reason was "to foster the local industry." In the Kurita paper in 2011, similarly, 13% of municipalities said it was "because the conventional recycling route is well-established," and 18% said it was "to foster and support local recyclers."

⁷⁵ Similar trends have been suggested by past studies and surveys. According to the survey results by the Ministry of the Environment, for example, the reasons for independent processing were that "compared to the designated juridical person route...it is more flexible" and "...even small lots...are accepted" by 26.9% and 26.6% of municipalities, respectively, and "compared to the designated juridical person route...the administrative procedures can be reduced" by 23.9%. In the Kurita paper in 2011, similarly, 18% of municipalities stated that the reason is that they can deliver in small lots.

⁷⁶ This seems to be different from the results of past studies and surveys. According to the survey results by the Ministry of the Environment in 2017, 0.8% of municipalities stated that the reason for conducting independent processing was "because they can specify the final use and application of waste," and it is considered that no option regarding this point was provided in the Kurita paper in 2011.

pointed out conventionally⁷⁷. On the other hand, the fourth reason for independent processing is a phenomenon that has become more common in recent years⁷⁸.

D. Methods used to Implement Independent Processing and Contract Administration

Questions were posed to municipalities that conduct independent processing regarding the method to contract for delivery to recyclers and other entities in case of independent processing, and the responses were as follows below.

Figure 51: Methods used to contract for independently processing used plastic bottles in municipalities (multiple answer)

Responses		Respondents (persons)	Percentage
a	Comprehensive evaluations.	1	0.2%
b	Proposals/ competitions.	5	1.0%
c	General competitive bidding other than "a" above.	20	3.8%
d	Designated competitive bidding other than "a" above.	111	21.2%
e	Private contracts (matching quotations).	181	34.6%
f	Special private contracts.	140	26.8%
g	Other ⁷⁹ .	81	15.5%
Respondents		523	100.0%
(Respondents who answered "private contracts ("e" or "f")) ⁸⁰		(319)	(61.0%)

Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

⁷⁷ See footnotes 73 through 75.

⁷⁸ See footnote 76.

⁷⁹ The following are the main responses received in the free-text field regarding the specific method:
- In the case of delivering to a business operator who is entrusted with intermediate treatment, the municipality has no involvement in selecting the subsequent delivery destination.

⁸⁰ Since respondents can choose multiple answers, this number differs from the total number of respondents who answered either "e" or "f."

Also, the following opinions regarding contract methods for independent processing were obtained in the interview survey of municipalities.

Figure 52: Opinions of municipalities on the contract system for independent processing of used plastic bottles

- We used to bid annually for independent processing, but since 2016, we have been delivering to local business operators under a private contract.
- We decide who to contract with for independent processing by bidding twice a year. We determine in the bid specifications that, as a condition to participate in the bidding, plastic bottles delivered to us must be recycled domestically and not exported overseas, and that they must be recycled as resources through chemical or material recycling rather than thermal recycling. Therefore, as a result, only those business operators with a reliable background can participate in our bidding process because we have set the bar as high as that of the JCPRA bidding process.
- We select business operators through proposals and outsource the entire process from the collection of bottles, cans, and plastic bottles through intermediate treatment to delivery to a recycler.
- We select who to contract with under restricted general competitive bidding by limiting the target to those recyclers who can realize bottle-to-bottle recycling for independent processing.
- Although we conclude agreements on bottle-to-bottle, as a municipality, we directly contract with recyclers and conclude private contracts to purchase plastic bottles collected by the municipality.

Source: Prepared by the JFTC based on responses to the interview survey (for municipalities)

E. Approach Under Competition Policies

As described in Section D above, the results of the survey show that in many cases, delivery is carried out under private contracts with recyclers and other entities when municipalities independently process used plastic bottles. In general, it is expected that competitions will function more effectively if general competitive bidding or other methods are used instead of private contracts. Therefore, it is

assumed that it will be possible to contract with more efficient contractors on more favorable terms and conditions. Furthermore, as described in Section (4) B (page 75) below, an economic analysis of the relationship between the delivered price and the method of contracting was conducted (see Appendix for details). The results show that the delivery price tends to be higher when the contract is carried out under a bidding method compared to when it is not. Therefore, the basic competition policy approach for municipalities to deliver used plastic bottles under the private contract is the same as described in Section 1 (3) D (page 53) above.

However, with respect to delivering used plastic bottles from municipalities to recyclers and other entities, the following may be considered in comparison with cases where municipalities outsource collection or intermediate treatment operations.

- Recyclers procure from a wider area than business operators perform collection or intermediate treatment.
- Some municipalities may consider used plastic bottles to be collected not as waste but as valuables when comprehensively assessing the characteristics, trade value, and other aspects of plastic bottles.⁸¹ If this is a prerequisite, it is thought that there is no need for recyclers and other entities to obtain a license as general waste disposers.

Therefore, it is not possible to generalize about the competitive environment regarding the disposal of used plastic bottles for each municipality because conditions such as the location of each municipality and the quality of the used plastic bottles to be discharged differ from one to another. However, in general, when municipalities select a business operator to deliver used plastic bottles, they are less likely to be constrained by the number of general waste disposers and other entities located in the area, compared to cases where municipalities outsource the collection or intermediate treatment of used plastic bottles.

⁸¹ According to the "Guidelines for Administrative Dispositions (Notice)" (dated April 14, 2021; issued by Industrial and Hazardous Waste Management Division, Environmental Regeneration and Material Cycles Bureau, Ministry of Environment, No. 2104141), which the Ministry of Environment inform each municipality, "waste is defined as material that is no longer needed because the holder cannot use it on its own or transfer it to another entity for value, and whether or not it falls under these categories should be determined by comprehensively taking into consideration the nature of the material, the circumstances of its emission, the normal handling pattern, whether or not it has any trade value, and the intention of the holder. "Whether or not the material is considered to be valuable is to be determined by comprehensively taking into account various factors to decide.

Thus, in terms of transparency, fairness, and other aspects, it is desirable to keep the contract method used for independent processing more competitive. For example, as shown in Figure 52, since there are certain cases where municipalities determine recyclers and other entities through bidding, such cases can be considered as a reference.

(4) Delivered Price

A. Changes in Prices

As described in Chapter 4-1 (3) (page 30) above, there are two processing routes for municipalities to deliver used plastic bottles to recyclers: the designated juridical person route and the independent route.

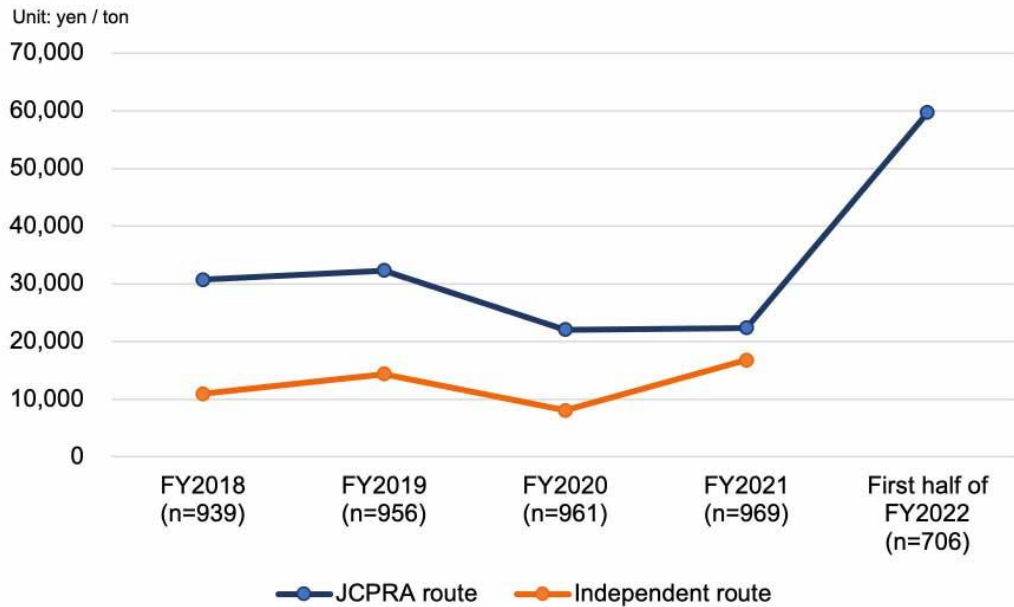
Questions were posed to municipalities regarding the volume (in tons) and delivered price (in yen) of used plastic bottles to recyclers and other waste disposers in each processing route, and the responses were obtained⁸².

The unit price per ton to deliver used plastic bottles from municipalities to recyclers and other entities, along with its trends, are shown below⁸³, and the unit price tends to be higher on average for those delivered through the designated juridical person route than for those delivered through the independent route.

⁸² As described in Chapter 3-1 (5) A (page 19) above, since it is considered that plastic bottles are traded under onerous contracts in most cases through the designated juridical person route, the JFTC corrects the unit price of successful bids and the corresponding quantities to be delivered when the JFTC checks the unit price of successful bids is a positive number (inverse onerous contract) in the designated juridical person route among the responses from municipalities with the bid data published by the JCPRA and it is considered that the positive or negative number is an error or a similar issue.

⁸³ As described in Chapter 3-1 (5) B (page 22) above, in the JCPRA's bidding, since the system is based on an inverse onerous contract, the price of the successful bid is inverse onerous contract when it is positive and onerous contract when it is negative. However, it is generally considered that a positive transaction price implies a situation where we receive compensation by providing something (onerous contract), and a negative transaction price recalls a situation where we need to pay additional fees when we are given something (inverse onerous contract). In subsequent figures in this report, for the sake of simplicity, the transaction price of an onerous contract is shown as a positive number and that of an inverse onerous contract as a negative number (for example, where the scale in Figure 53 is a positive number, it represents the unit price of delivery under an onerous contract.).

Figure 53: Unit price of used plastic bottles to be delivered from municipalities to recyclers⁸⁴



Source: Prepared by the JFTC based on responses to the questionnaire survey (for municipalities)

B. Factors Influencing on Prices

The delivered price of used plastic bottles is expected to fluctuate depending on various factors. For this reason, an economic analysis regarding factors that might influence price formation was conducted on the relevance of the delivered price (see Appendix for details.).

As a result, it was found that, in the designated juridical person route, the delivered price of used plastic bottles from municipalities to recyclers and other entities tends to be higher for those discharged from municipalities that were ranked A in the quality survey described in Chapter 4-1 (3) A (page 30) above and for those collected by sorted collection compared to those that were not discharged and collected from such municipalities. In addition, in cases of the independent route, the delivered price tends to be higher when contracts to deliver to recyclers and other entities are made by comprehensive evaluations, proposals/ competitions, or

⁸⁴ Unit prices on the independent route for the first half of FY2022 are not included because they are outside the survey scope.

designated competitive biddings compared to the cases of private contracts (matching quotations), special private contracts, or other methods. Furthermore, for the independent route involving a bottle-to-bottle initiative, it was observed that used plastic bottles tended to be taken back at higher prices. On the one hand, there are municipalities that realize higher delivered prices under the independent route than under the designated juridical person route, based on the fact that the unit prices of delivery under the designated juridical person route are higher on average than those under the independent route as described in Section A above along with the results of the interview survey. On the other hand, there are many municipalities where this is not the case. These differences among municipalities are thought to be due to differences in contracting methods and the presence or absence of a bottle-to-bottle initiative⁸⁵.

The results, which show that quality and segregated collection influence the delivered price in the designated juridical person route, are also consistent with the results of the interview survey shown below.

Figure 54: Opinions of municipalities on the determination factors for delivered prices of used plastic bottles

<p>[Quality]</p> <ul style="list-style-type: none"> • If the labels on plastic bottles are not removed, or if glass or other foreign matter is mixed inside plastic bottles, the quality of used plastic bottle baling will lose its quality. Recyclers are very concerned about this. • Quality will be higher if plastic bottles are cleanly sorted during collection. <p>[Amount to deliver]</p> <ul style="list-style-type: none"> • In all honesty, we do not understand why there is a bid price difference between the independent processing and the JCPRA's bids. We think that the bid price determination is also related to the quantity to be delivered.
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⁸⁵ In "Evaluation of the Financial Contribution System of the Containers and Packaging Recycling Law" (Ikuma Kurita, Society for Environmental Economics and Policy Studies, Vol. 2, No. 2, pp. 35-47, 2009), it is shown that (i) the more there are successful bids, (ii) the shorter the distance between the municipality and the recycler, (iii) the higher the sorting quality rank, and (iv) the more the sorting of designated storage facilities are not located on isolated islands, the lower the unit price of the successful bids (i.e., the transaction price gets high) tends to become. The Kurita paper in 2011 also indicates that the delivered price when used plastic bottles are processed independently gets (i) higher if foreign materials are removed or baled, (ii) lower if the recycler is selected under a private contract, (iii) higher if municipalities process independently due to financial advantages, and so on.

- We do not know the details of why the inverse onerous contract was taken at a certain point, but there is a possibility that it was difficult to find takers due to the extremely large volume of deliveries in our municipality amid the overall price fluctuations.

[Form]

- The unit price for transportation to business operators at the time of delivery is different between bales and round bottles. Unit prices are higher when used plastic bottles are baled compared to when they remain as round bottles. While baling allows for three fully loaded 10-ton trucks, round bottles are bulky and require three round trips for the same amount of used plastic bottles. For this reason, there is an approximate three- to five-fold price difference between round bottles and bales.

[Situation]

- The price of used plastic bottles depends on the price of oil and the global situation. This is true for both unit prices of successful bids under the designated juridical person route and unit prices when the municipality sells directly to recyclers as an independent route.

Source: Prepared by the JFTC based on responses to the interview survey (for municipalities)

Figure 55: Opinions of recyclers on determination factors for delivered prices of used plastic bottles

[Quality]

- The reason why there are differences in the purchase prices of used plastic bottles is not only the difference in workload in the recycling process, which depends on how much foreign matter and dirt remain, but also the amount of residue generated since we pay for its treatment and disposal.

[Form]

- It is natural that the unit price varies depending on whether the product is purchased in bales, in round bottles, or just in slightly compressed forms. When we purchase them as round bottles, about 5% to 10% of the weight is waste, which incurs extra transportation costs, removal costs, and discharging costs, so we determine the purchase price by taking such costs into account.

[Processing route]

- In some cases, recyclers that fail to win bids at the JCPRA find themselves in a challenging predicament during the fiscal period, and in such cases, they will purchase the amount of waste they independently process regardless of the amount they can actually afford. For this reason, municipalities may often be able to sell at a higher price if they process their own products independently rather than delivering to the JCPRA.
- Recyclers would have to stop their business if they were unable to successfully bid at all under the designated juridical person route. Therefore, considering such risks, they have no choice but to bid at a slightly higher unit price for the independent processing. All registered business operators bid with this in mind, which results in further increases in the unit price.

[Distance]

- When we collect used plastic bottles from municipalities, whether or not we accept them depends on the quality, the unit price, and other conditions, so although we sometimes receive them from far away, we put a priority on those close to us.

[Demand]

- Quality is important to us, but since we cannot afford to purchase used plastic bottles at very high prices, we sometimes purchase bottles of poor quality if we receive such an order.
- In FY2022, the unit prices of successful bids at JCPRA increased on average, which is because the demand for recycled plastic resin had increased on progress in bottle-to-bottle, increases in crude oil prices due to the situation in Ukraine, and other factors.

Source: Prepared by the JFTC based on responses to the interview survey (for recyclers)

3. Collection and Intermediate Treatment of Plastic Bottles Emitted as Industrial Waste

As explained in Chapter 3-1 (page 11) above, used plastic bottles emitted as industrial waste are not subject to the Containers and Packaging Recycling Law and are not required to be recycled. Business operators are only obligated to properly dispose of waste generated from their business activities in accordance with the Waste Management and Public Cleansing Act.

According to a survey on the current status of transactions related to the emission, collection, intermediate treatment, and other aspects of used plastic bottles emitted as industrial waste, the results are as follows below⁸⁶.

(1) Collection

A. Status of Collection

As mentioned in Chapter 4-5 (page 37) above, beverage manufacturers, retailers, and other business operators collect used plastic bottles from collection sites located beside vending machines or at storefronts, respectively.

Questions were posed to beverage manufacturers regarding their implementation status of collecting used plastic bottles, and the responses were as follows.

⁸⁶ With regard to the transaction of used plastic bottles emitted as industrial waste, almost all business operators in Japan are considered to be involved as the main emitters. In this survey, the JFTC conducted an interview survey on some of them, as well as a questionnaire survey and an interview survey on specified business operators and recyclers. Although a certain interview survey has been conducted on collectors and intermediate processors of used plastic bottles emitted as industrial waste, as well as recyclers that are not registered with the JCPRA, no questionnaire survey has been implemented with them. In this sense, it should be noted that the description of this item only clarifies a part of the actual trade situation of used plastic bottles emitted as industrial waste.

Figure 56: Implementation status of collecting used plastic bottles by beverage manufacturers

Responses		Respondents (persons)	Percentage
a	Collecting.	121	16.4%
b	Not collecting.	615	83.6%
Total (respondents)		736	100.0%

Source: Prepared by the JFTC based on responses to a questionnaire survey (for beverage manufacturers)

In addition, questions were posed to beverage manufacturers that collect used plastic bottles (those who selected "a" in Figure 56; the same applies hereinafter), and their answers were as follows below.

Figure 57: Collection sites of used plastic bottles by beverage manufacturers (multiple answer)

Responses		Respondents (persons)	Percentage
a	Retail stores, commercial facilities, transportation, etc. (Excluding recycling boxes next to vending machines.)	60	50.0%
b	Business sites other than those listed in "a" above (e.g., offices used only by employees).	54	45.0%
c	Recycling boxes next to vending machines.	45	37.5%
d	Other ⁸⁷ .	19	15.8%
Respondents		120	100.0%

Source: Prepared by the JFTC based on responses to a questionnaire survey (for beverage manufacturers)

⁸⁷ Homes, ways to deliver goods to workplaces, cafeterias, and rest areas for employees, guest rooms, and other places were mentioned as specific locations for collecting used plastic bottles.

B. Delivery to Processors

(A) Trends in Delivered Volumes and Delivered Prices

Beverage manufacturers, retailers, and other business operators that collect used plastic bottles deliver the said plastic bottles to industrial waste disposal services or similar.

Questions were posed to beverage manufacturers that collect used plastic bottles regarding delivered volumes (in tons) and delivered prices (in yen) of used plastic bottles to industrial waste disposal services and other entities, and responses were obtained⁸⁸.

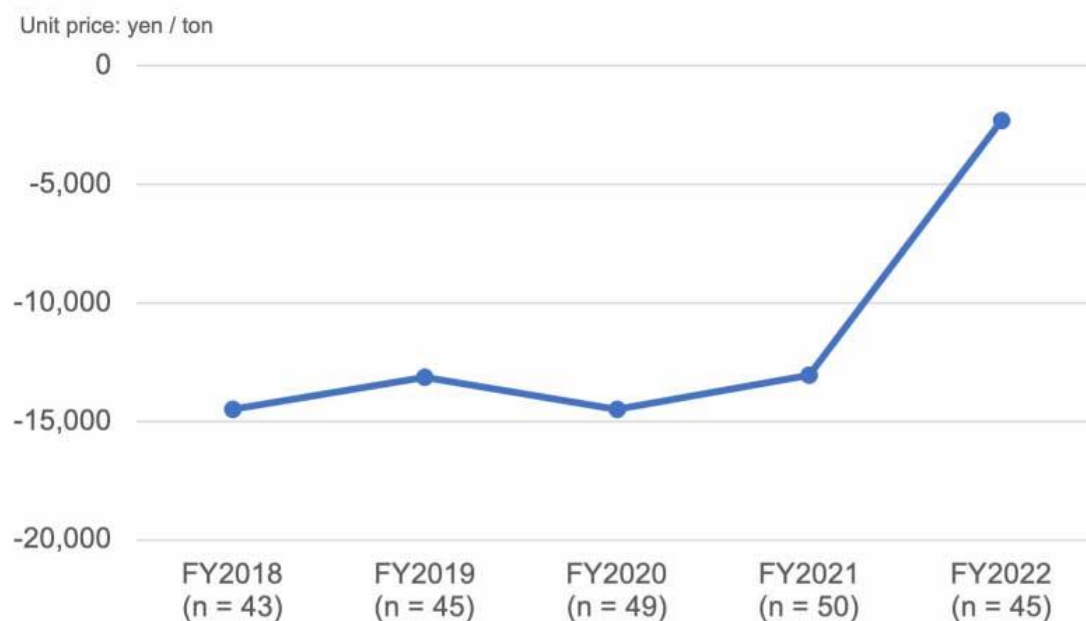
The unit price per ton for used plastic bottles to be delivered from beverage manufacturers to industrial waste disposal services and other entities, as well as its trends, are shown in Figure 58 below⁸⁹. On average, it can be seen that used plastic bottles are delivered under inverse onerous contracts and that unit prices of delivery increased in FY2022 (the amount paid under inverse onerous contracts decreased)⁹⁰.

⁸⁸ Since it is considered that a significant share of deliveries are made with containers mixed with other containers and the like, in cases where beverage manufacturers do not track the amount of used plastic bottles to be delivered or delivered prices due to the fact that they deliver bottles mixed with other containers and other reasons, the survey asked respondents to provide, on the survey sheets, the amount of used plastic bottles to be delivered and delivered prices, which were calculated based on reasonable assumptions by respondents themselves. However, it cannot be ruled out that some responses may include cases where it is considerably difficult to calculate values, for example, when containers are mixed with other containers which have significantly different transaction prices.

⁸⁹ In Figure 58, the scale indicates negative numbers, which indicates that the unit price of delivery is under an inverse onerous contract.

⁹⁰ This is a total of the responses to this question by specific business operators only and does not give an overall picture of the market size.

Figure 58: Unit prices of used plastic bottles to be delivered by collecting beverage manufacturers



Source: Prepared by the JFTC based on responses to a questionnaire survey (for beverage manufacturers)

(B) Status of Price Negotiations

Questions were posed to beverage manufacturers that collect used plastic bottles regarding the general frequency of delivered price revisions, and the answers are as follows below⁹¹.

Figure 59: Frequency that beverage manufacturers revise delivery prices for used plastic bottles

Responses		Number of responses	Percentage
a	Less than once a year.	69	46.3%
b	Approximately once a year.	18	12.1%
c	Approximately once every six months (twice a	7	4.7%

⁹¹ Specified business operators for each delivery destination were asked about the frequency of price revisions, and the responses were compiled by each delivery destination.

	year).		
d	Approximately once a quarter (four times a year).	3	2.0%
e	Twice a quarter or more (five times a year or more).	2	1.3%
f	Other ⁹² .	50	33.6%
Total (responses)		149	100.0%

Source: Prepared by the JFTC based on responses to a questionnaire survey (for beverage manufacturers)

The following opinions were collected in the interview survey on the status of price negotiations with business operators that emit used plastic bottles, beverage manufacturers, and recyclers.

Figure 60: Opinions of business operators that emit used plastic bottles regarding negotiating delivered prices of used plastic bottles

- Used plastic bottles discharged from collection boxes located in the office and other private areas are delivered to a business operator, which we contract with for disposal.
- Our company decides on the industrial waste disposal service with the highest evaluation through a competition that includes not only the price but also the nature of the work, regardless of the type of waste. As a result, some are paid 10 to 20 yen per kilogram to pick them up, while others are paid about 5 yen per kilogram by our company.

Source: Prepared by the JFTC based on responses to the interview survey (for generators)

Figure 61: Opinions of beverage manufacturers on the status of price negotiations for delivered prices of used plastic bottles

- We have business operators deliver used plastic bottles collected from recycling boxes next to vending machines, and we pay for the disposal costs as industrial waste. It is difficult to have used plastic bottles in recycling boxes picked up as valuable resources because of their poor quality and the other waste inside the boxes. Opportunities to review treatment costs arise less than once a year, but the contract is automatically

⁹² The specific frequency is, for example, once a week, approximately once every two years, when there are cost fluctuations such as minimum wage increases, and whenever there is a request for revision.

renewed unless there are special circumstances for both our company and business operators to deliver. Treatment costs are often set on a monthly or annual basis as a fixed amount in accordance with the market price of the unit price per weight.

- Those collected at recycling boxes next to vending machines are processed as industrial waste by paying processing fees together with plastic bottles, bottles, cans, garbage, and other foreign materials. They are not sold as valuable resources. In our company, some have suggested that since processors sell used plastic bottles even with poor quality and their prices have risen considerably in recent years, it would be a good idea to negotiate the cost of processing based on the profit that processors can earn when they sell bottles after processing. However, the person in charge feels that it would be better to pay only the cost of processing. Currently, this opinion prevails within our company.

Source: Prepared by the JFTC based on responses to the interview survey (for beverage manufacturers)

Figure 62: Opinions of collection and transport services, and intermediate treatment business operators regarding the status of price negotiations for delivered prices of used plastic bottles

- Beverage manufacturers are in a strong transactional position and may stop doing business with us, making it difficult to negotiate prices so that we will be allowed to reflect increased labor and transportation costs in the prices. In addition, a waste management company sometimes intervenes in dealing with beverage manufacturers. There might be a failure to communicate well with the management company, which could mislead the beverage manufacturer.
- We receive a fee to dispose of industrial waste from generators. In calculating processing costs, we take into account the approximate mixing ratio of each beverage container (cans, bottles, plastic bottles), transportation costs, sorting costs, anticipated sales, and other factors. The processing costs are to be reviewed annually. On the other hand, for recyclers' transactions, sales prices are reviewed as needed, sometimes on a monthly basis, if a customer requests a price change.

Source: Prepared by the JFTC based on responses to the interview survey (for collection and transport services, and intermediate treatment business operators)

Figure 63: Opinions of recyclers regarding the status of price negotiations for delivered prices of used plastic bottles

- In our company, the purchase price of business-related used plastic bottles is largely determined by the difference in yield (yield rate) when plastic bottles are recycled rather than by the labor and cleaning costs due to differences in quality. Generally speaking, there is a certain price differential between the purchase price of used plastic bottles for municipal collection and that of business-related used plastic bottles. However, we think this gap has narrowed recently due to increased competition in the purchase of used plastic bottles. This is because recyclers, who could not procure the estimated amount of used plastic bottles as a result of the JCPRA's bidding process, are forced to desperately seek used plastic bottles and purchase them at high prices even if their quality is relatively poor.
- Since we do not have a license as an industrial waste disposal service, we cannot receive money even if the business-related used plastic bottles are of poor quality. Nor do we intend to do so even if we could. Since plastic bottles are a resource, we generally have reservations about being paid to take them.
- Without a difference in the unit price of 20 to 30 yen per kilogram between used plastic bottles collected by municipalities and those collected by businesses, the profit margin when used plastic bottles are recycled would be inverted. This is because the yield rate is lower in the business waste. Poor yield means not only lower production per weight but also lower production per hour.
- In general, the purchase price of used plastic bottles collected from municipalities is higher than that of used plastic bottles emitted as business waste. However, the purchase price of used plastic bottles emitted as business waste has also increased due to the recent increase in demand for recycled plastic resins.

Source: Prepared by the JFTC based on responses to the interview survey (for recyclers)

(2) Intermediate Treatment

In many cases, used plastic bottles emitted as industrial waste are also subjected to intermediate treatment before being delivered to recyclers.

The following opinions were collected in the interview survey of beverage manufacturers, collection and transport services, intermediate treatment business

operators, and recyclers regarding the implementation of intermediate treatment of used plastic bottles emitted as industrial waste.

Figure 64: Opinions of beverage manufacturers regarding intermediate treatment of used plastic bottles (industrial waste)

- Our company's products are in our company's vending machines located around Japan, and so the used plastic bottles collected from the plastic bottle bins next to those vending machines are all from our company. However, the amount of plastic bottles collected from the plastic bottle bins next to those vending machines that can be used as resources is very small because of cigarettes inside the plastic bottles and various other types of trash in the plastic bottle bins that are not plastic bottles, such as empty lunch boxes.
- There might be some plastic bottles in the recycling bins next to the vending machines that are collected at the office building, and their quality may still be acceptable for bottle-to-bottle, but they are not currently being recycled horizontally because they are eventually grouped with those in the city to be processed. There are not only plastic bottles but also cans and lunch boxes from convenience stores mixed in the recycling bins next to the vending machines. Therefore, the percentage of plastic bottles is sometimes less than 40% of the total. It is likely that not even half of the used plastic bottles are good enough in quality to be turned into recycled plastic bottles.

Source: Prepared by the JFTC based on responses to the interview survey (for beverage manufacturers)

Figure 65: Opinions of collection and transport services, and intermediate treatment business operators regarding intermediate treatment of used plastic bottles (industrial waste)

- Beverage containers discharged by business operators are generally never separated by item but are instead emitted as a mixture of bottles and cans. Since the recycler handles only a single item, the most important part of the intermediate process is to separate beverage containers by item and remove foreign materials. Costs are incurred for collection, transportation, intermediate treatment, and disposal of residues to reach intermediate treatment, but intermediate treatment costs, including investment in machinery, account for a large portion of total costs.

- Our company exclusively deals with vendors of vending machines for industrial waste. The used plastic bottles our company collects are in their original state as they are removed from recycling bins. They include round bottles with caps and labels attached, as well as any leftover drink or non-beverage container waste if it has been discarded. The costs of intermediate treatment operations for industrial waste include transportation and intermediate treatment costs, as well as the cost of treating residuals.
- Our company does business with vending machine vendors who perform the following: (i) Collect used plastic bottles from recycling bins next to vending machines at each vendor's site, (ii) Sort cans, bottles, and plastic bottles at their own factories, and (iii) Implement intermediate treatment during the process of compressing each material.

Source: Prepared by the JFTC based on responses to the interview survey (for collection and transport services, and intermediate treatment business operators)

Figure 66: Opinions of recyclers regarding intermediate treatment of used plastic bottles (industrial waste)

- Regarding used plastic bottles emitted as business waste, they are grouped together with bottles, cans, and other materials and are of poor quality. The quality of plastic bottles is better now because a sorting machine has been installed through subsidies, which enables them to be properly intermediate-processed. However, the quality is still inferior to those collected from municipalities, which are cleaned by each resident.
- The main purchasers of used plastic bottles emitted as business waste are intermediate processors, who process used plastic bottles in recycling bins next to vending machines on behalf of beverage manufacturers. It is not uncommon for used plastic bottles delivered to our company to be in the form of round bottles, but even in such cases, intermediate processors are separately contracted to bale them before they are brought to our company. Since our company bears the cost of doing so, the purchase price of used plastic bottles is reduced due to such processes.
- Our company does not accept used plastic bottles as round bottles, so we always have them baled. This is not because of processing technology issues but because of storage facility space issues. In addition, round bottles are inefficient because the amount transported by truck is one-tenth of that of bales.

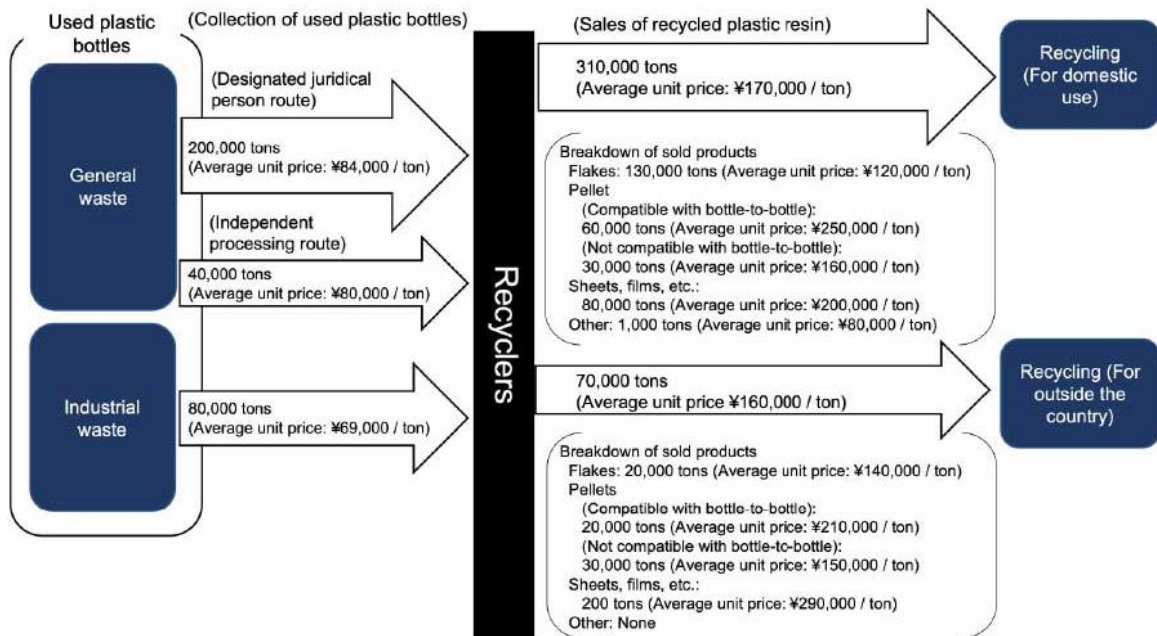
Source: Prepared by the JFTC based on responses to the interview survey (for recyclers)

4. Production of Recycled Plastic Resins

As described in Chapter 4-3 above (page 33), recycling business operators procure used plastic bottles as raw materials to produce recycled plastic resin (i.e., recycling of used plastic bottles).

A survey was conducted on the status of transactions related to the production of recycled plastic resin by recyclers, and the results were as follows below.

Figure 67: Transaction volume and other information by route based on responses from recyclers based on the questionnaire survey (FY2022)



Source: Prepared by the JFTC based on responses to the questionnaire survey (for recyclers)

(1) Purchasing Used Plastic Bottles

A. Purchasing Channels

As noted in Chapter 4-3 above (page 33), recyclers are supposed to procure used plastic bottles that are general waste and used plastic bottles that are industrial waste.

Questions were posed to recyclers regarding the channels through which they purchase used plastic bottles, and the responses were as follows below.

Figure 68: Suppliers of used plastic bottles purchased by recyclers (multiple answer)

Responses		Respondents (persons)	Percentage
a	Used plastic bottles collected by local governments subjected to JCPRA bidding.	42	100.0%
b	Used plastic bottles collected by local governments subjected to so-called independent processing.	34	81.0%
c	Used plastic bottles discharged from business operators.	31	73.8%
d	Other ⁹³ .	3	7.1%
Respondents		42	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for recyclers)

Thus, many recyclers tended to purchase used plastic bottles outside of the designated juridical person route.

The opinions below in Figure 69 were found in the interview survey for recyclers of used plastic bottles regarding where they purchase bottles.

Figure 69: Opinions of recyclers regarding where used plastic bottles are purchased

- The order of priority, from greatest to least, for purchasing used plastic bottles is as follows: (1) Successful bids from the JCPRA, (2) The amount independently processed by municipalities, and (3) The amount discharged by business operators. The first step is to go to the JCPRA for bids, and if we cannot secure a large volume there, we will go for our independent processing.
- In JCPRA's bidding process, successful bids are not revealed until the results are disclosed, so we make an effort to bid a lot. In addition, we also purchase used plastic bottles emitted as business waste. Since we cannot purchase used plastic bottles through the designated juridical person route unless we win the bidding process, there is a concern in terms of the stability of purchases. In this respect, we can purchase used

⁹³ There was a mention of used plastic bottles and other items purchased from other recyclers.

plastic bottles from business operators as long as the conditions are mutually agreeable. Therefore, our policy for purchasing used plastic bottles at our company is to prioritize used plastic bottles emitted as business waste first.

- By using used plastic bottles emitted as business waste, which have a low unit price, our company plans to keep the price of recycled plastic resin pellets we sell to beverage manufacturers as low as possible. For beverage manufacturers, it would be difficult to reflect the higher purchase price of recycled plastic bottles in the beverage prices. Our company does not want the market for used plastic bottles to rise, as we do not want to sell our recycled plastic resin pellets to beverage manufacturers at higher prices.
- Since we can recycle either those collected by municipalities or by the business sector, from the viewpoint of purchasing plastic bottles at a price as low as possible, if those from the business sector are cheaper, we purchase those from the sector.

Source: Prepared by the JFTC based on responses to the interview survey (for recyclers)

B. Quality of Raw Materials

As described in Section A above, many recyclers that are or were registered with the JCPRA recycle not only used plastic bottles, which are emitted as general waste, but also those emitted as industrial waste.

On the other hand, as shown in the interview results, in general, used plastic bottles, which are emitted as industrial waste, are considered to be of relatively poorer quality than general waste because, for example, leftover drinks and other garbage in plastic bottles tend to get mixed in at recycling bins and other boxes located next to vending machines.

Questions were posed to recyclers regarding the quality difference between used plastic bottles emitted as general waste and those as industrial waste (i.e., caps and labels, degree of residual material such as drink liquids, and contamination), and the responses were as follows below.

Figure 70: Quality differences between general waste and industrial waste used plastic bottles

Responses	Respondents (persons)	Percentage
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a	There is a difference in quality, and we think that used plastic bottles collected by local governments are generally of better quality.	34	85.0%
b	There is a difference in quality, and we think that used plastic bottles discharged by business operators are generally better quality.	0	0.0%
c	We think there is no difference in quality.	3	7.5%
d	We don't know if there is any difference in quality.	0	0.0%
e	Other ⁹⁴ .	3	7.5%
Total (respondents)		40	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for recyclers)

In addition, to recyclers who answered that there is a quality difference between used plastic bottles emitted as general waste and those emitted as industrial waste (recyclers who chose "a" or "b" in Figure 70), questions were posed regarding the impact of the quality difference (caps and labels, degree of residual drinking residue and contamination) on the production and sales of recycled plastic resin, and their responses were as follows below.

Figure 71: Impact of quality differences in used plastic bottles (caps and labels, degree of residue) on the production and sales of recycled plastic resin (multiple answer)

Responses		Respondents (persons)	Percentage
a	When we recycle used plastic bottles with many caps and labels remaining, production costs increase due to reasons such as the need to add processes to remove foreign substances.	30	78.9%
b	When we recycle used plastic bottles with many	18	47.4%

⁹⁴ Respondents indicated that there is a great deal of variation among cities, towns, and business operators.

	caps and labels remaining, the quality of recycled plastic resin to be produced decreases, resulting in a lower selling price.		
c	We don't purchase used plastic bottles with a lot of caps and labels remaining.	3	7.9%
d	Even if there are many caps and labels remaining, there is no need to change the manufacturing process, and there is no impact on manufacturing costs.	5	13.2%
e	The degree of caps and labels remaining does not affect the quality of recycled plastic resin to be produced and, therefore, does not affect the selling price.	4	10.5%
f	Other ⁹⁵ .	5	13.2%
Respondents		38	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for recyclers)

Figure 72: The impact of quality differences in used plastic bottles (such as residuals from drink liquids and degree of contamination) on the production and sales of recycled plastic resin (multiple answer)

Responses		Respondents (persons)	Percentage
a	When we recycle used plastic bottles with a lot of residual foreign matter, such as leftover drink liquids or stains, the production cost increases due to the need to add processes to remove foreign matter and contamination.	31	81.6%
b	When we recycle used plastic bottles with a lot of foreign matters remaining, such as leftover	19	50.0%

⁹⁵ Specific details given included that sales would decrease because yield rates are reduced by foreign matter, and that costs would increase because the processing speed for recycling would be reduced.

	drink liquids or contamination, the quality of recycled plastic resin that can be produced is affected, resulting in a lower selling price.		
c	We don't purchase used plastic bottles that have a lot of dirt or residual foreign matter, such as leftover drink liquids.	6	15.8%
d	Even if there is a large amount of residual foreign matter, such as leftover drink liquids or contamination, the manufacturing process does not need to be changed, and manufacturing costs are not affected.	2	5.3%
e	The degree of residual foreign matter, such as leftover drink liquids or contamination, does not affect the quality of recycled plastic resin that can be produced and, therefore, does not affect the selling price.	0	0.0%
f	Other ⁹⁶ .	3	7.9%
Respondents		38	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for recyclers)

In addition, questions were posed to recyclers regarding the most significant impact of each quality factor of used plastic bottles they procure on the cost to produce recycled plastic resin, and the responses were as follows.

Figure 73: The impact of each quality factor of used plastic bottles on the cost to produce recycled plastic resin (multiple answer)

	Responses	Respondents (persons)	Percentage
a	Degree of caps and labels remaining.	14	35.9%

⁹⁶ Respondents indicated that costs would increase because they would have to dispose of any residual foreign matter or heavily soiled items.

b	Degree of contamination or foreign matter remaining other than caps and labels, such as leftover drink liquids.	21	53.8%
c	Each factor in Figure 75.	1 ⁹⁷	2.6%
d	There are no differences in the impact on the production cost in any of the cases indicated from "a" to "c."	1	2.6%
e	Other ⁹⁸ .	2	5.1%
Respondents		39	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for recyclers)

Regarding the impact that the degree of quality of used plastic bottles has on the recycling process, the following opinions were found in the interview survey for recyclers.

Figure 74: Opinions of recyclers regarding the impact that the degree of quality of used plastic bottles has on the recycling process

- There are sometimes foreign materials in used plastic bottles from business operators. Some bales we take back from municipalities also contain caps and labels, but the caps can be separated by weight, and the labels can be removed with a peeling machine, so almost 100% of bales can be separated with basic equipment. However, tobacco and other materials left in used plastic bottles cannot be fully separated with such equipment.
- Yield rates (throughput yields) are completely different between those collected from municipalities and those from business operators. For those collected from municipalities, the yield rate is around the mid-80–90% range if the quality is good. On the other hand, for those from business operators, it drops to around 50% if the quality is poor. One of the causes behind lower yield rates in the case of those collected from business operators are cans, bottles, shampoo, detergent bottles, and other items mixed in with the bale. At our company, we remove such foreign matter by first sorting them

⁹⁷ Respondents answered that it is the distance from the location to pick up to their own facility.

⁹⁸ Respondents specifically mentioned contamination of glass fragments and other materials.

automatically using a machine, and after crushing used plastic bottles, the machine detects foreign matter, such as cap rings and labels that have become finer, and then sorts them out by blowing the said foreign matter with wind. However, in this case, the foreign matter is too fine to remove with pinpoint accuracy, and the flakes near the foreign matter are also sorted out together to some extent. This is another factor that reduces the yield rate.

- If glass fragments are mixed in, it is difficult to remove them. Although used plastic bottles with glass fragments, which have not been removed, can be used for fiber, they are a troublesome contaminant for recyclers because they clog the filter when removed, and it is very difficult to replace clogged filters. If glass fragments are mixed in, the possibilities for applications will be limited.

Source: Prepared by the JFTC based on responses to the interview survey (for recyclers)

C. Procurement Policy

As described in Section B above, if caps and labels remain inside used plastic bottles, or if there is a lot of residual foreign matter such as leftover drink or dirt, it will affect the manufacturing cost for recyclers and the quality of recycled plastic resin to be produced.

Questions were posed to recyclers regarding factors other than these (degree of residual caps and labels, degree of contamination and residuals of foreign substances such as leftover drinks, etc.) and prices when they purchase used plastic bottles, and their responses were as follows below.

Figure 75: Factors (other than the degree of residual caps and labels, degree of contamination, and residuals of foreign substances such as leftover drinks, price, etc.) in purchasing used plastic bottles (multiple answer)

Responses		Respondents (persons)	Percentage
a	The form of used plastic bottles (bales, round bottles, crushed, etc.)	32	80.0%
b	Whether used plastic bottles are collected by local governments or are discharged by	11	27.5%

	business operators.		
c	(For storage facilities subject to bidding conducted by the JCPRA) Rank according to the quality survey on bales conducted by the JCPRA.	16	40.0%
d	Distance from the pick-up location to one's own facility.	33	82.5%
e	Other factors ⁹⁹ .	9	22.5%
f	No particular factors considered.	0	0.0%
Respondents		40	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for recyclers)

The following opinions were given in the interview survey for recyclers regarding the factors they consider important when purchasing used plastic bottles.

Figure 76: Opinions of recyclers regarding the factors they consider important when purchasing used plastic bottles

- When we purchase used plastic bottles that are independently processed by municipalities or business operators, we rank the quality of used plastic bottles based on the performance of the supplier and the predicted condition of used plastic bottles. We have set the ranks and their criteria as A, B, and D according to the JCPRA, and the rankings are based on the results of the JCPRA's judgment, as well as on appearance and past experience.
- In the quality survey on bales by the JCPRA, the main emphasis is on the ranks of used plastic bottles in terms of labels, contamination, and glass. On the other hand, if there is an order to use used plastic bottles of poor quality because it is not possible to purchase them at a very high price, we may then purchase used plastic bottles of poor quality.
- Whether or not we accept used plastic bottles collected from municipalities depends on quality, unit price, and other conditions, so while some used plastic bottles are brought

⁹⁹ Respondents mentioned the possibility of processing at their own facilities, the weight and size of bales, conditions such as time to pick up, and the possibility of glass fragments mixed together.

in from distant areas, priority is usually given to those from nearby areas.

Source: Prepared by the JFTC based on responses to the interview survey (for recyclers)

D. Quantity and Price for Purchase

Questions were posed to recyclers regarding the quantities (tons) and prices (yen) of purchases for used plastic bottles separated by each of the following routes: (i) the designated juridical person route (those collected by municipalities and subject to bidding by the JCPRA), (ii) the independent route (those collected by municipalities and subject to independent route by municipalities), or (iii) the business operator route (discharged by business operators), and responses were obtained¹⁰⁰.

For routes (ii) and (iii), the questions include not only cases of direct purchases from municipalities or business operators but also cases of purchases from other business operators when municipalities or business operators have handed waste over to other business operators for the reason of outsourcing collection operations, intermediate treatment, etc.

The unit price per ton for recyclers to purchase used plastic bottles and its transition is as follows: (i) There are no significant differences unit purchase prices between the designated juridical person route and the independent route¹⁰¹, (ii) There are no significant differences in unit purchase prices of used plastic bottles discharged from business operators between the designated juridical person route and the independent route, and bottles are purchased for a fee¹⁰², and (iii) Unit

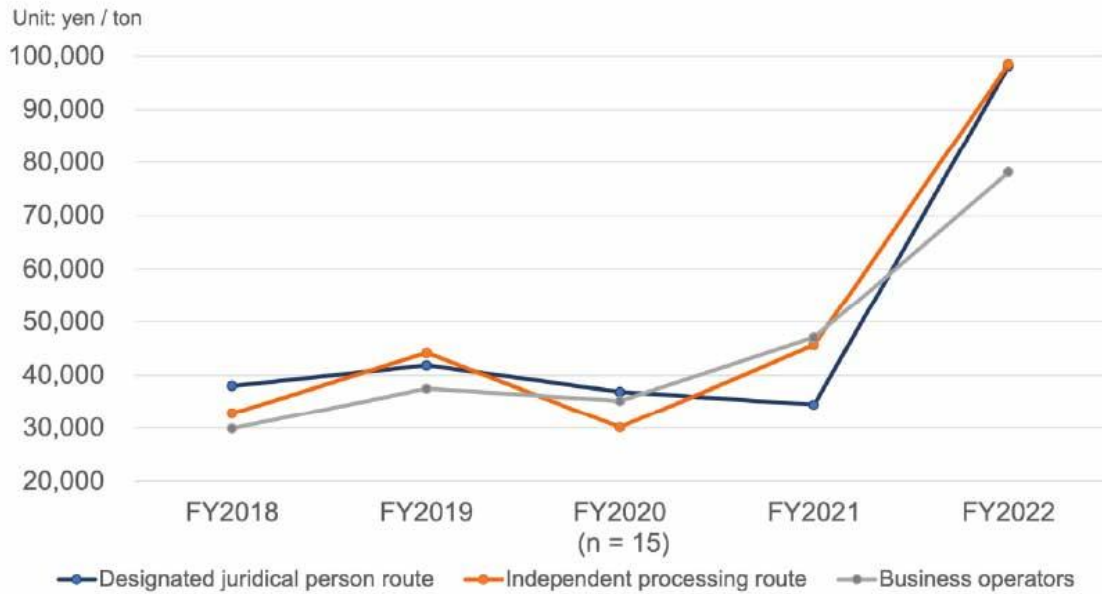
¹⁰⁰ In addition to routes (i) through (iii), a question was also asked about route (iv) "Others," but since a sufficient number of responses could not be obtained, the analysis was not conducted.

¹⁰¹ Although it is difficult to make simple comparisons due to the different targets set at the survey, as described in Section 2 (4) A (page 74) above, the unit delivered costs, which municipalities responded to via the survey form, tended to be higher on average for the designated juridical person route compared to the independent route. As for the difference between the two routes, municipalities deliver, in principle, used plastic bottles that are baled through the designated juridical person route and those that are at various stages of processing, such as round bottles, through the independent route, so the unit delivered cost in case of the designated juridical person route is higher (see Section 2 (4) B (page 75) above). On the other hand, recyclers generally purchase used plastic bottles baled by other business operators that perform intermediate treatment and other operations in the independent route as well, and this is one of the factors to be considered.

¹⁰² Although it is difficult to make a simple comparison because the survey targets are different, as described in Section 3 (1) B (A) (page 81) above, according to the responses from beverage manufacturers, it can be seen that used plastic bottles emitted as industrial waste to be delivered to the generator of used plastic bottles are, on average, under inverse onerous contracts. Differences between inverse onerous contracts and onerous contracts can be attributed to the fact that beverage manufacturers

purchase prices increased in FY2022 for all routes.

Figure 77: Unit purchase price per procurement route for recyclers



Source: Prepared by the JFTC based on responses to the questionnaire survey (for recyclers)

Also, in the interview survey for recyclers, the following opinions were obtained regarding the transaction price of used plastic bottles emitted as general waste and those emitted as industrial waste.

- Changes in the purchase price are linked.
- The unit purchase price of used plastic bottles emitted as general waste tends to be higher than that of used plastic bottles emitted as industrial waste. However, the unit purchase price in the latter case is also increasing, and the price difference between the two cases is shrinking.

Figure 78: Opinions of recyclers regarding factors that have an influence on prices

[Quality]

- Major recyclers that engage in bottle-to-bottle generally take a mechanical recycling

deliver plastic bottles without sorted collection or intermediate treatment, whereas recyclers generally purchase used bottles that have already been baled.

approach. Because the less dirt there is in mechanical recycling, the easier it is to recycle, unit prices tend to be higher for those collected by municipalities over those collected by business operators in the market as a whole. However, recently, those collected from business operators are growing more expensive, and in some cases, their prices are higher than those collected from municipalities.

- In comparing prices based on identical weights in the bale condition, unit prices of used plastic bottles from business operators tend to be lower than those of used plastic bottles from the designated juridical person route. This is because there is a large percentage of caps, labels, and other foreign materials contained in used plastic bottles emitted from business operators. Comparing only the amount of plastic bottles contained in the bale may reverse prices.
- The quality of used plastic bottles from business operators varies. For example, some are in good condition with no labels, caps, or stains on them when bottles are collected at stores, while others have labels and caps still on them or are stained. If the quality of used plastic bottles is better, the cost of the recycling process can be reduced. However, the purchase price will naturally be higher. On the other hand, it costs extra for used plastic bottles that are not good quality in the recycling process, but the purchase price can be kept low.

[Increased competition rate]

- Generally speaking, there is a certain price difference between the purchase price of used plastic bottles collected from municipalities and that of used plastic bottles collected from business operators. However, we think that this gap has narrowed recently due to increased competition in the purchase of used plastic bottles. This is because recyclers that could not procure the estimated amount in the JCPRA bidding process are desperate to collect used plastic bottles and cannot afford to purchase used plastic bottles at a higher price, even if they are relatively of poor quality.

[The JCPRA's bidding unit price]

- We think that the prices of used plastic bottles collected from municipalities and from business operators are linked. This is likely because intermediary processors refer to the results of the JCPRA's bidding as an indicator when they consider the sales price as a business. In addition, the unit price in the JCPRA bidding got high because the demand for used plastic bottles by beverage manufacturers has increased, which has led to

higher unit prices for the business.

[Export unit price]

- Since used plastic bottles from business operators are exported, and there was an increase in demand for used plastic bottles overseas in the first half of 2022, it appears that the unit price difference between those from business operators and those collected by municipalities have narrowed. Since then, however, the overseas market has plunged, and the difference seems to have stopped narrowing.

Source: Prepared by the JFTC based on responses to the interview survey (for recyclers)

(2) Sales of Recycled Plastic Resin

A. Sales Destinations

Questions were posed to recyclers regarding where they sell recycled plastic resin and other materials they produce, and the responses were as follows below.

Figure 79: Sales destinations of recycled plastic resin by recyclers (multiple answer)

	Responses	Respondents (persons)	Percentage
a	Plastic bottle manufacturers.	7	16.7%
b	Beverage manufacturers of products in plastic bottles containing foodstuffs, soft drinks, and alcoholic beverages.	4	9.5%
c	Beverage manufacturers of products other than those in "b."	2	4.8%
d	Manufacturers of sheets, films, fibers, molded plastic products, etc.	39	92.9%
e	Manufacturers of flakes and pellets made from recycled plastic resin.	24	57.1%
f	Distributors of recycled plastic resin (e.g., trading companies).	9	21.4%
g	Exporters of recycled plastic resin.	4	9.5%
h	Business operators located outside Japan (when exporting on their own).	4	9.5%

i	Other.	3	7.1%
Respondents		42	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for recyclers)

B. Transactions Among Recyclers

As the majority of recyclers answered "e" in Figure 79, recyclers sell recycled plastic resin obtained from used plastic bottles not only to business operators that use and manufacture plastic bottles but also to other recyclers. Therefore, questions were posed to recyclers regarding the status of their purchases of recycled plastic resin from other recyclers, and their responses were as follows below.

Figure 80: Recycled plastic resin purchased by recyclers from other recyclers (multiple answer)

Responses		Respondents (persons)	Percentage
a	Purchases or purchased flakes made from recycled plastic resin.	14	35.9%
b	Purchases or purchased pellets made from recycled plastic resin.	2	5.1%
c	Purchases or purchased neither.	25	64.1%
Respondents		39	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for recyclers)

In addition, questions were posed to recyclers that purchase recycled plastic resin from other recyclers (recyclers that chose "a" or "b" in Figure 80) regarding their application, and their responses were as follows below.

Figure 81: Applications of recycled plastic resin purchased by recyclers from other recyclers (multiple answer)

Responses		Respondents (persons)	Percentage
a	Used as raw materials for flakes manufactured by our company.	5	35.7%
b	Used as raw materials for pellets compatible with bottle-to-bottle products manufactured by our company.	1	7.1%
c	Used as raw materials for pellets incompatible with bottle-to-bottle products manufactured by our company.	5	35.7%
d	Used as raw materials for sheets, films, fibers, and molded plastic products manufactured by our company.	5	35.7%
e	Wholesales to other business operators.	2	14.3%
f	Other.	0	0.0%
Respondents		14	100.0%

Source: Prepared by the JFTC based on responses to the questionnaire survey (for recyclers)

The following opinions were obtained in the interview survey for recyclers regarding recycled plastic resin transactions among recyclers.

Figure 82: Opinions of recyclers regarding recycled plastic resin transactions among recyclers

- We purchase bales and sell them as flakes. When we sell our flakes to major recyclers, we send them a sample of our flakes, and if they confirm the quality to be sufficient, they send us a quotation for the purchase price.
- We sometimes receive spot requests from major recyclers to sell, and in such cases, we generally sell the product. This is not unique to our company, as other recyclers are generally connected horizontally and do business with each other.

- We sell flakes of the recycled plastic resin that we produce to sheet manufacturers and major recyclers that can manufacture recycled plastic resin compatible with bottle-to-bottle.
- We also purchase flakes from other recyclers, but we procure these flakes as raw materials for producing pellets.
- We sometimes receive inquiries from other recyclers about whether we can convert used plastic bottles that they purchase from municipalities and business operators into flakes at our company.

Source: Prepared by the JFTC based on responses to the interview survey (for recyclers)

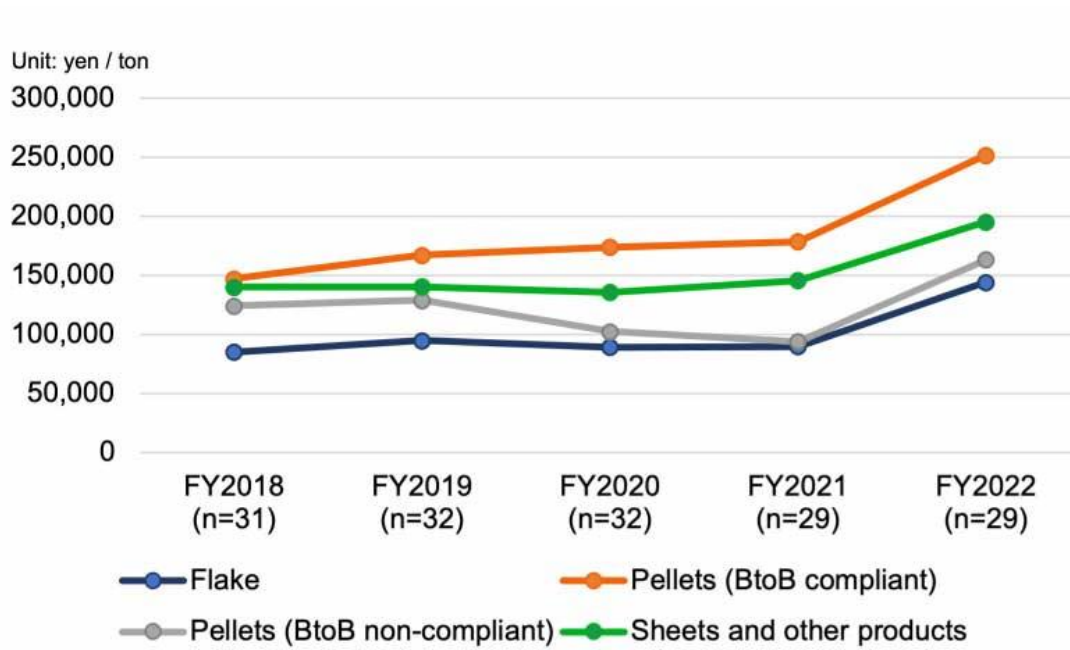
C. Sales Volume and Sales Price

Questions were posed to recyclers regarding the sales volume (in tons) and sales price (in yen) by type of recycled plastic resin produced, and the responses were obtained.

The trends in unit purchase prices per ton of recycled plastic resin by type, which are set by recyclers, are as follows¹⁰³. Unit sales prices of pellets compatible with bottle-to-bottle during the last few years tend to exceed unit sales prices of those not compatible with bottle-to-bottle.

¹⁰³ A question on the option of "Other" was also asked, but since there was not a sufficient number of responses, the analysis was not conducted for that option.

Figure 83: Unit purchase prices of recycled plastic resin by type, set by recyclers



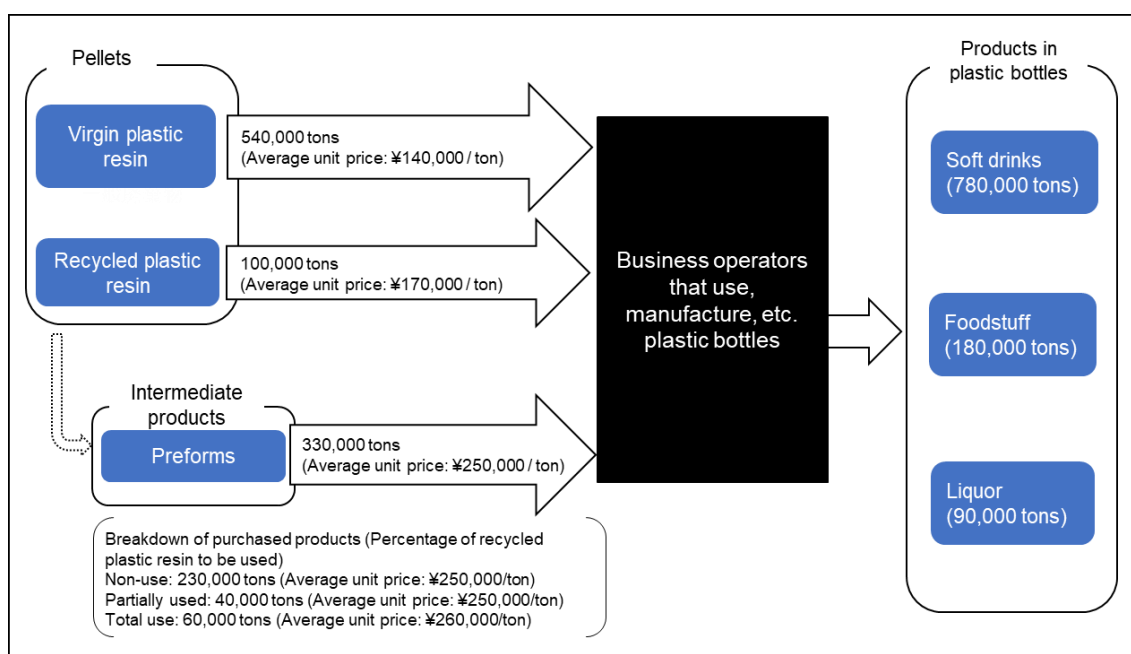
Source: Prepared by the JFTC based on responses to the questionnaire survey (for recyclers)

5. Use of Recycled PLASTIC Resin in Plastic Bottles

In recent years, beverage manufacturers and other business operators that use or manufacture plastic bottles have begun to use recycled plastic resin in addition to virgin plastic resin, which is the conventional raw material for plastic bottles.

A survey was conducted on the status of transactions related to the manufacture of plastic bottles by businesses that use and manufacture plastic bottles, and the results are as follows below¹⁰⁴.

Figure 84: Transaction volume by route based on responses to the written survey of business operators using or manufacturing plastic bottles (FY2022)



Source: Prepared by the Committee based on responses to the written survey (for business operators that use or manufacture plastic bottles)

(1) Procurement Quantity and Price

A. Pellets

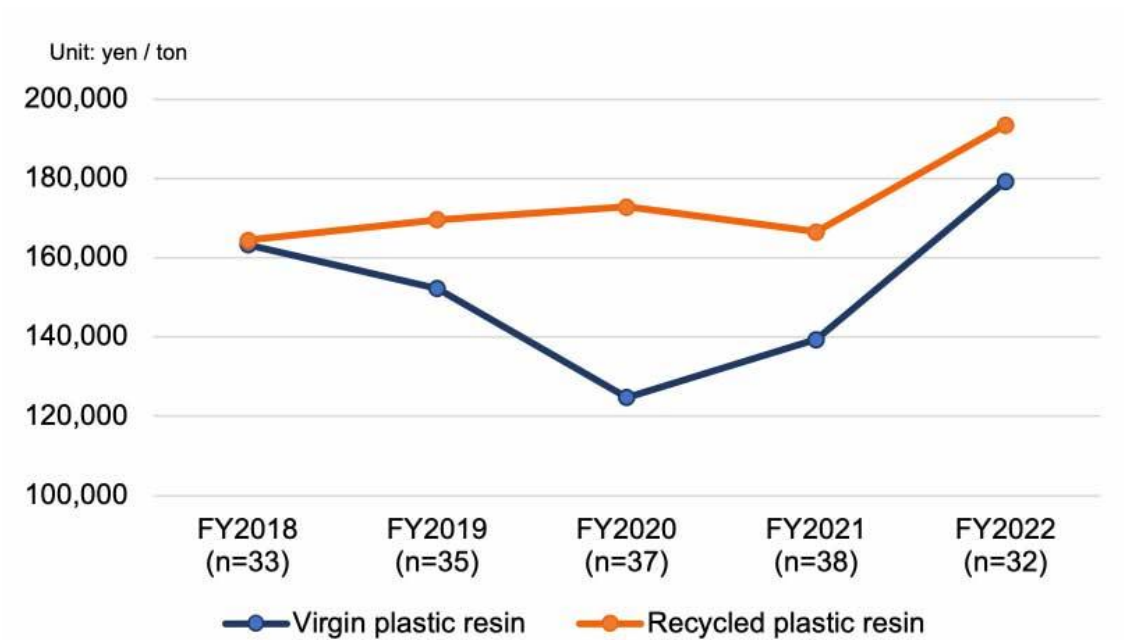
We asked the suppliers that use or manufacture plastic bottles about the purchase volume (tons) and purchase price (yen) of each type of plastic resin pellet (virgin

¹⁰⁴ As described in Chapter 3-2 (page 24) above, the use of recycled PLASTIC resin is not limited to plastic bottles. However, based on the purpose of the survey described in Chapter 1-1 (page 1) above, this survey only investigated the actual status of transactions regarding the use of the resin in plastic bottles.

plastic resin or recycled plastic resin) and obtained their answers.

The following figure shows the transitions of unit purchase prices per ton of each plastic resin type for pellets. The unit purchase price of recycled plastic resin continues to exceed that of virgin plastic resin, indicating a growing demand for recycled materials.

Figure 85: Unit purchase price of pellets by business operators that use or manufacture plastic bottles



Source: Prepared by the Committee based on responses to the written survey (for business operators that use or manufacture plastic bottles)

B. Preforms

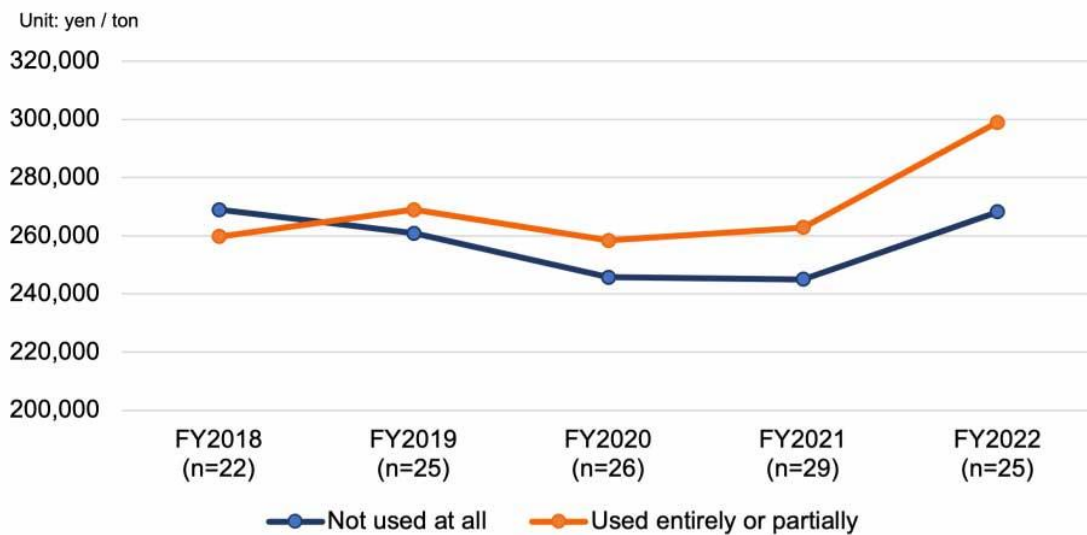
Businesses that use or manufacture plastic bottles were asked about the purchase volume (tons) and purchase price (yen) of preforms for each plastic resin type (whether they use or do not use recycled plastic resin), and responses were obtained¹⁰⁵.

The following figure shows the transitions of unit prices per ton of preform sold by

¹⁰⁵ Businesses that use or manufacture plastic bottles were also asked about the sales volume (tons) and sales price (yen) of each type of preform PLASTIC resin. However, since we did not receive a sufficient number of responses, we did not analyze them.

plastic resin type, and indicates that the purchase price of preform using recycled plastic resin has been increasing in recent years.

Figure 86: Unit purchase price of preform by business operators that use or manufacture plastic bottles



Source: Prepared by the Committee based on responses to the written survey (for business operators that use or manufacture plastic bottles)

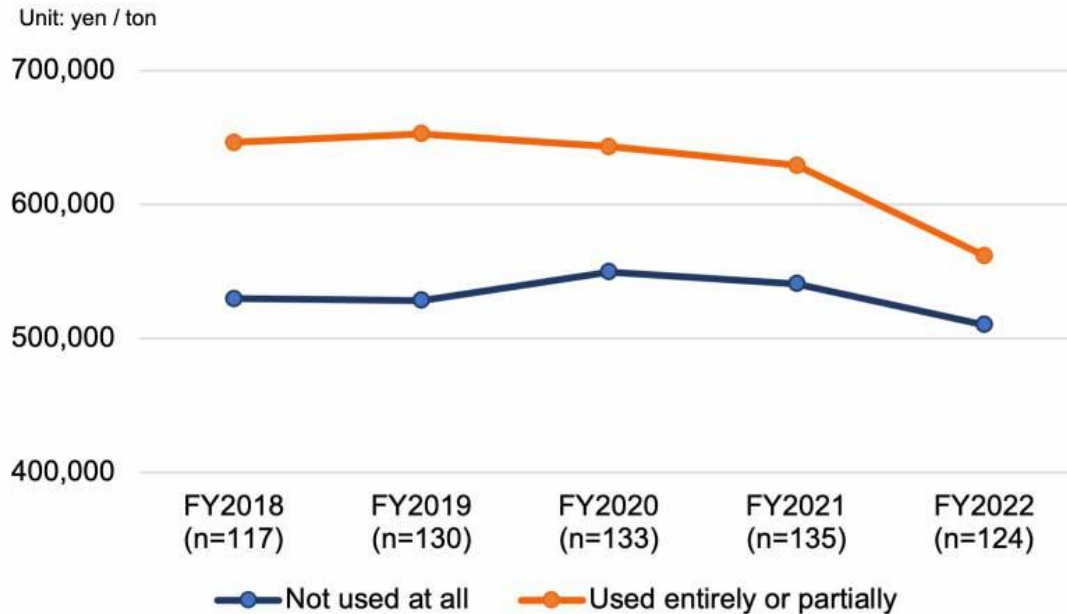
C. Plastic Bottles

We asked plastic bottle users/manufacturers about the purchase volumes (tons) and purchase prices (yen) of each plastic resin type for plastic bottles (whether they use or do not use recycled plastic resin) and obtained their answers¹⁰⁶.

The following table shows the transitions of unit purchase prices per ton of each plastic resin type for plastic bottles used by businesses that use or manufacture plastic bottles. It shows that plastic bottles that use recycled plastic resin are traded at higher unit purchase prices than those that do not, indicating a high demand for recycled materials.

¹⁰⁶ Businesses that use or manufacture plastic bottles were also asked about the sales volumes (tons) and sales prices (yen) of each PLASTIC resin type used in plastic bottles. However, since we did not receive a sufficient number of responses, we did not analyze them.

Figure 87: Unit purchase price of plastic bottles by business operators that use or manufacture plastic bottles



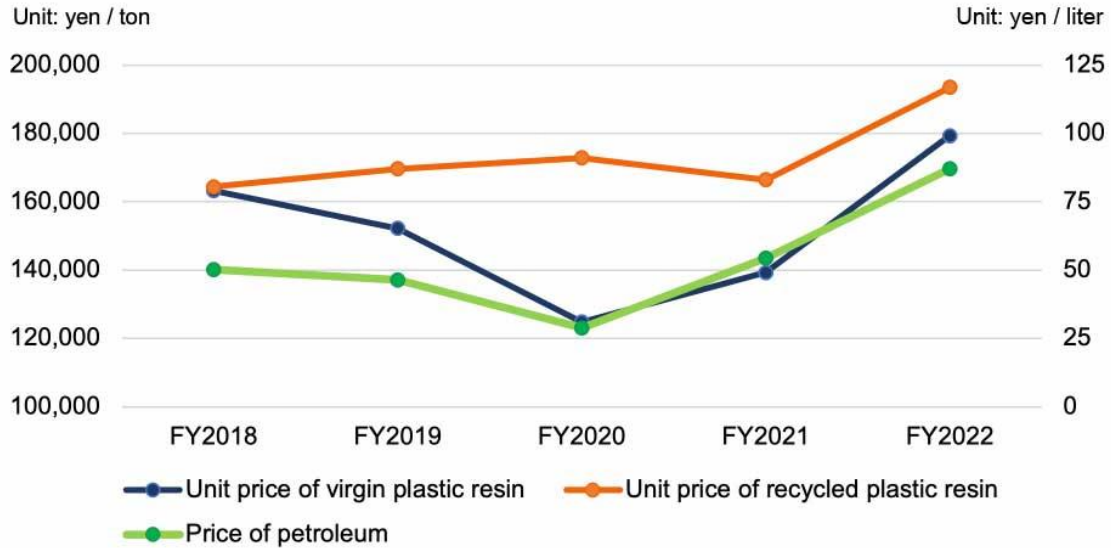
Source: Prepared by the Committee based on responses to the written survey (for business operators that use or manufacture plastic bottles)

(2) Factors Affecting Prices

Recycled plastic resin is used as a substitute for virgin plastic resin. Transaction prices of virgin plastic resin are expected to fluctuate depending on the impact of the price of petroleum, which is the raw material. Import prices of petroleum are overlaid in Figure 85, which shows the unit purchase price per ton of each type of plastic resin purchased by businesses that use or manufacture plastic bottles for pellets, as shown below.

While transaction prices of virgin plastic resin tend to be linked to changes in petroleum import prices, transaction prices of recycled plastic resin tend to remain stable even when petroleum import prices decrease, given the high demand for recycled materials.

Figure 88: Unit purchase price of each type of PLASTIC resin in pellets and import price of petroleum



Source: Trade Statistics, Ministry of Finance (Ordinary Trade Statistics (Tables by Statistical Commodity) Item Code: 2709.00-900)

These results are also consistent with the results of the following interview surveys.

Figure 89: Opinions of business operators that use or manufacture plastic bottles on factors affecting prices

- In theory, between plastic bottles made from virgin plastic resin and recycled plastic bottles, recycled plastic bottles should be cheaper (since there is no need to go out of your way to buy recycled plastic bottles if the former is less expensive). However, there were several occasions when recycled plastic bottles were more expensive. In the end, demand determines the price, and the demand for recycled plastic bottles is expected to increase in the future.
- Despite the rising price of crude oil, recycled plastic bottles are more expensive than virgin plastic bottles. Since you also use energy to manufacture recycled plastic bottles, we believe the reasons for soaring prices are increasing energy costs, competition among beverage manufacturers, and new entrants and businesses that have added plants and are buying up the amount of used plastic bottles they need to keep their plants running.

- The prices of virgin plastic resin and recycled plastic resin used to be linked, but recently, it seems that they are gradually becoming unlinked from each other. In the market of used plastic bottles, the market price of crude oil and virgin plastic resin used to be the first factor, and the bidding price of JCPRA was determined in conjunction with those prices. The transaction price of used plastic bottles for business was then determined by the bidding price of JCPRA, which then led to the market of recycled plastic resin. However, the current market of recycled plastic resin is soaring independently of the market price of virgin plastic resin.

Source: Prepared by the Committee based on the responses to the interview survey (for business operators that use or manufacture plastic bottles)

Figure 90: Opinions of recyclers on factors affecting prices

- It seems as though the price of virgin plastic resin and the price of recycled plastic resin are linked. In the past, recycled plastic resin was sold to manufacturers of egg cartons and fibers at 60–70% of the price of virgin plastic resin. Since things such as egg cartons can be manufactured directly from flakes and there is no cost of pellet production, the selling price of recycled plastic resin can be kept low. However, now that recycled plastic resin has the added value of being made into beverage plastic bottles, the overall price of recycled plastic resin is equal to or higher than that of virgin plastic resin.
- The prices of virgin plastic resin and recycled plastic resin are usually linked, and it is often said that the price of recycled plastic resin is seven times that of virgin plastic resin. However, demand for recycled plastic resin has increased as beverage manufacturers promote bottle-to-bottle production, and the price of recycled plastic resin has come to exceed the price of virgin plastic resin.
- As one might expect, the quality of virgin plastic resin is higher than that of recycled plastic resin and is easier to use. Therefore, users are balancing virgin plastic resin, which is more expensive but of better quality, with recycled plastic resin, which is inferior in quality but less expensive, in consideration of the quality they want from the product and the cost they can spend. This is the same thing as considering whether to buy new or used products for the same product. However, if the number of consumers who only want used products increases, the price of used products will rise. This is

exactly the situation with the current price of recycled plastic resin. Beverage manufacturers have publicly set a target for the percentage of recycled plastic resin used in their bottles. Therefore, they have no choice but to use recycled plastic resin, and the situation is no longer a matter of preference between virgin plastic resin and recycled plastic resin. This has caused the price of recycled plastic resin to skyrocket.

- In recent years, the selling price of recycled plastic resin has been rising, and especially for FY2022, it is due to a combination of three factors: first, soaring crude oil prices; second, new recyclers entering the bottle-to-bottle pellet production market and the principle of competition has become stronger; and third, used plastic bottles are being collected by beverage manufacturers.
- Regarding the price linkage between virgin plastic resin and recycled plastic resin, before beverage manufacturers started bottle-to-bottle initiatives, there was a certain degree of price difference between the two, and they were linked to each other. This was due to the fact that the two types of resin were used separately, where virgin plastic resin had good quality but a high price, and recycled plastic resin had lower quality but a low price. However, due to bottle-to-bottle initiatives, beverage manufacturers want recycled plastic resin, so they no longer use virgin plastic resin and recycled plastic resin separately, and the price linkage between the two is sometimes broken.

Source: Prepared by the Committee based on responses to the interview survey (for recyclers)

6. Bottle-to-bottle and Similar Initiatives

(1) Status of Setting Implementation Targets for Bottle-to-bottle and Similar

As described in Chapter 4-4 (page 36) above, beverage manufacturers and other companies have declared at the JSDA that they aim to achieve a 50% ratio of bottle-to-bottle, the horizontal recycling of plastic bottles, by 2030 as the soft drink industry, and each manufacturer has also set a target for the ratio of recycled plastic resin and other materials used in its products¹⁰⁷.

Specifically, we asked the following questions to businesses that use or manufacture plastic bottles about their targets for the percentage of recycled PLASTIC resin and other materials used in their products in a written survey, and the results of the survey showed that the following targets were most common:

- By 2030, the ratio of recycled plastic resin or plant-derived raw materials to be used should be 100%.
- By 2030, we are targeting an increased ratio of recycled plastic resin or plant-derived raw materials to 50% or more.

In addition, many respondents answered that they would like to achieve the following goals in addition to the use of recycled plastic resin and other materials:

- A reduction of the overall amount of plastic packaging materials used, including plastic bottles.
- Switching from plastic bottles to aluminum bottles.

There were also some respondents stated the following:

- Currently using ready-made plastic bottles and have no plans to use recycled plastic resin.

(2) Manufacturing Status of Recycled Plastic Resin Compatible with Bottle-to-bottle

As described in Chapter 3-2 (page 24) above, in order to implement bottle-to-bottle, it is necessary to adopt processing methods for horizontal recycling. When recyclers were asked about products manufactured and sold at their facilities where they

¹⁰⁷ Since the total production volume of plastic bottles is limited, it is not possible to realize all of the goals of business operators related to bottle-to-bottle and the requests of the municipalities that desire bottle-to-bottle. There were some opinions that it is necessary to take into account the current situation where business operators who cannot secure the necessary amount of recycled plastic resin are forced to use virgin plastic resin.

recycle used plastic bottles, about 40.4% of respondents were currently manufacturing bottle-to-bottle compliant recycled plastic resin. However, as described in Chapter 4-3 (2) (page 36) above, there have been some cases where large companies have started manufacturing bottle-to-bottle compliant recycled plastic resin without registering with JCPRA, although the survey was not able to capture this trend since the survey was conducted for recyclers that are or were registered with JCPRA.

Recycling companies that manufacture bottle-to-bottle compatible recycled plastic resin were asked about the reasons they manufacture bottle-to-bottle compatible recycled plastic resin, and their responses were as follows below.

Figure 91: Reasons why recyclers produce recycled plastic resin for bottle-to-bottle (multiple answer)

Responses		Respondents (persons)	Percentage
a	Demand for recycled plastic resin compatible with bottle-to-bottle is increasing, and sales are expected to increase.	11	57.9%
b	There are few business operators that manufacture recycled plastic resin compatible with bottle-to-bottle recycling, so we considered differentiating our products from others.	4	21.1%
c	Proposed by business operators that purchase our recycled plastic resin.	7	36.8%
d	A manufacturer of equipment necessary to produce bottle-to-bottle compatible recycled plastic resin submitted a proposal.	0	0.0%
e	There is a social need to manufacture bottle-to-bottle compatible recycled plastic resin.	8	42.1%
f	Requests or instructions from our parent company.	4	21.1%
g	Other.	1	5.3%
Respondents		19	100.0%

Source: Prepared by the Committee based on the responses to the written survey (for recyclers)

The following opinions were obtained in the interview survey of recyclers regarding the production of recycled plastic resin compatible with bottle-to-bottle.

Figure 92: Opinions of recyclers on the production of recycled plastic resin compatible with bottle-to-bottle

- Recycling into plastic bottles is more technically challenging than recycling into sheets and other products and requires special equipment to produce recycled plastic bottles. In addition, since the plastic bottles produced are for human consumption, sanitary facilities are required, and investments in such facilities are very expensive.
- The production of bottle-to-bottle compatible recycled plastic resin requires special technology. However, it is questionable whether it is environmentally friendly from an overall perspective since it requires carbon dioxide emissions, wastewater treatment, and heat treatment.
- Recycled plastic bottles need certification from beverage manufacturers to verify that they can be used as beverage plastic bottles. Certification from beverage manufacturers cannot be obtained overnight. Therefore, it is not easy to enter the bottle-to-bottle market even if funds are available.
- In Japan, guidelines have been established for safety standards for recycled plastic materials used for food containers and packaging, which comply with the standards set by the U.S. Food and Drug Administration. The guidelines stipulate testing to see if the material meets safety standards. However, it is difficult for us to prepare facilities to manufacture recycled plastic resin of a quality that would meet testing requirements. Therefore, we do not intend to manufacture bottle-to-bottle compatible recycled plastic resin and deal directly with beverage manufacturers but will instead be indirectly involved in the bottle-to-bottle business by selling the recycled plastic resin flakes we manufacture to recyclers that can then manufacture bottle-to-bottle compatible recycled plastic resin.
- Preforms that contain glass cannot be inflated. While such preforms can be used for egg cartons and other thicker containers, they cannot be used in plastic bottles.

Although it is becoming possible to process used plastic bottles, even if they contain glass, depending on the technology, it is still better not to mix it in from the beginning.

- While it is possible to use recycled plastic resin intended for high-quality applications for low-quality applications, it is troublesome. The resin quality is adjusted for each use, and for example, recycled plastic resin for plastic bottles is something that has recovered viscosity. However, if the viscosity is too strong to make short fibers, it may be difficult to stretch them as fibers.

Source: Prepared by the Committee based on responses to the interview survey (for recyclers)

(3) Implementation Status of Used Plastic Bottles Emitted as General Waste

A. Status of Implementation

(A) Municipalities

As described in Chapter 3-3 (2) (page 26) above, it is believed that in recent years, some municipalities have started to implement bottle-to-bottle initiatives with the aim of "visible recycling," "horizontal recycling," and "local circulation recycling" in order to raise environmental awareness among residents.

Therefore, we asked municipalities about the status of their bottle-to-bottle initiatives, and their responses were as follows below.

Figure 93: Implementation status of bottle-to-bottle initiatives in municipalities

Responses		Respondents (persons)	Percentage
a	Currently implementing bottle-to-bottle initiatives.	124	8.9%
b	Interested in bottle-to-bottle but currently not implementing it.	741	53.4%
c	Currently not implementing bottle-to-bottle initiatives and have no particular interest.	522	37.6%
Total (Respondents)		1,387	100.0%

Source: Prepared by the Committee based on responses to the written survey (for municipalities)

In addition, municipalities that are currently implementing bottle-to-bottle initiatives (municipalities that selected “a” in Figure 93; the same applies hereinafter) were asked about the reasons, purposes, or benefits of their bottle-to-bottle initiatives, and the responses were as follows below.

Figure 94: Reasons for municipalities to implement bottle-to-bottle initiatives or similar

Responses		Multiple responses		Matters of greatest importance	
		Respondents (persons)	Percentage	Respondents (persons)	Percentage
a	Clarification of post-recycling uses will increase residents' awareness and interest in waste separation and recycling.	101	70.1%	47	45.2%
b	The recycling method has low environmental impacts.	100	69.4%	23	22.1%
c	Enables the recycling of resources within the community.	52	36.1%	10	9.6%
d	The delivery price of used plastic bottles will increase, which will benefit the local government in terms of finances (revenue).	26	18.1%	9	8.7%

e	The delivery price of used plastic bottles will be stable, which is beneficial to the local government in terms of finances (revenue).	28	19.4%	3	2.9%
f	Reduction of administrative workload related to the disposal of used plastic bottles.	7	4.9%	1	1.0%
g	Reduced burden of operations required for the collection, intermediate treatment, and transportation of used plastic bottles.	4	2.8%	1	1.0%
h	Other.	25	17.4%	10	9.6%
Respondents		144	100.0%	104	100.0%

Source: Prepared by the Committee based on responses to the written survey (for municipalities)

The following opinions were obtained in the interview survey of municipalities regarding the reasons for municipalities to implement bottle-to-bottle initiatives.

Figure 95: Opinions of Municipalities on reasons for implementing bottle-to-bottle initiatives

- If everything is recycled into plastic bottles, some industries will run out of materials, such as those needed for fiber and trays. Therefore, we do not think there is a most desirable place to recycle. However, we would like to utilize bottle-to-bottle recycling

because it is very easy to understand and easy to explain to residents.

- Japanese plastic bottles are transparent. Therefore, it is possible to recycle them into plastic bottles as bottle-to-bottle. Although it is my personal opinion, if it is possible to return to plastic bottles, returning to plastic bottles is better from the perspective of resource recycling than turning to fiber.
- In the designated juridical person route, plastic bottles are not only made into plastic bottles but may also be processed into fibers and sheets. Turning them into fiber is also recycling. However, in this case, products made from this fiber would eventually be incinerated. On the other hand, plastic bottles can be recycled again.
- The major difference between our municipality and other municipalities is that there are recyclers that are capable of bottle-to-bottle recycling within the municipality. The government often first asks local companies to conduct business in consideration of local development, but in other municipalities, there are not many recyclers in the region, making it difficult to conduct recycling within their region.

Source: Prepared by the Committee based on responses to the interview survey (for municipalities)

Moreover, municipalities that are not currently implementing bottle-to-bottle initiatives (those that selected “b” or “c” in Figure 93) were asked why they are not implementing bottle-to-bottle initiatives, and their responses were as follows below.

Figure 96: Reasons why municipalities have not implemented bottle-to-bottle initiatives (multiple answer)

Responses		Respondents (persons)	Percentage
a	We cannot find cooperative partners, such as recyclers or beverage manufacturers, which are necessary to implement bottle-to-bottle initiatives.	234	19.0%
b	If we try to implement bottle-to-bottle initiatives, we will have to enter into private contracts with business operators that can realize the initiative, which is problematic from the perspective of	152	12.3%

	fairness in selecting a business entity.		
c	The basic policy based on the Containers and Packaging Recycling Law states that bottles must be handed over smoothly to a designated juridical person.	354	28.7%
d	We are obliging with the "Request for Smooth Handover to Designated Juridical Persons" from the JCPRA.	312	25.3%
e	Concerns over the impact on our future relationship with the JCPRA.	92	7.5%
f	It is necessary to maintain our business relationship with waste disposal services.	107	8.7%
g	The delivery price of used plastic bottles will decrease, which will be a disadvantage in terms of local government finances (revenue).	116	9.4%
h	The administrative workload related to used plastic bottle disposal will increase.	280	22.7%
i	The burden of operations required for collection, intermediate treatment, and transportation related to used plastic bottle disposal will increase.	221	17.9%
j	We believe that recycling for purposes other than bottle-to-bottle is also important.	220	17.8%
k	Difficult for residents to understand.	18	1.5%
l	No particular advantages.	145	11.8%
m	Other.	219	17.8%
Respondents		1,233	100.0%

Source: Prepared by the Committee based on responses to the written survey (for municipalities)

The following opinions were obtained in the interview survey of municipalities regarding the reasons why municipalities do not implement bottle-to-bottle initiatives.

Figure 97: Opinions of municipalities on reasons for not implementing bottle-to-bottle initiatives

- It may be true that horizontal bottle-to-bottle recycling is superior in the sense of effectively using resources. We are aware that several municipalities in the prefecture are promoting bottle-to-bottle recycling. However, there are no major recyclers in the vicinity of our municipality that are capable of bottle-to-bottle recycling. Therefore, it would be difficult for the municipality to take on the initiative in this area.
- Bottle-to-bottle is fine for the beverage industry to engage in. However, there is a question as to whether it is something to be promoted as a municipality. We understand that horizontal recycling is desirable, but if beverage manufacturers want to promote it, why don't they cooperate with recyclers and win high bids in the bidding for the designated corporate route?
- If a transaction that was underway through the independent processing route is suddenly canceled, it would be difficult to have the beverage companies collect the beverages through the designated juridical person route. There is also a concern about entering into a private agreement with one company for a large transaction.

Source: Prepared by the Committee based on responses to the interview survey (for municipalities)

(B) Businesses

As described in Chapter 3-3 (2) (page 26) above, bottle-to-bottle initiatives by municipalities appear to often be implemented in collaboration with beverage manufacturers and other business operators.

Therefore, we asked plastic bottle users, manufacturers, and recyclers about the implementation status of bottle-to-bottle initiatives in cooperation with municipalities. The responses are as follows below.

Figure 98: Implementation of bottle-to-bottle initiatives in cooperation with municipalities among businesses that use or manufacture plastic bottles

Responses					Respondents (persons)	Percentage
a	Implementing	bottle-to-bottle	initiatives	in	11	1.5%

	cooperation with municipalities		
b	Not implementing bottle-to-bottle initiatives in cooperation with municipalities	722	98.5%
Total (respondents)		733	100.0%

Source: Prepared by the Committee based on responses to a written survey (for business operators that use or manufacture plastic bottles)

Figure 99: Implementation status of bottle-to-bottle initiatives in collaboration with municipalities among recyclers

Responses		Respondents (persons)	Percentage
a	Implementing bottle-to-bottle initiatives in cooperation with municipalities	5	23.8%
b	Not implementing bottle-to-bottle initiatives in cooperation with municipalities	16	76.2%
Total (respondents)		21	100.0%

Source: Prepared by the Committee based on responses to the written survey (for recyclers)

B. Impact of the Initiative

As described in Section A (A) above, the reasons for municipalities to implement bottle-to-bottle initiatives include raising residents' awareness of waste separation and recycling, as well as financial benefits.

Municipalities that are currently implementing a bottle-to-bottle program were asked about the impact of the implementation of the bottle-to-bottle program on the amount of used plastic bottles sorted and collected and the amount delivered to recyclers.

The responses were as follows below.

Figure 100: Impact of bottle-to-bottle initiatives in municipalities on the amount of separate collection (multiple answer)

Responses		Respondents (persons)	Percentage
a	Increased overall.	15	17.2%

b	Remained the same overall.	60	69.0%
c	Decreased overall.	0	0.0%
d	Depends on the time of the year.	12	13.8%
e	Do not know.	29	33.3%
Total (respondents)		87	100.0%

Source: Prepared by the Committee based on responses to the written survey (for municipalities)

Moreover, municipalities that are currently implementing a bottle-to-bottle initiative were asked about the impact of the implementation of the bottle-to-bottle initiative on the price at which used plastic bottles are delivered to recyclers. The responses were as follows below.

Figure 101: Impact of bottle-to-bottle initiatives in municipalities on delivered prices

Responses		Respondents (persons)	Percentage
a	Increased overall.	25	21.4%
b	Remained the same overall.	17	14.5%
c	Declined overall.	7	6.0%
d	Depends on the time of the year.	24	20.5%
e	Do not know.	44	37.6%
Total (respondents)		117	100.0%

Source: Prepared by the Committee based on responses to the written survey (for municipalities)

C. Factors to be Considered in Implementing Bottle-to-bottle Initiatives

In the interview survey of municipalities, the following opinions were expressed regarding the matters that municipalities consider important in implementing bottle-to-bottle initiatives, and some municipalities responded that they consider factors other than the price of delivery, such as the achievement of resource recycling and the ease of communicating measures to residents.

Figure 102: Factors municipalities consider important in implementing bottle-to-bottle

- There are benefits other than those related to price. The benefits of such agreements include the following: (i) the ability to conduct recycling of resources within the region, (ii) the reduction of carbon dioxide emissions through recycling, (iii) the ease of understanding for residents through visible recycling, (iv) the securing of local employment, and (v) the establishment of a treatment facility within the city, which will allow the city, as the license holder of the general waste treatment facility, to monitor the treatment status.
- It is important for residents to know that the plastic bottles they emit are returned as raw materials and to know where they are taken and what they become.
- Cooperation with local companies is one of the objectives of the agreement. This municipality is considering establishing a cooperative relationship that is not limited to bottle-to-bottle initiatives by concluding an agreement.
- In our internal discussions, there was an opinion that we should actively promote bottle-to-bottle horizontal recycling as it will increase residents' understanding of recycling, and since our municipality receives many domestic and international tourists, our efforts will send a message to the whole country and the rest of the world.
- The consideration of switching from handing over to the JCPRA to independent processing was based upon the assumption that it would decrease the municipality's revenue to a level of several million yen. The priority was given to achieving the policy objective of resource recycling through horizontal recycling rather than revenue.
- The contract was based on the principle of "bottle-to-bottle," so it was not just a question of price. On the other hand, there is a view that even though it is garbage, it is the property of residents and should be handed over to a place that will purchase it at a higher price. Such considerations must be made in relation to residents.

Source: Prepared by the Committee based on responses to the interview survey (for municipalities)

D. Methods of Implementing Bottle-to-bottle Initiatives

(A) Actual Situation

As described in Section A above, in recent years, some municipalities have begun to implement bottle-to-bottle initiatives by concluding agreements with beverage

manufacturers and other parties.

Municipalities that are currently implementing bottle-to-bottle initiatives were asked about the method of contracting for the delivery of used plastic bottles, and the responses were as follows below.

Figure 103: Contracting methods for bottle-to-bottle initiatives in municipalities (multiple answer)

	Responses	Respondents (persons)	Percentage
a	Comprehensive evaluations.	2	1.6%
b	Proposals/ competitions.	4	3.2%
c	Competitive bidding other than those listed in “a” above.	2	1.6%
d	Nominated competitive bidding other than “a” above.	8	6.5%
e	Private contracts (negotiated quotation).	22	17.7%
f	Private contracts by special order.	40	32.3%
g	Other.	47	37.9%
	Respondents (Number of respondents who answered that the contract was a private contract (“e” or “f”))	124 (62)	100.0% (50.0%)

Source: Prepared by the Committee based on responses to the written survey (for municipalities)

Municipalities that are currently implementing bottle-to-bottle initiatives were also asked about their contractual arrangements for the delivery of their used plastic bottles. The responses were as follows below.

Figure 104: Method of determining delivery price for bottle-to-bottle initiatives in municipalities

	Responses	Respondents (persons)	Percentage
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a	The prices of successful bids or proposals in biddings or competitions are used as delivery prices.	20	17.2%
b	The unit price is determined by referring to the average unit prices of the successful bids in the most recent JCPRA bidding in Japan or in the neighboring prefectures.	0	0.0%
c	The unit price is determined by referring to the average unit prices of the successful bids of local governments in the same prefecture or neighboring prefectures in the most recent JCPRA bids.	6	5.2%
d	The unit price is determined by referring to the unit prices of the successful bids of their own local governments in the most recent JCPRA bids.	8	6.9%
e	The unit price is determined by referring to the average unit prices of the successful bids in the last few years of JCPRA bids, both national and of neighboring prefectures.	2	1.7%
f	The unit price is determined by referring to the average unit prices of successful bids from the local governments in the same prefecture or neighboring local governments in the past few years of JCPRA bids.	16	13.8%
g	The unit price is determined by referring to the unit prices of the successful bids of the local governments in the past several years of JCPRA bids.	6	5.2%
h	The price proposed by the business is used as the delivered price, but we do not know how it is calculated.	21	18.1%

i	Other.	37	31.9%
	Total (respondents)	116	100.0%

Source: Prepared by the Committee based on responses to the written survey (for municipalities)

The following opinions were expressed in the interview survey of municipalities regarding the contracting method for bottle-to-bottle initiatives. While some municipalities concluded private contracts on agreements, a certain number of municipalities concluded contracts through general competitive bidding or other methods inviting a large number of unspecified bidders.

Figure 105: Opinions of municipalities on contracting methods for bottle-to-bottle initiatives

- The municipality has an agreement with a beverage manufacturer. The municipality's direct contractor in the agreement is a recycler, and it is a private contract for the purchase of used plastic bottles collected by the municipality.
- The municipality has a bottle-to-bottle agreement with a beverage manufacturer, but the contract for the delivery of plastic bottles is a private contract with the recycler.
- The agreement is a tripartite agreement between the beverage manufacturer, its subsidiary, and the municipality. However, in terms of the actual business relationship, the municipality has a sales contract with the recycler. This sales contract is a private contract.
- The municipality selects recyclers for its independent processing through a limited competitive bidding process, which is limited to business operators that can realize bottle-to-bottle recycling.
- The recycling rate is maintained at a yield rate by bottle-to-bottle recycling, and business operators were selected through an open call for proposals.
- Within the prefecture, another municipality first contracted with a beverage manufacturer. However, the municipality in question had a beverage manufacturer's factory in its municipality. On the other hand, our municipality does not have a beverage manufacturing factory. Therefore, we decided to carry out an open call for proposals as there would not be a viable explanation to the residents if we concluded a private

agreement with one company.

Source: Prepared by the Committee based on responses to the interview survey (for municipalities)

(B) Competition Policy Approach

As described in Section (A) above, the survey results show that in many cases, municipalities implement bottle-to-bottle initiatives based on agreements with beverage manufacturers and enter into private contracts with recyclers.

The basic competition policy approach in cases where municipalities implement bottle-to-bottle initiatives through private contracts is the same as described in Section 1 (3) D (page 53) and Section 2 (3) E (page 72) above.

For example, as shown in the interview survey (Figure 105), there are some cases in which a cooperative business operator is determined by general competitive bidding or an open call for proposals, and such cases can be considered as references when municipalities consider using contracts.

(4) Status of Implementation Regarding Used Plastic Bottles Emitted as Industrial Waste

A. Status of Implementation

As described in Section (3) above, while bottle-to-bottle initiatives have been implemented for used plastic bottles that are general waste, initiatives for used plastic bottles emitted as industrial waste as well as general waste are also being implemented.

Business operators that use or manufacture plastic bottles and recyclers were asked about the implementation status of bottle-to-bottle initiatives for used plastic bottles discharged by or collected by other business operators, and the responses were as follows below.

Figure 106: Bottle-to-bottle initiatives (industrial waste) by businesses operators that use or manufacture plastic bottles

Responses	Respondents (persons)	Percentage
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a	Implementing bottle-to-bottle initiatives in cooperation with other business operators.	13	1.8%
b	Not implementing bottle-to-bottle initiatives in cooperation with other business operators.	719	98.2%
Total (respondents)		732	100.0%

Source: Prepared by the Committee based on responses to a written survey (for business operators that use or manufacture plastic bottles)

Figure 107: Implementation of bottle-to-bottle initiatives by recyclers (industrial waste)

Responses		Respondents (persons)	Percentage
a	Implementing bottle-to-bottle initiatives in cooperation with other business operators.	2	8.7%
b	Not implementing bottle-to-bottle initiatives in cooperation with other business operators.	21	91.3%
Total (respondents)		23	100.0%

Source: Prepared by the Committee based on responses to a written survey (for recyclers)

B. Trading Conditions

When business operators that use or manufacture plastic bottles were asked by a written survey regarding the price of delivery of used plastic bottles emitted as industrial waste for the bottle-to-bottle initiative, the general response was as follows:

- In general, business operators deliver plastic bottles to recyclers for a fee based on market conditions and other factors.

In addition, the following response was also obtained:

- As for transaction conditions, the price is determined in the contract between the business operator commissioned to collect used plastic bottles and the recycler, and therefore, are not aware.

In addition, when we asked recyclers how they determine the delivery price of used plastic bottles emitted as industrial waste for their bottle-to-bottle initiatives, their responses were as follows below.

**Figure 108: Method of determining delivery price for bottle-to-bottle initiatives
(industrial waste) by recyclers**

Responses		Respondents (persons)	Percentage
a	The unit price is determined by referring to the average unit price of the successful bidding in the most recent bidding by the JCPRA in Japan or in the neighboring prefectures of the prefecture where the counterparty is located.	0	0.0%
b	The unit price is determined by referring to the average unit price of successful bids of the most recent bidding by the JCPRA in the prefecture where the partner business operator is located or in the neighboring municipalities where the counterparty business partner is located.	1	16.7%
c	The unit price is determined by referring to the average unit price of the successful biddings of JCPRA's bidding received in the past few years from all prefectures in Japan or from neighboring prefectures of the prefecture where the counterparty is located.	1	16.7%
d	The unit price is determined by referring to the average unit price of successful bidding of JCPRA's bidding in the past few years of the prefectures in which the partner business operators are located or the neighboring municipalities of the municipality in which the counterparty is located.	0	0.0%
e	The unit price is determined through negotiation with the counterparty business operator, taking into consideration the planned purchase volume and transportation costs, without referring to the	2	33.3%

	successful bidding unit price of the JCPRA.		
f	The price offered by the partner business operator is used as the purchase price, but we are not aware of how it is calculated.	2	33.3%
g	Other.	0	0.0%
Total (respondents)		6	100.0%

Source: Prepared by the Committee based on responses to a written survey (for recyclers)

(5) Opinions on Bottle-to-bottle Initiatives and Future Prospects

The implementation of bottle-to-bottle initiatives is a new phenomenon that has emerged in recent years, and as described in Section (2) above, only a few recyclers are currently manufacturing plastic resin compatible with bottle-to-bottle initiatives. As described in Sections (3) and (4) above, only a few municipalities, recyclers, and business operators that use or manufacture plastic bottles are currently implementing bottle-to-bottle initiatives.

Therefore, we surveyed the opinions of various business operators regarding the future prospects of bottle-to-bottle initiatives, and the results are as follows below.

A. Opinions of Businesses That Use and Manufacture Plastic Bottles

The following opinions were expressed in the interview survey of business operators that use or manufacture plastic bottles regarding the future prospects of bottle-to-bottle initiatives.

Figure 109: Opinions of Businesses That Use or Manufacture Plastic Bottles Regarding Future Prospects for Bottle-to-bottle and Other Initiatives

- We believe that it is the responsibility of beverage manufacturers to promote horizontal recycling.
- If only beverage manufacturers scramble to collect recycled plastic resin in an effort to achieve recycling, the price of recycled plastic resin will soar, and business operators that manufacture fibers and sheets using recycled PLASTIC resin will not have enough to use. If such businesses that originally used recycled plastic resin are forced to use virgin resin, it would be a real setback for domestic recycling as a whole. From the

perspective of resource recycling in society as a whole, we believe that there is a limit to simply recycling used plastic bottles into recycled plastic resin through mechanical recycling.

Source: Prepared by the Committee based on responses to the interview survey (for business operators that use or manufacture plastic bottles)

B. Opinions of Recyclers

Recyclers that currently manufacture plastic resin compatible with bottle-to-bottle were asked about their future plans for manufacturing recycled plastic resin compatible with bottle-to-bottle, and their responses were as follows below.

Figure 110: Future plans for manufacturing plastic resin compatible with bottle-to-bottle (recyclers currently manufacturing)

Responses		Respondents (persons)	Percentage
a	Considering continuing to manufacture recycled plastic resin compatible with bottle-to-bottle, maintaining current volumes.	6	31.6%
b	Considering continuing to increase the production volume of recycled plastic resin compatible with bottle-to-bottle.	10	52.6%
c	Will continue to manufacture recycled plastic resin compatible with bottle-to-bottle, but considering reducing the amount.	1	5.3%
d	Considering not to manufacture recycled plastic resin compatible with bottle-to-bottle in the future.	0	0.0%
e	Other.	2	10.5%
Total (respondents)		19	100.0%

Source: Prepared by the Committee based on responses to the written survey (for recyclers)

In addition, recyclers that do not currently manufacture plastic resin compatible with bottle-to-bottle were asked about their future plans for manufacturing recycled

PLASTIC resin compatible with bottle-to-bottle, and their responses were as follows below.

Figure 111: Plans for future production of bottle-to-bottle compatible plastic resin (recyclers that are currently non-producing)

Responses		Respondents (persons)	Percentage
a	We would like to manufacture and are in the process of formulating specific plans, such as considering plans for purchasing equipment and financing.	1	4.8%
b	We would like to manufacture but have not yet begun any specific studies.	2	9.5%
c	We would like to manufacture but consider it difficult to actually do so.	2	9.5%
d	We are not considering manufacturing at this time.	14	66.7%
e	Other.	2	9.5%
Total (respondents)		21	100.0%

Source: Prepared by the Committee based on responses to the written survey (for recyclers)

Recyclers that would like to produce plastic resin compatible with bottle-to-bottle but find it difficult to actually do so were asked about the reasons for their desire to do so. The responses were as follows below.

Figure 112: Reasons behind difficulties in manufacturing bottle-to-bottle compatible plastic resin (multiple answer)

Responses		Respondents (persons)	Percentage
a	Sales of bottle-to-bottle compatible recycled plastic resin cannot be expected due to a lack of potential customers or other such reasons.	0	0.0%
b	High capital investment is required to install the	2	66.7%

	necessary equipment to manufacture bottle-to-bottle compatible recycled plastic resin.		
c	Costs required to produce bottle-to-bottle compatible recycled plastic resin are high, and profitability cannot be expected.	1	33.3%
d	It is difficult to achieve the quality standards required by manufacturers of products containing plastic bottles.	2	66.7%
e	The quality of the used plastic bottles we are currently purchasing is not suitable for the production of bottle-to-bottle compatible recycled plastic resin.	1	33.3%
f	Customers for bottle-to-bottle recycled plastic resin have already been covered by recyclers who are currently manufacturing the resin, and we believe it is too late to enter the market now.	1	33.3%
g	Other.	0	0.0%
Total (respondents)		3	100.0%

Source: Prepared by the Committee based on responses to the written survey (for recyclers)

Recyclers were also asked why they are not currently considering manufacturing plastic resin compatible with bottle-to-bottle, and their responses were as follows below.

Figure 113: Reasons for not considering manufacturing bottle-to-bottle compatible plastic resin (multiple answer)

Responses		Respondents (persons)	Percentage
a	It is possible to continue the recycling business of used plastic bottles without manufacturing recycled plastic resin compatible with bottle-to-bottle.	2	13.3%
b	It is important to manufacture recycled plastic resin	5	33.3%

	for applications other than bottle-to-bottle.		
c	Demand for recycled plastic resin for applications other than bottle-to-bottle is greater.	0	0.0%
d	We manufacture products other than plastic bottles and use recycled plastic resin as raw materials.	3	20.0%
e	It is important to continue doing business with other existing companies that manufacture products other than plastic bottles.	5	33.3%
f	We want to sell to local business operators that manufacture products other than plastic bottles.	0	0.0%
g	Other.	4	26.7%
h	No particular reason.	2	13.3%
Total (respondents)		15	100.0%

Source: Prepared by the Committee based on responses to the written survey (for recyclers)

Regarding future prospects for bottle-to-bottle and other initiatives, the following opinions were obtained in the interview survey of recyclers.

Figure 114: Opinions of recyclers regarding future prospects for bottle-to-bottle and other initiatives

[About the company's future policy]

- We deliver our bottle-to-bottle compatible pellets to beverage manufacturers. We plan to continue the bottle-to-bottle initiative in the future.
- We expect the number of agreements between beverage manufacturers and local governments to continue increasing. The number of invitations will also increase. We are prepared to get involved in the trend. We think we may be approached by someone soon.

[About bottle-to-bottle initiatives in general]

- We have business relationships with textile manufacturers, and we have heard from them that major recyclers are buying up used plastic bottles in order to produce recycled plastic resin compatible with bottle-to-bottle, so the textile manufacturers do

not have access to recycled plastic resin, and the production of fiber from recycled plastic resin has grown challenging.

- Although the progress of bottle-to-bottle itself is desirable from the perspective of diversification of recycling, we are concerned that if recyclers who produce recycled plastic resin incompatible with bottle-to-bottle recycling lose their jobs due to the loss of buyers, then used plastic bottles with poor quality may no longer be recycled in Japan. It will depend on how bottle-to-bottle technology progresses in the future. However, a certain amount of used plastic bottles of poor quality that cannot be used for bottle-to-bottle will remain, no matter how hard we try. However, if only recyclers that solely produce bottle-to-bottle compatible recycled plastic resin exist, used plastic bottles that cannot be converted to bottle-to-bottle products will not be recycled by anyone and, in turn, will be incinerated. If this is the case, is this really a good situation for the recycling of used plastic bottles when considering it as a whole?
- There is a growing number of small-scale recyclers that are unable to compete with large-scale business operators that conduct bottle-to-bottle in terms of procuring used plastic bottles. In response to this situation, we have commissioned small-scale recyclers to produce flakes. This may change the nature of the work of small-scale recyclers, but we do not think the work itself will disappear.
- In other countries where the rates of collection of plastic bottles are low, it is not wrong for beverage manufacturers to push for bottle-to-bottle in order to promote recycling. However, Japan has already achieved fairly high collection and recycling rates. Under such circumstances, if too much priority is given to bottle-to-bottle, and fiber and food containers have to be manufactured from virgin raw materials, the significance of recycling will be lost.
- Since only the supernatant of used plastic bottles can be used (for bottle-to-bottle recycling), it is impossible for beverage manufacturers to achieve a 100% recycling rate at the same time. This is probably one of the reasons why each beverage manufacturer has set a target figure that includes bio-materials. However, local governments and residents are not well aware of this situation and think that 100% of used plastic bottles are directly converted into new recycled plastic bottles.
- Recyclers of bottle-to-bottle bid high prices and transport used plastic bottles from various municipalities throughout Japan to their factories. However, from a recycling

perspective, no matter how compressed the bottles are, it is as though they are transporting air while still emitting carbon dioxide during transportation, which begs the question of whether this is really appropriate.

Source: Prepared by the Committee based on responses to the interview survey (for recyclers)

C. Opinions of Other Business Operators

Regarding the future prospects of bottle-to-bottle initiatives, the following opinions were obtained in the interview survey of business operators other than those mentioned in Sections A and B above.

Figure 115: Opinions of municipalities on future prospects for bottle-to-bottle and other initiatives

- We are verifying whether bottle-to-bottle is superior to existing recycling methods, but we are very concerned about what figures are desirable and can be shown in terms of environmental impact. Since we cannot grasp the detailed processes of various recycling applications and methods, we cannot make simple comparisons.
- Since municipalities are now trying to turn to horizontal recycling, textile manufacturers will probably have a hard time in the future. However, since recycling into fiber is a one-time process, it would be desirable for plastic bottles to be recycled horizontally if possible.
- In relation to used plastic bottles, it is important to reduce the emission amounts. Therefore, in order to raise public awareness, a policy encouraging residents to use their own non-disposable bottles is currently under consideration.

Source: Prepared by the Committee based on responses to the interview survey (for municipalities)

Chapter 6. Promotion of Fair Competition in Transactions pertaining to

Recycling Used Plastic Bottles

1. JCPRA-issued Letters and Other Documents

(1) JCPRA-issued Letters, etc.

A. Current Status

(A) Basic Policy Provisions

As stated in Chapter 3-1 (4) D (page 17) above, municipalities are not obligated under the Containers and Packaging Recycling Law to dispose of used plastic bottles through the designated juridical person route. And, as described in Chapter 4-1 (3) (page 30) above, the basic policy formulated by the competent minister based on the Containers and Packaging Recycling Law states that municipalities are required to smoothly deliver waste that conforms to the sorting standards obtained through sorted collection to the designated juridical person or other such entities. Even in cases where waste is not delivered to the designated person or other such entities, municipalities are required to take into account the facility capacity of the recycling facilities and confirm that the sorted and collected waste containers and packaging are properly processed with all possible measures for environmental conservation. This suggests that it is assumed that some municipalities will conduct processing independently.

(B) Documents Issued to the Japan Soft Drink Association by the JCPRA

In October 2021, the JCPRA sent a letter (a document titled "Municipalities and Beverage Companies' Opinion on the Agreement of Transferring the Plastic Bottles that Conform to the Plastic Bottle Separation Standards") to the Japan Soft Drink Association (JSDA), a business association comprised of beverage manufacturers and other organizations, stating that the JCPRA hopes for an appropriate response from the JSDA because the JCPRA considered it "not in line with the policy (spirit) of the Containers and Packaging Recycling Law" that beverage manufacturers had concluded an agreement with municipalities to promote bottle-to-bottle recycling, and they had been taking measures to recycle beverage bottles without going through the JCPRA and for other reasons (see (2) below for the JSDA's response in regard to the said document.).

(C) Municipalities' Perception of Communications With the JCPRA

In the interview survey of municipalities, some stated that the JCPRA prevented them from utilizing the JCPRA's bidding, and the JCPRA visited them to confirm the reasons they newly started independent processing. Although some municipalities received explanations from the JCPRA about the Containers and Packaging Recycling Law in conjunction with the said confirmation, they were only told that the basic policy based on the Containers and Packaging Recycling Law requires smooth delivery to the designated juridical person. One respondent indicated that some municipalities felt that such an explanation could lead to a mistaken impression that independent processing is an inappropriate approach in light of the basic policy based on the Containers and Packaging Recycling Law. In addition, some municipalities that heard that the document described in Section (B) above was scheduled to be sent to the JSDA were given the impression that agreements with beverage companies were in violation of the Containers and Packaging Recycling Law.

Furthermore, some municipalities that process independently stated that they had confirmed with the JCPRA that it is possible to return to the designated juridical person route when circumstances change with regard to the delivered amount that has been transferred to the independent route. On the other hand, other municipalities indicated that they have been informed by the JCPRA that it is not easy to request the JCPRA to deliver waste again if waste is transferred to their independent processing system.

Figure 116: Municipalities' opinions on the JCPRA's approach regarding the use of the designated juridical person route

- After we decided to start independent processing, an official from the JCPRA came and explained to us the benefits of handing over used plastic bottles to the JCPRA. However, since we only received explanations that the basic policy based on the Containers and Packaging Recycling Law requires smooth delivery to the designated juridical person, we felt that such explanations could cause a misunderstanding that independent processing is an inappropriate approach in light of the basic policy based on the

Containers and Packaging Recycling Law.

- We used to deliver 100% of our used plastic bottles to the JCPRA, but after we started our independent processing and came to deliver half through the designated juridical person route and half through our independent route, the volume delivered to the JCPRA dropped to half. Therefore, the JCPRA asked about what was happening, and the person in charge came to our municipality. We were requested by the JCPRA to give used plastic bottles as much as possible to the designated juridical person and asked the reasons why we deliver half to the independent person route and half to the designated juridical person route. In addition, we, the municipality, confirmed whether there would be any inconvenience, for example, if we were not able to take the designated juridical person route again once we reduced the volume of deliveries, even if we decided to process independently.
- We informed the JCPRA that we were positively considering concluding an agreement with beverage manufacturers when we reported the estimated emission volume for the next fiscal year and that we were planning to switch to the entity to which we deliver plastic bottles. In response, we seldom receive phone calls from the JCPRA, but a person in charge of the JCPRA called us and asked us if we were okay with that.
- The person also mentioned that the JCPRA intends to send out a document to the JSDA. This gave us the impression that concluding an agreement with beverage manufacturers was a violation of the law.
- The JCPRA's application form to deliver to the JCPRA for FY2022 states, "If you have independently processed used plastic bottles or delivered them to a third party despite having applied for the amount of delivery, you may not dispute the JCPRA refusing to accept materials that comply with the sorting standards in FY2023 and FY2024." What we were concerned about was that if we were to stop delivering plastic bottles, we would not be able to have the JCPRA accept all bottles, plastic containers, or packaging, either. In order to avoid such a situation, we carefully checked with the JCPRA and were told that we must comply with the application for emissions in FY2022 as a mandatory condition.
- Although the JCPRA accepted the fact that increasingly more municipalities are switching to independent routes for plastic bottles, the JCPRA used to tell us that it is not easy to deliver to the JCPRA again once we stop delivering. We wonder if this kind of

talk goes against the movement to promote bottle-to-bottle initiatives.

Source: Prepared by the JFTC based on responses to the interview survey (for municipalities)

B. Approach Under the Antimonopoly Act or Competition Policies

At this time, the JCPRA is the only corporation that has been designated under the Containers and Packaging Recycling Law, and as described in Chapter 3-1 (4) A (page 15) above, about two-thirds of the volume of used plastic bottles (used plastic bottles delivered from municipalities to recyclers), which are emitted as general waste, are recycled through bidding conducted by the JCPRA.

On the other hand, as described in Chapter 3-1 (4) D (page 17) above, it is not an obligation for municipalities, recyclers, or other entities to use the JCPRA's bidding process for recycling used plastic bottles.

Under these circumstances, there is no problem under the Antimonopoly Act or competition policies for the JCPRA, which is a designated juridical person under the Containers and Packaging Recycling Law, to present the provisions and other items of its basic policy to municipalities and beverage manufacturers, and to encourage municipalities to utilize the JCPRA's bidding process for used plastic bottles. However, if such presentation or encouragement would have the effect of making municipalities hesitant to conduct independent processing in a manner that is not problematic under the Containers and Packaging Recycling Law system or would have the effect of restricting beverage manufacturers and other entities from being involved in concluding agreements with municipalities, etc., it should be noted that this may cause problems under the Antimonopoly Act or competition policies.

In this interview survey, as described in Section A (C) above, with regard to the independent processing for promoting bottle-to-bottle, there were some cases where some municipalities misunderstood that not taking the designated juridical person route would cause a problem under the Containers and Packaging Recycling Law, or independent processing would result in inconvenience when municipalities use the designated juridical person route. It is desirable for the designated juridical person, which has been designated by the competent minister as those who can appropriately and reliably perform recycling operations under the

Containers and Packaging Recycling Law, not to mislead municipalities and other entities about the Containers and Packaging Recycling Law system, for example, to prevent them from using the independent processing route, when the designated juridical person contacts municipalities and other entities.

C. Response by the JFTC

The JFTC has informed the JCPRA of the concept in Section B above for reference in its future activities.

(2) The JSDA Agreement

A. Current Status

(A) Details of the JSDA Agreement

Each beverage manufacturer that belongs to the JSDA has agreed to the following matters and others regarding used plastic bottles to be recycled under the designated juridical person route (this refers to used plastic bottles processed by the designated juridical person route other than those that have already been switched to independent processing by the municipality; the same shall apply hereinafter) at the JSDA's committee meeting held in December 2021 and January 2022 after receiving the document sent by the JCPRA as described in Section (1) A (B) above.

- (i) Do not encourage municipalities to conduct independent processing.
- (ii) If a municipality proposes that a beverage manufacturer undertake independent processing, defer the proposal. Also, if it is difficult to decline, the JSDA should also attend if the beverage manufacturer requests.
- (iii) In the case of Item (ii) above, if declining is not feasible and accepting the request is highly unavoidable, clarify the reasons for acceptance and the risks associated with declining, and report and share the information with the JSDA.

Subsequently, the JSDA partially revised the aforementioned agreement at the JSDA's committee meeting held in January 2023. It was agreed that in the future, in the case of Item (ii) above, if the municipality itself expresses its intention to switch to the independent processing route from the following fiscal year and contacts the beverage manufacturer, there would be no need to immediately

decline, but the matter should be reported and shared with the JSDA as soon as the independent processing project takes concrete shape¹⁰⁸. However, at the same time, the JFTC confirmed that the content of the agreement remains unchanged, which states that beverage manufacturers shall not encourage municipalities to conduct independent processing.

(B) Impact of the Agreement

In response to the agreement described in Section (A) above at the JSDA, it is considered that each beverage manufacturer that constitutes the business operators of the JSDA is not engaged in sales activities that would encourage municipalities to conclude agreements for bottle-to-bottle or other independent processing for the designated juridical person route, at least not by actively offering to do so on their own.

On the other hand, as described in Section (A) above, the original agreement was to defer to concluding an agreement with a beverage manufacturer if a municipality offered to do so, but some exceptions were considered permissible. Moreover, according to the amended agreement of January 2023, it was acceptable to conclude an agreement in certain cases. In fact, there have been a significant number of new agreements between beverage manufacturers and municipalities since the period before and after the said agreement. Therefore, it is not necessarily clear how many beverage manufacturers were actively marketing their products to municipalities for independent processing and on what scale when the absence of such an agreement is considered, and the impact of such an agreement was not specifically evaluated in this survey.

Figure 117: Beverage manufacturers' opinions on the impact of the JSDA agreement

- Since the JSDA considers used plastic bottles as resources that belong to all beverage manufacturers, it seems that the JSDA would like to unify the way these resources are handled as an industry. Therefore, the JSDA may not consider beverage manufacturers who are actively engaged in their own initiatives in a positive light.

¹⁰⁸ In fact, at the JSDA's committee meeting, several beverage manufacturers reported that they planned to conclude agreements with municipalities for new bottle-to-bottle in the near future.

- At the JSDA's committee meeting, it was decided not to actively pursue the so-called "excluding the JCPRA," in which beverage manufacturers would switch the portion that was originally on the designated juridical person route to the independent route based on the agreement. From the standpoint of the JSDA, it is not desirable for some manufacturers to engage in such initiatives with municipalities because it would drive up the price and be an overall nuisance.
- At first, the JSDA issued instructions specifying that agreements with municipalities should be uniformly suspended. However, since there were also cases where municipalities initiated negotiations, it was decided that in such cases, there was no need to refuse offers. Nevertheless, it is likely to be a stumbling block for beverage manufacturers who are promoting the agreement.
- There has been a lot of discussion at the JSDA. One of the ideas includes the goal to achieve a 50% bottle-to-bottle ratio, and this idea should be pursued by the industry as a whole rather than by each company taking its own initiatives.
- It is unclear why the JSDA is giving consideration to the JCPRA, and it is uncomfortable. There may be a desire to make horizontal recycling a non-competitive area, but this may not be possible since there is already currently competition for used plastic bottles.
- Some beverage manufacturers seek to reach out to municipalities, while other beverage manufacturers want to lock them down. In short, those beverage manufacturers who want to lock them down are eager to create industry rules that would stop certain beverage manufacturers from monopolizing the municipality's independent processing portions. There seems to be a struggle among beverage manufacturers within the JSDA under the pretext of the letters sent by the JCPRA.
- Since the JSDA requires its members to agree on any decision, the JSDA carefully explains the details of the system when the members consider how to respond to the letter sent by the JCPRA. However, when we look at the beverage manufacturers that listen to these explanations, our impression is that few of them, other than the major beverage manufacturers, are able to agree or express their opinions based on a full understanding of the situation and on an assumption of what will happen in the future. Most beverage manufacturers seem to follow the JSDA's decision with the understanding that if the industry group has made such a decision after much consideration, then it must be correct.

- From the standpoint of the JSDA, there is an understanding that plastic bottles of the designated juridical person route are off-limits to beverage manufacturers. However, we believe that there is no need to restrict municipalities that have announced their intention to promote horizontal recycling and other initiatives from delivering used plastic bottles to the designated juridical person and starting their independent processing together with beverage manufacturers. The intention is to respect the designated juridical person route as a beverage manufacturer. We believe that the beverage industry should respect the container and packaging recycling system because we believe that this system contributes to the high ratio of recycling in Japan. There were many discussions within the JSDA, but in the end, all beverage manufacturers unanimously agreed on the idea.
- Our company agrees with the JSDA's policy on how to respond. We also believe that it is because of the JSDA that information about the agreement between beverage manufacturers and the municipality was shared with the entire industry. Without the JSDA, certain aspects of the movements of each beverage manufacturer would have been unavailable to learn about.
- The JCPRA system should be protected. On the other hand, we assume that the major beverage manufacturers are making efforts because they are afraid that the JSDA's goal of "achieving a 50% bottle-to-bottle rate by 2030" will not be met in time under the current circumstances. Hopefully, we can move forward with both in a good way.
- We believe that recycling should be actively promoted in the future as well, and this is the same stance that is being taken by the JSDA and other beverage manufacturers. On the other hand, there are many different business operators in the industry, and there are many issues that cannot be handled by individual companies alone. We must continue to learn what we should do.

Source: Prepared by the JFTC based on responses to the interview survey (for beverage manufacturers)

Figure 118: Recyclers' opinions on the impact of the JSDA agreement

- We know that the JCPRA has sent a letter to the JSDA indicating its concern about the agreements between beverage manufacturers and municipalities to secure used plastic bottles. As a recycler, if we can participate in an agreement between a municipality and a beverage manufacturer, we can ensure that we purchase used plastic bottles collected

by municipalities under the independent route. This is more business-friendly than relying on the designated juridical person route. We do not know if we can win the bid under this route. We believe it is up to municipalities' discretion to decide to whom they will sell.

- We are aware that the JCPRA sent a letter to the JSDA indicating its concern about the agreements between beverage manufacturers and municipalities to promote the independent processing of bottle-to-bottle. The JCPRA may feel that it has been responsible for recycling so far, and beverage manufacturers may want to promote efforts on bottle-to-bottle goals. It is difficult to know what to think about this because we understand both sides. We do not even know, in the first place, whether it is an either-or situation between procurements through the designated juridical person and the independent routes of municipalities.
- We are aware that the JCPRA has sent a letter to the JSDA indicating its concern about the agreements between beverage manufacturers and municipalities, but this has not affected our company in any way. In the first place, we have no idea why the JCPRA insists on using the designated juridical person route. Perhaps the JCPRA may simply be unwilling if it does not receive the same amount as it did before. However, even if municipalities start to process used plastic bottles independently, and the JCPRA only collects those used plastic bottles with poor quality via inverse onerous contracts, it is the role of the JCPRA to recycle such bottles.

Source: Prepared by the JFTC based on responses to the interview survey (for recycling companies)

B. Approaches Under the Antimonopoly Act

As for certain containers, such as plastic bottles for beverage manufacturers to use for their beverages, the question of how and from where to procure is an important means of competition for each business operator. This should be determined by the voluntary decision of each beverage manufacturer.

The agreement described in Section A (A) (page 141) above is a behavior that the JSDA could restrict regarding the way for beverage manufacturers, its constituent business operators, to conduct their business. However, as described in Section A (B) (page 142) above, the impact of such an agreement was not specifically

evaluated in this survey. Depending on the circumstances surrounding the subsequent independent processing and other matters, the agreement may become problematic under the Antimonopoly Act because it substantially restricts competition in a certain transaction field or unreasonably limits the business activities of beverage manufacturers that are constituent business operators.

C. Response by the JFTC

The JFTC informed the JSDA in the course of its survey that the agreement described in Section A (A) (page 141) above may cause problems under the Antimonopoly Act, as described in Section B (page 145) above. In September 2023, the JSDA broke the agreement off and notified each of its member business operators that they could make a decision regarding their future activities with municipalities on their own initiative, taking into consideration the main purpose of the Containers and Packaging Recycling Law.

The agreement in question has already been terminated, but there was conduct that may cause a problem under the Antimonopoly Act. Therefore, the JFTC requested the JSDA to inspect not only the activities related to the promotion of recycling plastic bottles but also the entire activities of the JSDA, based on the approach under the Antimonopoly Act as described in the Guidelines for Business Operators¹⁰⁹ and to improve them voluntarily as necessary based on the inspection results, as well as to promptly report the inspection results and the details of improvements to the JFTC.

2. About JCPRA's Bidding System

(1) Current Status

JCPRA conducts bidding for the delivery of used plastic bottles from municipalities to recyclers as described in Chapter 3-1 (5) B (page 22) above.

Regarding the JCPRA bidding process, the following opinions were found in the interview survey.

¹⁰⁹ Antitrust Act Guidelines Concerning the Activities of Business Operators' Associations (October 30, 1995)

Figure 119: Municipalities' Opinions on JCPRA's Bidding

- We are grateful for the JCPRA, but we consider it more desirable to be able to designate recycling applications. We were also asked by JCPRA whether we would use JCPRA if we could designate the application. Since there is an advantage that the processing is ensured by the JCPRA, it is highly likely that we would continue to deliver to the JCPRA if we could designate recycling applications.
- The JCPRA should be able to add conditions to the bidding process that take into account the wishes of municipalities if the goal is to recycle resources. Municipalities do not want to stop delivering used plastic bottles to the JCPRA.
- If the independent route under the agreement progresses, the JCPRA's bidding volume will decrease, but it is not clear from the standpoint of municipalities whether the JCPRA's approach is fair in the first place.
- We do not intend to deny the role of the JCPRA, which has been responsible for recycling since the days when there was not much recycling going on, and we think some parts of the JCPRA are still necessary. If the JCPRA can also deliver used plastic bottles it accepts for recycling, similar to bottle-to-bottle, municipalities should use the JCPRA.
- The primary reason for using the designated juridical person route is stability. Even if a business operator suddenly stops doing business, the JCPRA will be responsible for finding another business operator to take its place.

Source: Prepared by the JFTC based on responses to the interview survey (for municipalities)

Figure 120: Opinions of business operators about JCPRA's bidding

- The designated juridical person system is an excellent system that allows municipalities to recycle without excessive burdens, even if they are located in underpopulated areas or on remote islands.
- The JCPRA's bidding mechanism is clear and fair. If municipalities wish to designate the application of recycling, they should focus on the overall energy cost and designate the application after taking into account the entire environmental impact.
- Given that plastic bottles are mostly already traded via onerous contracts, there is no need to keep them within the framework of the Containers and Packaging Recycling Law forever, and we might be able to follow other frameworks, not the framework of the

Containers and Packaging Recycling Law. There are some places where plastic bottles discharged from remote islands are subject to inverse onerous contracts, but it may be possible for the JCPRA to handle only that portion of plastic bottles.

- The Containers and Packaging Recycling Law was enacted to prevent final disposal sites from becoming tight and other problems from arising, but currently, the need for recycling is also closely related to global warming, energy issues, climate change, and other issues. Therefore, it would be desirable for recyclers near the place of discharge to recycle, and it would not be desirable to transport waste over long distances, which would result in carbon dioxide emissions.
- The JCPRA bidding process is supposed to reject either extremely high or extremely low bids, but since there is no standard for what constitutes "extremely high" or "extremely low," the bids are never rejected, and large corporations with affluent funds win the bidding at a high price.
- The larger the municipality is, the more likely there are to be inverse onerous contracts because business operators that can process a large amount of discharged materials are limited. In the past, we could not find a purchaser in a large municipality that collects mixed wastes, and we ended up with a very successful bid under a significant inverse onerous contract. The JCPRA's bidding rules state that those bids that are submitted when they are significantly different from the actual values are invalid, but this is not working as a practical matter.
- From the standpoint of the JCPRA, its purpose is to dispose of used plastic bottles, so its recycling applications are open-ended. However, since municipalities left the designated juridical person route because they cannot choose the recycling application in the JCPRA's bidding process, we are now suggesting once again that they should be able to choose the recycling application in order for the designated juridical person route to be used.
- In order for the recycling of plastic bottles to progress further, a key point is capital investment, in addition to changes in consumer behavior and recycling technology. If we take the designated juridical person route, the price fluctuates tremendously as it goes through a semi-annual bidding process. Without stable prices of raw materials, it is difficult for business operators requiring capital investment to enter the market. In order to obtain loans and other financing, it is necessary to secure more stable raw materials

over a certain period of time, and we should have an option for longer-term contracts.

Source: Prepared by the JFTC based on responses to the interview survey (for recycling companies)

As can be seen from the results of the above interviews, there were opinions about the significance and fairness of the JCPRA's bidding process. However, as the recycling of used plastic bottles has taken root in recent years, for example, there might be a difference between the needs of municipalities that would like to implement more advanced measures, such as the promotion of bottle-to-bottle.

The JCPRA held the "Study Group on the Recycling of Plastic Bottles" five times from 2017 to 2018 in response to the "Report on the Evaluation and Examination of the Enforcement Status of the Containers and Packaging Recycling Law" by the 18th Joint Meeting of the Industrial Structure Council of the Ministry of Economy, Trade and Industry and the Central Environment Council of the Ministry of the Environment in May 2016. The JCPRA actively held discussions on the bidding system¹¹⁰. These discussions also showed that there is a need for municipalities to deliver plastic bottles by limiting the application of bottles. Although the possibility of a bidding system that incorporates municipalities' requests for applications was discussed under the name of "Requested Bidding System," and the advantages and concerns of such a system were thoroughly discussed, no conclusion has been reached on the introduction of such a system so far.

(2) Approach Under Competition Policies

Used plastic bottles are discharged as general waste from each municipality. Since there are more than 1,000 municipalities in Japan, the JCPRA system needs to function as a universal service, including remote islands and sparsely populated areas where bottles are recycled under inverse onerous contracts.

In addition, in the case where each municipality decides, on its own, which business operator to deliver used plastic bottles to, the cost of searching for a supplier would be a heavy burden, especially for recyclers. In this regard, the bidding process by the

¹¹⁰ For details, please refer to the "Study Group on the Recycling of Plastic Bottles" page on the JCPRA website (<https://www.jcpa.or.jp/recycle/study/tabid/914/index.php>).

JCPRA, a designated juridical person, is conducted uniformly throughout Japan, with each designated storage facility as a unit. Therefore, it is considered to be particularly effective in reducing search costs for recyclers.

Moreover, the JCPRA, a designated juridical person, conducts surveys on the quality of used plastic bottles to be discharged for municipalities, as well as other surveys on the capacity and status of processing for recyclers. These are important efforts for the JCPRA to ensure that used plastic bottles are properly recycled. Even in cases where each municipality does not have enough capacity to conduct surveys on recyclers due to various reasons, the designated juridical person route makes it possible to easily confirm proper recycling practices.

On the other hand, the results of the interview survey described in Section (1) above and the results of the questionnaire survey for municipalities that conduct independent processing described in Chapter 5-2 (3) A (page 64) show that some municipalities have needs that are not covered by the conventional bidding system of the JCPRA. And they use this fact as a reason for selecting their own processing. In fact, there are cases where some municipalities are promoting independent processing in the form of agreements with beverage manufacturers and other entities for the purpose of the bottle-to-bottle initiative¹¹¹. Also, some recyclers stated that unless they can procure raw materials at stable prices over a longer period of time, instead of bidding every six months when transaction prices fluctuate significantly, it will be difficult for them to make the necessary capital investments to enter the market and procure the necessary funds to do so. If there are municipalities that avoid the designated juridical person route simply because they cannot specify the application, or if there are business operators that have not been able to enter the recycling business because they have not made the necessary capital investments, there is a risk that the advantages of the abovementioned designated juridical person system are not being fully realized.

In this regard, as described in Section (1) above, there have been studies on the bidding system. However, the JCPRA is the only corporation designated under the Containers and Packaging Recycling Law, and in fact, the JCPRA deals with about

¹¹¹ There are various methods of recycling used plastic bottles and applications after recycling, and they are not evaluated in this report because they are beyond the scope of this report's discussion, such as, for example, which method or application is the most conducive for reducing environmental burdens.

two-thirds of used plastic bottles emitted as general waste. In light of this, it can be said that the JCPRA's bidding process plays an important role in the transaction of used plastic bottles between municipalities and recyclers. In this regard, there seem to be municipalities that avoid the designated juridical person route simply because they cannot designate the application, and there are business operators that have not been able to enter the recycling business due to a lack of progress in making the necessary capital investments. Therefore, if those entities use or participate in JCPRA's bidding, a greater variety of recyclers will participate in JCPRA's bidding for deliveries from a greater number of municipalities, and thus competition will function better. As a result, it is desirable, in terms of competition policies, for the designated juridical person to conduct a constant review of the bidding system so that competition among recyclers, including new capital investment and entry into the market, is further promoted while taking into account the demands of municipalities, recyclers, and other business operators as much as possible.

(3) Response by the JFTC

The JFTC informed the JCPRA of the aforementioned concept in Section (2) for reference to its future activities.

3. Promoting Recycling of Used Plastic Bottles Emitted as Industrial Waste

(1) Current Status

The Containers and Packaging Recycling Law imposes an obligation to recycle used plastic bottles emitted as general waste. However, the Waste Management and Public Cleansing Act requires that used plastic bottles emitted as industrial waste are properly disposed of, although the act does not impose an obligation to recycle bottles.

In the responses to the interview survey, some respondents stated that used plastic bottles emitted as industrial waste are mixed with various types of waste and are relatively poor quality compared to the general waste disposed of by households. Therefore, they pay a waste disposal company to take them away. As described in Chapter 5-3 (1) B (A) (page 81) above, the JFTC confirmed that the unit price to deliver used plastic bottles emitted as industrial waste from generators to waste disposers and others. During this survey, it was found that, on average, transactions were

conducted under inverse onerous contracts.

On the other hand, some respondents said that it is difficult to have used plastic bottles emitted as industrial waste accepted as valuable resources. However, other respondents commented that the unit price of used plastic bottles emitted as industrial waste has been increasing due to their growing demand¹¹².

(2) Approach Under Competition Policies

If the price of an item is negative, it is economically rational for the emitter of that item to dump it, for example. Therefore, it is generally considered necessary to manage the occurrence of externalities such as negative impacts and other factors on the environment caused by dumping, and it is required to have appropriate regulations on the disposal of such waste.

However, if the price of the item is positive, those who emit the item are acting in an economically rational manner by selling it as a valuable resource. If it is more profitable for those who purchase the items to sell them with added value through recycling than to spend them in the form of fuel and other items, then it is economically rational for them to take such action. In such cases, recycling will be driven without regulation¹¹³.

Used plastic bottles incur costs not only at the recycling stage but also at the stages of collection and intermediate treatment. However, if the product has a positive value even after taking these costs into account, it can be expected that recycling will be implemented in the market¹¹⁴.

¹¹² However, it should be noted that the successful bid unit price (yen/ton) under the JCPRA bids decreased from -87,210 yen in FY 2022 to -52,444 yen in FY 2023, according to publicly available information from the JCPRA, so the unit price has not been consistently increasing.

¹¹³ According to Eiji Hosoda (2012), "The Economics of Goods and Bads (2nd ed.)," Toyo Keizai Inc., the "items of value, in other words, those traded with a positive (strictly speaking, non-negative) price are considered as goods, and on the contrary, "bads" are those that do not have a positive price in a normal transaction and must go through the trouble of suitable treatment at a cost." In light of this, the JFTC considers "goods" to be items whose prices are positive and "bads" to be items whose prices are negative in the analysis. He also states that "the relationship between goods and bads is exceptionally relative, and whether a material becomes a good or a bad depends on the balance of supply and demand." If the price of the recycled product is more than the recycling cost, he points out that "Recycling will take place in the market without any policy intervention. If recycling occurs naturally in a competitive market, resource allocation is efficient, and nothing could be more desirable."

¹¹⁴ According to Kazuhiro Ueda (1992), "The Economics of Waste and Recycling," in Yuhikaku, the following four conditions must be met in order for recycling activities to be active: "(i) A large amount of waste exists", "(ii) Useful attributes exist in the waste," "(iii) Technology exists to recycle the waste," and "(iv) Demand exists for recycled products." He indicates that compared to the cost of using virgin resources, "the cost of using recycled resources derived from waste is less expensive and the price difference is maintained for a certain length of time." The costs at the stages of collection, intermediate treatment and the like are also considered to be included in the "cost of using recycled resources derived from waste."

If the demand for used plastic bottles increases further with the development of additional recycling efforts, the value of the entire market for used plastic bottles, including those as industrial waste, will increase. With this, the following examples can be presented.

- (i) For recyclers who procure used plastic bottles, there will be more incentives to sufficiently clean used plastic bottles of relatively low quality, to install facilities capable of advanced processing and the like, even if it costs a certain amount of money.
- (ii) For business operators that emit used plastic bottles, there will be more incentive to promote efforts for emitting clean used plastic bottles as much as possible, for example, by raising awareness among consumers and others, devising collection methods and the like, even if it requires a certain level of cost.

With these effects, it is expected that industrial waste with more and better quality will be provided to the recycling market.

Thus, it is expected that the efforts of recycling will be driven by the function of the market, even for used plastic bottles emitted as industrial waste that are not obligated to be recycled, by diversifying their distribution, increasing their demand, and so on.

4. Discharge of Used Plastic Bottles for Further Promotion of Recycling

(1) Current Status

There have been various initiatives to promote utilizing used plastic bottles as a resource, and some of these initiatives are mentioned in this report. For example, at the manufacturing stage, labels are perforated so that they can be easily peeled off, and other initiatives are taken to increase recyclability. Also, at the time of collection, most municipalities require residents to remove caps and labels and wash the inside of used plastic bottles before disposing of them. At the same time, there are developments toward placing recycling boxes, such as those with an inlet shaped to prevent foreign objects from mixing in and those colored to make it clear that they are installed for resource collection and are not garbage boxes. Demonstrations of such efforts are underway. In addition, according to the interview survey of municipalities, there is an opinion that the aim behind bottle-to-bottle initiatives is to raise the awareness of residents regarding the recycling of plastic bottles. In this way, each

entity is promoting efforts to encourage behavioral changes in each consumer by devising such designs to make it easier to separate and dispose of waste and to raise awareness.

In a questionnaire survey to recyclers, the majority of respondents indicated that the degree of residual foreign materials such as caps, labels and leftover drinks or contamination is a factor that has a significant impact on the production costs of recycled plastic resin. In light of this (see Figure 73 on page 93), it can be considered that encouraging specific fundamental consumer behavior, such as ensuring that used plastic bottles are not disposed of with leftovers remaining inside, is an important aspect of further promoting consumer-driven recycling¹¹⁵.

(2) Approach Under Competition Policies

By promoting competition among business operators, competition policies encourage the efficient use of resources, and from the perspective of bringing innovation in new technologies and the like, competition policies indirectly contribute to the realization of a green society, a society that balances economic growth with a reduction of environmental burdens. In order to achieve both environmental impact reduction and economic growth in the market for recycling used plastic bottles, it is important to have active competition in the market. However, to achieve this, the market must be attractive enough to attract a large number of market participants. The better the quality and the lower the cost of products supplied to the recycling market, the more demand they will attract. The development of advanced and innovative recycling technologies around this sizable demand will not only reduce the environmental burden but also bring high-added value that will lead to economic growth.

The production cost of recycled plastic resin can be decreased by reducing the degree of contamination and residual foreign matter such as caps, labels, and leftover drink liquids. In addition, as described in Chapter 5-2 (4) B (page 75), an economic analysis of the relationship between the delivered price and the quality of used plastic

¹¹⁵ Note that, as shown on Figure 73 (page 93), there were relatively more recyclers who indicated that it would cost more to recycle used plastic bottles with leftover drinks and other materials than those with caps and/or labels left on them. This implies the importance of not discharging used plastic bottles with residual drink product and other material left on.

bottles was conducted, and it was found that the delivered price tends to be higher when the quality of bottles is high, along with other reasons. Therefore, if each consumer understands the value of plastic bottles as a resource and discharges them in a way that increases their value as a resource, such as not disposing of bottles with residue, not mixing them with other waste, and removing caps and labels, the cost of producing recycled plastic resin will be minimized, which in turn will lead to a supply of recycled commodities with a high quality and low cost. Such consumer understanding and behavior would make the market for recycling used plastic bottles more attractive and desirable from the perspective of competition policies that would encourage the realization of a green society.

Chapter 7. Response by the Japan Fair Trade Commission

In March 2023, the Japan Fair Trade Commission formulated the Approach to the Activities of Business Operators, etc., Toward the Realization of a Green Society (hereinafter referred to as the "Green Guidelines") and took other measures, which aims to support the realization of the green society (a society that balances economic growth with a reduction in environmental impact). This report clarifies the current status and other aspects of transactions in recycling used plastic bottles as a market study/fact-finding survey in the specific market and presents the approach under the Antimonopoly Act and competition policies.

An important role of competition policies is to develop and maintain an environment that enables such free business activities and contributes toward promoting recycling. As a result of this survey, it was confirmed that many measures were being taken by municipalities and each business operator to promote recycling. However, it was also observed that some business associations were engaging in activities that could be problematic under the Antimonopoly Act with regard to bottle-to-bottle measures.

In addition, as this report has indicated, it is essential that bottles with high quality be discharged in the first place in order to increase the value of used plastic bottles and to ensure that recycling is carried out efficiently. Furthermore, it is considered crucial that every consumer understands the importance of recycling efforts to reduce environmental impacts, as well as to properly sort and discharge waste, rather than relying solely on the originality and ingenuity of business operators.

As the Green Guidelines indicate, the Antimonopoly Act and competition policies are for promoting competition among business operators. From the perspective of promoting efficient use of resources and bringing innovation in new technologies and other areas, the Antimonopoly Act and competition policies indirectly contribute toward the realization of a green society. In other words, they play a complementary role in environmental policies and other regulations. The JFTC will continue to take initiatives to encourage the realization of a green society.

Furthermore, the JFTC will keep a close watch on the trends in the market for recycling used plastic bottles and will take strict action against any violations under the Antimonopoly Act.

Appendix. Economic Analysis of Factors Influencing the Delivered Price of Used Plastic Bottles¹

In the following, it is examined what factors are reflected in the price of used plastic bottles that the recycler receives from each municipality, either through the designated juridical person route or through the independent processing route, respectively, by means of an empirical analysis².

1. Empirical Analysis on the Designated Juridical Person Route

First, for the designated juridical person route, the successful bid price of the designated storage facility in the municipality that responded to the questionnaire survey was used as the explained variable. As explanatory variables, the following dummy variables³ were used: The amount of successful bids for used plastic bottles to be delivered (tons), the distance between designated storage facilities and factories for recyclers to pick up bottles (km), a dummy variable if a municipality is located on a remote island, a dummy variable regarding sorting quality, a dummy variable regarding the collection method of used plastic bottles (mixed collection or not), a dummy variable if pre-bale intermediate treatment is performed, and a dummy variable regarding whether or not bottle-to-bottle measures are taken.

For each variable data missing certain information, responses without mentioning the successful bid price were excluded from responses to the questionnaire survey obtained from municipalities, and data with obvious errors, such as reversed positive/negative values or differences in units, were corrected using the successful bid prices and other data published by the JCPRA. For a dummy variable regarding sorting quality, a dummy variable if a municipality is located on a remote island, a dummy variable regarding the collection method of used plastic bottles (mixed collection or not), a dummy variable if pre-bale

¹ This analysis was conducted jointly with the Economic Analysis Office established within the JFTC's General Secretariat.

² According to "Evaluation of the Financial Contribution System of the Containers and Packaging Recycling Law" (Ikuma Kurita, Review of Environmental Economics and Policy Studies Vol. 2, No. 2, pp. 35-47, 2009), which was referred to as a previous study (hereinafter referred to as the "Kurita paper in 2009"), it is shown that (i) the larger the amount of successful bids, (ii) the shorter the distance between the municipality and the recycler, (iii) the higher the sorting quality rank, and (iv) the more sorted materials are collected from designated storage facilities not located on remote islands, the lower the successful bid unit price (the higher the transaction price).

³ A dummy variable is a variable that represents the presence or absence of attributes and other factors, and is indicated as either 0 or 1.

intermediate treatment is performed, and a dummy variable regarding whether or not a bottle-to-bottle measure, there was a certain degree of fluctuation during the survey period as a matter of fact from the questionnaire survey. However, from the perspective of workload to verify and correct responses, the latest values were applied uniformly over the survey period to ensure that they remained constant throughout the survey period. Each explanatory variable without response in the questionnaire survey was not corrected and was treated as missing data.

Regarding the significance of the data for each variable, the explained variable, which is the successful bid price, indicates that the recycler is responsible for recycling by receiving the successful bid price in the recycle bidding process if the successful bid price is negative, which means that the recycler will buy items at that price and take responsibility for their recycling. Therefore, if positive values of the successful bid price are smaller and absolute values representing negative values are larger, used plastic bottles will be taken back at a higher price.

Each dummy variable is represented by the following:

- The dummy variable “ $Iland_i$ ” indicates whether a municipality is located on a remote island. $Iland_i$ takes a value of 1 to indicate that the municipality is located on a remote island and a value of 0 otherwise.
- The dummy variables regarding sorting quality, “ QA_i ” and “ QB_i ,” take a value of 1 for QA_i for Quality A and 0 otherwise, and take a value of 1 for QB_i for Quality B and a value of 0 otherwise. Also, for quality D, $QA_i = QB_i = 0$.
- The dummy variable “ $Mixed_i$ ” indicates the collection method of used plastic bottles. $Mixed_i$ takes a value of 1 for mixed collection and a value of 0 for separate collection.
- The dummy variable “ $INTV_i$ ” indicates whether pre-bale intermediate treatment has been carried out on collected plastic bottles. $INTV_i$ takes a value of 1 for cases in which such intermediate treatment has been performed and a value of 0 otherwise.
- The dummy variable “ BTB_i ” indicates whether bottle-to-bottle measures are taken. BTB_i takes a value of 1 if bottle-to-bottle measures are being taken in the specified municipality and a value of 0 otherwise.

For $Iland_i$, which indicates whether a municipality is located on a remote island, the price is considered to be influenced by the fact that more transportation costs are required when the municipality is located on a remote island. For the sorting quality dummy variables QA_i

and QB_i , the collection method dummy variable $Mixed_i$, and the pre-bale intermediate treatment dummy variable $INTV_i$, the price is influenced by the quality of the used plastic bottles that are discharged. For the bottle-to-bottle measure dummy variable BTB_i , if bottle-to-bottle measures raise consumer awareness to recycle used plastic bottles more, it could have a certain impact on the quality of used plastic bottles discharged, which could influence the price.

The descriptive statistics for each explanatory variable and the explained variable in the designated juridical person route are shown in the table below.

Table 1: Descriptive statistics of data for the designated juridical person route

Variable	Average	Standard deviation	Minimum value	Maximum value	Sample Size
Successful bid price (yen/ton), Price	-31,841	36,596.4	-89,000	639,300	12,488
Successful bid amount (tons), Amount	148.6423	260.0114	0.3	3,866	12,488
Distance (km), Distance	128.9653	129.7226	0	1,071.964	11,359
Remote island dummy variable, Iland	0.04124	0.198852	0	1	12,488
Sorting quality dummy variable, QA	0.799488	0.4004	0	1	12,488
Sorting quality dummy variable, QB	0.03083	0.172863	0	1	12,488
Collection method dummy variable, Mixed	0.092249	0.289388	0	1	12,488
Intermediate treatment dummy variable, INTV	0.863549	0.343281	0	1	12,488
Bottle-to-bottle dummy variable, BTB	0.088405	0.283894	0	1	12,488

Responses were obtained for successful bid prices in the first and second terms from 2012 to the first term of 2022. Each successful bid price was set as $t=1, \dots, 20$ (that of the

year 2012 was not divided into the first and second terms), and the successful bid prices (yen/ton) for used plastic bottles purchased by recyclers ($i=1, \dots, 78$) were defined as “Price_{it},” the successful bid volume (tons) as “Amount_{it},” and the distance (km) between the designated storage facilities and recyclers as “Distance_{it}.” The impact of each variable is analyzed by estimating the following regression equation.

$$Price_{it} = \alpha_i + \lambda_t + \beta_1 Amount_{it} + \beta_2 Distance_{it} + \beta_3 Iland_{it} + \beta_4 QA_{it} + \beta_5 QB_{it} + \beta_6 Mixed_{it} + \beta_7 INTV_{it} + \beta_8 BTB_{it} + e_{it}$$

Where “ α_i ” is a fixed effect specific to recyclers that remains constant over time, and “ λ_t ” is the time effect specific to each point that is common to all recyclers. In addition, since it is normal for recyclers “ i ” to successfully bid for several designated storage facilities in period “ t ,” there are several instances of Price_{it}, and the same is true for the other variables. In the 2009 Kurita paper, an empirical analysis was conducted using the cross-sectional data on FY2007 regarding the successful bid prices (yen/ton) “ X_i ” for the designated storage facilities “ i ” ($i=1, \dots, 720$). On the other hand, at this time, since the empirical analysis was conducted using panel data from 2012 to the first half of 2022, it is estimated by taking into account the exogenous nature of each variable to solve the endogeneity problem in the estimation of the successful bid prices (yen/ton) by recyclers “ i ” ($i=1, \dots, 78$)⁴.

2. Empirical Analysis of the Independent Route

Similar to the designated juridical person route, an empirical analysis is carried out to verify transactions in the independent route from municipalities that do not go through the designated juridical person route. The same explanatory variables described in the above analysis will be used for the purchase price of used plastic bottles, which are delivered to recyclers from the designated storage facilities in municipalities that responded to the questionnaire survey. Moreover, in special private contracts, the dummy variable “Comp_{*i*}” is added for methods to determine because each municipality uses a variety of methods to determine recyclers to be contracted for delivery under the independent route, such as comprehensive evaluations, proposals, general competitive bidding, designated

⁴ The number of registered business operators for recycling used plastic bottles in FY2023 was 44, but the number exceeds 44 because it includes business operators who had been registered in the past since 2012.

competitive bidding, and private contracts (negotiated quotation).

The dummy variable $Comp_i$ takes the value 1 if a competitive method for decision-making is used, such as comprehensive evaluations, proposals, general competitive bidding, and designated competitive bidding, and the value 0 otherwise. For the dummy variable $Comp_i$, if the municipality uses competitive bidding or other competitive methods in determining the recycler, it can be assumed that delivery is achieved at a higher amount (with a larger absolute value of the negative value).

In addition, in order to make it easy to compare estimation results from the designated juridical person route with those from the independent route, each variable was set to be positive or negative, with a negative price signifying that the recycler is responsible for recycling by purchasing the product at that price.

Each explained variable, along with the dependent variable in the independent route, has the following descriptive statistics.

Table 2: Descriptive statistics of data to be used for the independent route⁵

Variable	Average	Standard deviation	Minimum value	Maximum value	Sample Size
Successful bid price (yen/ton), Price	-10807.5	32280.9	-176000	114320	1,037
Successful bid amount (tons), Amount	110.7608	148.073	0.06	1011.2	1,037
Distance (km), Distance	40.91915	72.47286	0	1013.619	728
Remote island dummy variable, Iland	0.018322	0.134178	0	1	1,037
Sorting quality dummy variable, QA	0.032787	0.178164	0	1	1,037
Sorting quality dummy variable, QB	–	–	–	–	–
Collection method dummy variable, Mixed	0.094503	0.292669	0	1	1,037
Intermediate treatment	0.629701	0.483118	0	1	1,037

⁵ There were no samples where QB was 1 in the valid data.

dummy variable, INTV						
Bottle-to-bottle	dummy	0.176471	0.381404	0	1	1,037
variable, BTB						
Contract decision method		0.323047	0.467866	0	1	1,037
dummy, Comp						

Responses were obtained for the purchase prices contracted for each month from January 2012 to December 2022. Each purchase price was set as $t=1, \dots, 123$ (each municipality had a month without a contract), and the delivered price (yen/ton) of used plastic bottles by the recycler “ i ” ($i=1, \dots, 34$) as “ Y_{it} ,” the successful bid amount (tons) as $Amount_{it}$, and the distance between the designated storage facility and recycler’s factory to pick up (km) as $Distance_{it}$. The impact of each variable is analyzed by the following regression equation.

$$Price_{it} = \alpha_i + \lambda_t + \beta_1 Amount_{it} + \beta_2 Distance_{it} + \beta_3 Iland_{it} + \beta_4 QA_{it} + \beta_5 QB_{it} + \beta_6 Mixed_{it} + \beta_7 INTV_{it} + \beta_8 BTB_{it} + \beta_9 Comp_{it} + e_{it}$$

Here, as in the designated juridical person route, α_i is a fixed effect, and λ_t is a time effect of each recycler. Since recycler “ i ” usually purchases used plastic bottles from several municipalities in period “ t ,” there are several instances of $Price_{it}$, and the same is true for the other variables.

3. Results of Analysis

The regression equations (1) and (2) above were estimated⁶ by the least squares dummy variable “LSDV,” as follows below.

Table 3: Regression analysis using the delivered prices (yen/ton) as $Price_{it}$

Dependent variable:		
Price _{it}		
Designated	juridical	Independent route

⁶ In making this estimation, the JFTC received advice from Associate Professor, Masamune Iwasawa, Faculty of Economics, Doshisha University.

	person route	
Successful bid amount (tons), Amount	-12.03119*** (2.064334)	-4.145138 (16.78331)
Distance (km), Distance	29.79285*** (4.101249)	7.296097 (37.56876)
Remote island dummy variable, Iland	21,730.28*** (3,007.148)	5,646.361 (4,855.775)
Sorting quality dummy variable, QA	-9,730.644*** (1,678.598)	-18,445.24*** (6,886.381)
Sorting quality dummy variable, QB	-2,253.126 (2,607.953)	–
Collection method dummy variable, Mixed	13,152.6*** (1,851.744)	-5,056.395 (8,118.419)
Intermediate treatment dummy variable, INTV	679.3133 (698.7793)	373.9641 (2,825.335)
Bottle-to-bottle dummy variable, BTB	123.6853 (783.7652)	-14,973.31*** (3,405.063)
Contract decision method dummy variable, Comp	–	-26,361.12*** (3,237.37)
Observations	11,359	728
F Statistic	1,061.37***	62.37***

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% significance levels.

The numbers in parentheses indicate robust standard errors (cluster robust standard errors), assuming that the error terms of the same business operator are correlated. “F Statistic” indicates the F statistic for the null hypothesis that all regression coefficients, except the constant term, are zero.

The null hypothesis was rejected in both the designated juridical person route and the independent route as the results of the F-test for the null hypothesis indicated that all fixed effects were the same at $F(72,957) = 1090.78^{***}$ and $F(34,406) = 57.51^{***}$, respectively.

For the designated juridical person route, the sorting quality dummy variable QA and the collection method dummy variable Mixed are significant at the 1% level of significance. One observation is that used plastic bottles tend to be purchased at a higher price if they are Quality A and not a mixed collection in each dummy variable. In addition, the distance (km)

and the remote island dummy variable “Iland” are also significant at the 1% level of significance. It was found that used plastic bottles tend to be purchased at a lower price when the distance is greater and when the island is remote in each dummy variable.

For the independent route, the contract decision method dummy variable Comp is significant at the 1% level of significance. When municipalities use competitive bidding or other competitive methods in determining recyclers, it was found that used plastic bottles tend to be purchased at a higher price. Also, the bottle-to-bottle dummy variable BTB is significant at the 1% level of significance. For the independent route involving bottle-to-bottle initiatives, it was observed that used plastic bottles tend to be purchased at a higher price.