Republic of Indonesia
KLHK
PUPR
Palembang city：BAPPEDA/DLHK
Balikpapan city：BAPPEDA/DLH

The Project for Capacity Development of Central and Local Governments for 3R and Solid Waste Management in The Republic of Indonesia

Technical Cooperation Products

November 2017

Japan International Cooperation Agency
(JICA)

Yachiyo Engineering Co., Ltd.
Kokusai Kogyo Co., Ltd.

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List

１．Report on Formulation Assistance for Draft Ministerial Regulations

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1． Purpose of Study

This study aims to compare and examine the current laws and regulations (laws, governmental and ministerial regulations, national strategies/plans, etc.) on waste management and 3Rs; and to identify duplication and relevance in legal frameworks on waste management and 3Rs in Indonesia, and roles of ministries concerned such as Ministry of Environment and Forestry (Kementerian Lingkungan Hidup dan Kehutanan, hereinafter referred to as “KLHK”) and Ministry of Public Works and Housing (Kementerian Pekerjaan Umum dan Perumahan Rakyat, hereinafter referred to as “PUPR”). The status of enacting bylaws is also studied to identify characteristics of plans/strategies being formed on waste management and 3Rs promotion activities. This study was implemented in 2014 and its results are compiled.

2． Results of Study

2．1 Study on Current Laws and Regulations on Waste Management and 3Rs

The target laws and regulations (Presidential Regulations, Governmental Regulations, and Ministerial Regulations) are the following Act (1), Governmental and Ministerial Regulations (4) and National Standard (1). Table 2-1 shows the duplication, relevance and other points among these laws and regulations.

① Act of Republic of Indonesia Number 18 Year 2008 on Waste Management

② Government Regulation Number 81 Year 2012 on Waste Management of Household Waste and Household-like Waste

③ Regulation of the Minister of Public Works of Republic of Indonesia Number21/PRT/M/2006 on National Policy and Strategy of Waste Management System Development

④ Regulation of the Minister of Environment of Republic of Indonesia Number 13 Year 2012 on Guidelines for Implementation of Reduce, Reuse and Recycle through Waste Bank

⑤ Regulation of the Minister of Public Works of Republic of Indonesia Number 03/PRT/M/2013 on Implementation of Waste Infrastructure in Household and household-like Waste Management

⑥ Regulation of the Minister of Home Affair s of Republic of Indonesia Number 33 Year 2010 on Guidelines of Waste Management

⑦ National Standards of Indonesia 3242 Year 2008 on Waste Management in Settlements

２．２　Study on National Plans/Programs for Appropriate Waste Management and 3Rs Promotion Activities

This study organized the contents of the following plans/programs on appropriate waste management and 3Rs activities by the central government.

- 3Rs promotion program: 3Rs promotion program for community and local city, School education program for 3Rs promotion,
- Waste Bank program : Education for source segregation and separate collection to reduce waste,
- Landfill Improvement program: Improvement plan of old landfill sites and development plan of new landfill sites,
- Awareness raising campaign: Awareness raising for citizen in collaboration with Ministry of Education, Ministry of Health, KLHK and Women's Association, Election of "National Sanitation Ambassador".

（１）3Rs promotion program: 3Rs promotion program for community and local city, School education program for 3Rs promotion

3Rs activity is regarded as one of the waste management activities, and as a feasible and inexpensive activity by anyone at any time. KLHK established a guidance of 3Rs activity utilizing with Waste Bank to promote waste management incorporating 3Rs (KLHK Regulation No.13/2012). This guidance is expected to realize that both the government and society can implement 3Rs activity through Waste Bank. In the 3Rs activities at the home level, inorganic wastes are separated at each household or community. B3 wastes (harmful and toxic wastes) require special containers, and a collection service for these wastes is necessary at an appropriate frequency. Organic wastes can be treated at the home level utilizing a simple device to produce composts. The 3Rs activities at the regional level need to be suitable for regional characteristics, and require regional participation. These activities are implemented at the comprehensive waste management facility (TPST-3R), and PUPR Regulation (No. 3/2013) stipulates technical standards and guidelines including facility requirements and technology of TPST-3R, and collection and transportation technology (equipment) of wastes to TPST-3R.

KLHK revises and develop Guidance of Adipura (KLHK Regulation No.1/2009) as one of the policies to promote 3Rs activity at the city level (KLHK Regulation No.7/2011 and KLHK Regulation No.1/2013).KLHK also establishes Guidance of Adiwiyata Program Implementation (KLHK Regulation No.5/2013) in association with Ministry of Education and Culture to promote waste management at the sites of education. This program gives awards to schools enthusiastic about environmental protection and management activities. It emphasizes educational points of views. The activities need to be participatory and continuous.

（２） Waste Bank program : Education for source segregation and separate collection to reduce waste

KLHK Regulation No.13/2012 stipulates that Waste Bank is a separation point of wastes, and a collection point of wastes with economic value. It shows the guidance of 3Rs activity through Waste Bank. 3Rs activity is one of the national program, and KLHK is one of the responsible and supervisory agencies of 3Rs activity through Waste Bank. KLHK is regarded as playing roles to establish technical foundation, to develop pilot projects, to incorporate Waste Bank activity into the regional 3Rs activity, and to promote international cooperation. Waste Bank is required to realize regional involvement and direct participation of regions through the source segregation and other activities. As of February 2012, 471 Waste Bank sites[1] in the whole country and 47,123 accounts were confirmed, and treated wastes were 755.6 ton/month equivalent to IDR 1.65 billion.

（３） Landfill Improvement program: Improvement plan of old landfill sites and development plan of new landfill sites

According to the Long-Term Development Plan (RPJP) for 2005 to 2015 of PUPR, 80.6% of 378 final disposal sites in the whole country are open dumping sites, 15.5% are controlled disposal sites, and 2.8% are sanitary landfills. The central government promotes to improve existing disposal sites toward sanitary landfills and to construct new sanitary landfills in order to increase the sanitary landfills. Although PUPR assists to construct a landfill by a local government, a local government has a responsibility to operate a landfill. This program organizes the issues on landfill from the points of regulations/legal system, organization/human resources, technology, finance, and society/private sector participation.

（４） Awareness raising campaign: Awareness raising for citizen in collaboration with Ministry of Education, Ministry of Health, KLHK and Women’s Association, Election of “National

Although Environment Management Act No.23/1997 stipulates that the society has the opportunity to equally and extensively participate in environmental management, environmental management is not implemented according to this Act. For example, the social awareness of waste management remains low. A campaign activity on waste management is one of the activities to raise the social awareness. One example is Indonesia Waste Care, “Action towards Society with 3Rs Culture for Society Welfare”, which was held with “Waste Care Day” in Surabaya City in 2014. This activity was expected to ①attract people to waste management through 3Rs activity; ②work

[1] It is reported that there are 4,280 sites throughout the country as of July 2017. (Source: homepage of KLHK).

on the society to initiatively start waste management incorporating 3Rs; ③shift to the new social paradigm in which wastes shall be useful resources; ④aim 20% of waste reduction by 3Rs activities by 2019; and ⑤reduce 6% of global warming gas emissions, which shall be considered as the emissions from the waste sector, to zero. And 3Rs activities are expected to lead not only to the waste reduction but also to the improvement of social welfare.

PUPR (Directorate General of Human Settlements, Cipta Karya) started the program of Sanitation Ambassador. This program holds jamborees four times in a year to select Ambassadors (youth sanitation instructors) from junior high school students who will support projects and to support projects and policies in the sanitation sector in the social development. They are expected to contribute to social sanitation development, and to support activities in order to disseminate and realize the idea of sanitation for society and primary school students.

Meanwhile, Ministry of Health issued National Strategy of Total Sanitation with Society Basis (hereinafter referred to as "STBM") (Regulation of Ministry of Health No.852/2008) in view of achieving Millennium Development Goals (hereinafter referred to as "MDGs") 2015. This adopts the concept of Basic Sanitation, and aims to change social health and sanitation behavior; to secure safe drinking water; and to disseminate household sanitation facilities (toilets, waste disposal facilities, and home drainage facilities).

Similarly Ministry of Education and Culture issues the guideline of My Country Clean National Action (hereinafter referred to as "GNBN") in order to realize the clean and healthy school life. Its main activity program includes establishment of health education, health service, and healthy school environment with the aim of securing healthy lifestyle and student health.

Table 2 -1 Relevance Study Result between the Act of Waste Management (No.18/2008) (①) and Other Current Laws and Regulations in Indonesia

	Government Regulation No. 81/2012 (②)	PUPR Regulation No. 21/2006 (③)	KLHK Regulation No.13/2012 (④)	PUPR Regulation No. 3/2013 (⑤)	Regulation of Ministry of Home Affairs No.33/2010 (⑥)	National Standards No.3242/2008 (⑦)
Duplication (identical chapters and articles, etc.)	This is equivalent to the enforcement order or enforcement regulations of the Act ①. Accordingly it stipulates supplemental details or details of each provision of the Act ①.	This was established prior to the Act ①. It is the guideline for the central and local governments, the private sector and the community concerning the setting, organization, development and others of the waste management system.	This is one of the additional regulations to be determined by KLHK required by the Act ①. It is the guideline to promote 3Rs utilizing the system of Waste Bank.	This supplements and details the provisions under the jurisdiction of PUPR described in the provisions of the Act ①. The content includes contents duplicated with the Act ①.	This provides the guidelines for the provisions of the Act ①, especially on the comprehensive or unified waste management and on the involvement of private companies and communities in waste management.	This emphasizes waste management based on principle of reduce, reuse and recycle. It stipulates general or technical requirements, separation, TPS, standards for equipment and facilities, and management system. Accordingly the provisions of the Act ① follow it.
Contradiction (contradiction in meaning and interpretation, etc.)	There is no interpretation or contradiction that conflicts with the Act ①.	It is the guideline on the establishment of technical policy/program of waste management. Accordingly there are no duplications or contradictions with the Act ①.	There is no discrepancy in interpretation with the Act ①. This and the Act ① complement and reinforce the relevant provisions to each other.	There are no conflicting points on regulations concerning waste management facilities especially required at each stage of the waste management flow.	There is no interpretation discrepancy or contradiction point. This focuses on waste management issues, so it includes all matters of concern stipulated in the Act ①.	This explains the application of 3Rs concept and waste management by social participation. Its each provision details the provisions of the Act ①.
Relevancy (similarity, reconstruction or unification of ideas, conflict between legal systems, etc.)	The basic statement concerning waste management is equal to or closely related to the Act ①.	The basic statement concerning waste management is equal to or closely related to the Act ①.	The basic statement concerning waste management is equal to or closely related to the Act ①.	The basic statement concerning waste management is equal to or closely related to the Act ①.	The basic statement concerning waste management is equal to or closely related to the Act ①.	The basic statement concerning waste management is equal to or closely related to the Act ①.

(Note) The legal identification number (circled number) in the table indicates the number of the legal list to be studied shown in the text.

２．３　Roles of Ministries Concerned on Waste Management and 3Rs Activity

The National Medium Term Development Plan from 2010 to 2014 (hereinafter referred to as “RPJMN”) shows that the waste management issue is the third priority in Action Plan of Health Sector. RPJMN describes as follows:

- To focus on both symptomatic and precautionary approaches, to extend the average life expectancy from 70.7 years of age in 2009 to 72.0 years of age in 2014, to achieve MDGs in 2015, and to aim to secure safe drinking water and reduce slum areas
- To implement education and guidance, fund procurement and investment, and others in order to construct sanitation facilities (wastewater treatment, waste treatment, and drainage treatment) by 2014 in 138 areas of the 387 target areas,
- As PUPR and KLHK are ministries directly involved in waste management policies and technical policies, each ministry develops a strategic plan for the field of concern.

KLHK plays a role in assisting the President with regard to policy planning and coordination in the environmental field, and to policies and projects of environmental impact management. Its strategic plan (KLHK Regulation No.11/2011) focuses on the green economy in the objectives of the development plan from 2010 to 2014, and aims to develop based on sustainable development by overcoming environmental damage. Development goals are to improve environmental functions and manage natural resources; to control pollution damage of rivers, lakes, marine and groundwater; to conserve the country; to secure biodiversity; to conserve the forest ecosystem; to improve air pollution; to manage solid waste and hazardous/toxic waste; and to realize integral natural resource management and environmental management.

According to Presidential Regulation No.24/2010, PUPR is supposed to be responsible for the service related to the public work sector, and to assist the President in implementing policies and projects in the field of public works. Specifically, PUPR plays the role of planning, decision making, and implementation of public works policy; management of public assets of the country; supervision of PUPR projects; technical guidance and supervision of the public works field. The strategic plan indicates the issues that the situation of final disposal has not reached a satisfactory level; final disposal sites have not been improved at all especially in the metropolis and large cities; construction of equipment and facilities for waste management could not catch up with the increase of wastes; 3Rs activity is just the pilot projects in 80 areas; and the goal achievement rate of waste management has not reached the target value of PRJMN or MDGs. Accordingly it mentions that the requirements are to promote construction of final disposal sites, and to certainly achieve the goals of waste management

As mentioned above, RPJMN requires KLHK to focus on the activities and programs for improving environmental performance and for management of natural resources, and to implement them under principles of sustainable development. PUPR is required to focus on the implementation of public works projects, and to manage/supervise and provide technical instruction/guidance for the national and local public works while assisting the President.

２．４　Status of Enacting Bylaws, Strategies and Plans/Programs in Local Cities

The target cities of this study are 6 cities (Surabaya City, Malang City, Denpasar City, Bandung City, Palembang City and Balikpapan City). Surabaya City and Malang City are known as the advanced cities of waste management and 3Rs activity. Waste management in Denpasar City and Bandung City is not relatively underdeveloped. Palembang

City and Balikpapan City are the target cities of this Project.

（１） Status of Enacting Bylaws

Only Malang City and Bandung City enacted the bylaws following the Act of Waste Management No.18/2008 (Malang City Regulation No.10/2010: 18 chapters consisting of 35 articles) (Bandung City Regulation No.9/2011: 17 chapters consisting of 67 articles). Although Surabaya City enacted the regulation on sanitation and waste treatment service fee (No.10/2012: 23 chapters consisting of 31 articles), they have not enacted a draft bylaw on waste management prepared in 2011. Balikpapan City prepared a draft bylaw, but the work for enactment is suspended. Denpasar City does not have any own bylaws. They follow the Bali Provincial Regulation on Waste Management No.2/2011 (13 chapters consisting of 40 articles). Palembang City enacted the regulation on waste/sanitation management and service fee (No.27/2011: 27 chapters consisting of 53 articles). They are expected to enact a bylaw only for waste management.

（２） Strategies and Plans/Programs on Waste Management and 3Rs

There is no duplication in the plan/program in the same city because waste management or 3Rs promotion activity is implemented on the basis of the plan/program of each city. The implementation agency of these activities is Cleansing and Landscape Agency (DKP) or Cleansing and Environmental Department (BLH). Having “Green and Clean” as a banner, both agencies have joint or independent plans/programs. These plans/programs comprehensively include Waste Bank, 3Rs activity (separation), compost production, handy craft production and others. These activities are continuously conducted as community activities at the Rukun Warga (RW) level and are triggers to incorporate the 3Rs concept into everyday life.

3. Background of Formulation Assistance for Draft Governmental and Ministerial Regulations

The Act of Waste Management No.18/2008 is the waste management basic law aiming the waste management mainly with reduction of (final disposal) wastes (including household waste, household-like waste and special waste) by 3Rs activity and with appropriate treatment. This Act stipulates the basic principles on waste management, and Governmental/Ministerial Regulations and bylaws are required to handle the interpretation of the legal provisions and the details of regulations/rules necessary for operation of this Act. It is the first law in Indonesia, and requires Governmental/Ministerial Regulations including the contents of 12 fields to be maintained under the jurisdiction of KLHK. KLHK is establishing priorities and enacting them sequentially.

The assistance work to formulate the draft Ministerial Regulations was implemented according to the following policy.

- The Project established the National 3R Working Group (hereinafter referred to as "3R-WG") within KLHK for formulation of the draft Ministerial Regulations
- Among the Ministerial Regulations (12 fields) required by the Act of Waste Management, the Project formulated the draft Ministerial Regulations to be prepared by the end of 2016 based on the priority of KLHK.

The contents of the draft regulations to be formulated were carefully considered for the national waste management policies and strategies.

3. 1 Establishment of National 3R-WG

The Project selected the member agencies of the National 3R-WG to formulate the draft Ministerial Regulations, and it was approved in the Joint Coordination Committee (JCC) on November 20th, 2013.

The National 3R-WG was held at each step to formulate the drafts (①setting priority→②formulation of the first drafts→③finalization of the drafts) to discuss the contents of the drafts. According to the contents of the drafts, the Project called officers of other related ministries and experts of educational research institutes.

3. 2 Background of Formulation Assistance for Draft Ministerial Regulations

In the Act of Waste Management No.18/2008, the implementation detailed rules of regulations to be sequentially prescribed include Governmental Regulation (peraturan pemerintah (PP)), Presidential Regulation (peraturan presiden) and Ministerial Regulation (peraturan menteri). Among them, KLHK raised the following Governmental Regulation (1), Presidential Regulation (1) and Ministerial Regulations (3) as the draft regulations to be preferentially formulated.

① Governmental Regulation Concerning Specific Waste
② Presidential Regulation Concerning National Policy and Strategy of Waste Management (draft)
③ Ministerial Regulation Concerning Emergency Response System for Handling Wastes at Landfill (TPA)
④ Ministerial Regulation Concerning Leachate Quality Standards for TPA
⑤ Ministerial Regulation Concerning Extended Producer Responsibility (hereinafter referred to as "EPR")

（１）Governmental Regulation Concerning Specific Waste

Article 2 (4) and Article 23 of the Act of Waste Management No.18/2008 indicates that the types of specific waste and their management methods shall be required to be regulated. According to this law, the specific waste is defined as ①solid waste containing hazardous material, ②solid waste containing hazardous waste, ③disaster waste, ④construction and demolition waste, and ⑤waste not to be processed with existing technology.

（２）Presidential Regulation Concerning National Policy and Strategy of Waste Management

Article 7a of the Act of Waste Management No.18/2008 requires the central government to establish the national waste management policy and strategy. Article 4, 5 and 6 of Governmental Regulation No.81/2012 stipulates the contents to be included the above national policy and strategy. They indicates that the important viewpoint to be regulated is to identify the direction of the policy on waste reduction/treatment and the programs for this policy. They also indicates that the target values of waste reduction/treatment should be included.

In June 2015, the President requested the ministers and director generals of minister concerned on solid waste management administration to promote response to the waste issues, and instructed to formulate the national waste management policy and strategy as Presidential Regulations immediately. Consequently, KLHK formulated the draft through the above WG within KLHK (July 2015). Then the legal affairs bureau of KHLK examined the contents of the draft with the WG members and external experts (August 2015).

In early September 2015, KLHK held a consultation meeting inviting persons in charge and experts of related ministries/agencies, and discussed the details. Based on the comments in this meeting, the draft was finalized. Although KLHK aimed to enact this Presidential Regulation by December 2015, finalization of the draft is still being carried out between the Cabinet Secretariat and related ministries/agencies.

（３）Ministerial Regulation Concerning Emergency Response System for Handling Wastes at TPA

The draft was formulated before this Project started. However it was found as a result of the re-examination of the draft contents that the Academic Paper should be prepared by a university at the end of February 2016. Accordingly it was decided that the draft should be newly formulated with reference to this Academic Paper. This Project provided assistance for its formulation. This Academic Paper was reported as “Guideline of Waste Emergency Response in Indonesia” in September 2016. This report consists of 8 chapters; Chapter 1 Introduction, Chapter 2 State of waste management in Indonesia, Chapter 3 Risk analysis of waste management system, Chapter 4 Emergency response system in waste management, Chapter 5 Emergency guidelines before emergency cases, Chapter 6 Guidelines for measures in emergency, Chapter 7 Emergency guidelines, and Chapter 8 Guidelines after emergency countermeasures.

（４）Ministerial Regulation Concerning Leachate Quality Standards for TPA

The water quality survey of leachate from the actual landfills was conducted (by a private research company entrusted under the assistance of this Project) in order to formulate the leachate emission standards. The target landfill were in 10 Cities (Makassar, Maros, Pekanbarn, Payakumbuh, Jakarta, Depok, Tangerang, Balikpapan, Samarinda and Surabaya). Based on the results of this survey, a kickoff meeting of WG in KHLK was held at the

beginning of September 2015. After that, WG put external experts into WG members and completed the work of the draft formulation in January 2016. This Ministerial Regulation was enacted on July 19th, 2016.

（５）Ministerial Regulation Concerning EPR

Article 13 of the Act of Waste Management No.18/2008 requires to arrange a facility for waste separation. Article 14 requires producers to put labels or symbols on products and packaging containers to facilitate separation. And Article 15 requires producers to take responsibility for disposing of products or packaging containers which are not decomposed in nature or which are difficult to decompose. A kickoff meeting to formulate the draft of this Ministerial Regulation was held in September 2015.

After that, a survey necessary for this regulation (awareness survey on consumer's shopping bag/eco bag use) was conducted with the assistance of this Project, and a meeting was held inviting private enterprises.

Table 2-1 shows the list of Governmental/Ministerial Regulations, of which this Project was requested to assist in formulation, and each progress of formulation (as of July 2017).

Table 3-1 Progress of Formulation of Governmental/Ministerial Regulations Requesting Assistance of This Project and Future Schedule (as of July 2017)

Target Governmental/Ministerial Regulations of Formulation Assistance	Progress	Future Schedule and Assistance Plan
Governmental Regulation Concerning Specific Waste	The draft was formulated by the WG within KHLK (July 2015), and it was submitted to the legal affairs bureau of KHLK. The department in charge has still examine it. According to the person in charge, KLHK aims to enact it within this fiscal year.	Assistance of this Project was completed.
Presidential Regulation Concerning National Policy and Strategy of Waste Management (draft)	Finalization of the draft is still being carried out between the Cabinet Secretariat and related ministries/agencies.	Assistance of this Project was completed.
Ministerial Regulation Concerning Emergency Response System for Handling Wastes at TPA	It was enacted as "Leachate quality standard for landfill business and activity No 59/2016" in July 2016.	
Ministerial Regulation Concerning Leachate Quality Standards for TPA	It was reported with Academic Paper in September 2016.	After formulation of Academic Paper, it was confirmed that further assistance of this Project was not necessary (September 2016). Consequently the assistance of this Project was completed.
Ministerial Regulation Concerning EPR	With the assistance of this Project, a survey necessary for this regulation (awareness survey on consumer's shopping bag/eco bag use) was conducted, and a meeting was held inviting private enterprises.	Counterparts (hereinafter referred to as "C/Ps") in KLHK intends to aim for finalization of the draft after continuing to conduct necessary surveys and to hold meeting for private enterprises. Consequently JICA Expert Team agreed with C/Ps in KHLK not to forcibly finalize the draft by the end of the Project.

4. Outline of Enacted Governmental/Ministerial Regulations

Ministerial Regulations Concerning Leachate Quality Standards for TPA and Ministerial Regulation Concerning EPR are still in the draft formulation stage and are not codified. Consequently, among the target regulations for formulation assistance of this Project, only enacted Governmental Regulation and Governmental/Ministerial Regulations awaiting enactment are described below. The original texts (English translation) of these regulations are attached.

4. 1 Governmental Regulation Concerning Specific Waste

The draft of this Governmental Regulation consists of the following 7 chapters consisting of 68 articles, and intends to:

a. To implement specific waste management that is environmental friendly and sustainable as the realization of duties, obligation and responsibility of the government and regency/city government.

b. Provide legal basis in implementing specific waste management so that it will not result in pollution and environmental damage; and

c. To develop public's role and participation in household, community and business-based specific waste management. (Section 2 Purpose in Chapter 1)

Chapter 1 General Provision
- Section 1 Definition (Article 1)
- Section 2 Purpose (Article 2)
- Section 3 Types of Specific Waste (Article 3)
- Section 4 Scope (Article 4)

Chapter 2 Implementation of Specific Waste Management
- Section 1 Waste Containing Toxic and Hazardous Material and/or Toxic and Hazardous Material Waste (Article 5 to 7)
  - Item 1 Reducing (Article 8)
  - Item 2 Handling (Sorting and Collecting) (Article 9 to 11)
- Section 2 Waste Resulting From Disaster (Article 12 to 14)
- Section 3 Building Ruins (Article 15 to 16)
  - Item 1 Reducing Waste (Article 17 to 18)
  - Item 2 Waste Handling (Article 19 to 22)
- Section 4 Technologically Challenged Waste (Article 23)
  - Item 1 Reducing Waste (Article 24 to 26)
  - Item 2 Waste Handling (Article 27 to 31)
- Section 5 Non Regular Waste (Article 32)
  - Item 1 Waste from Outdoor Activities (Article 33 to 36)
  - Item 2 Large Waste (Article 37 to 41)

Item 3 River, Shore and/or Beach and Open Water (Article 42 to 47)

Item 4 Junk Vehicles (Article 48 to 53)

Chapter 3 Duties and Authority

Section 1 Duties (Article 54)

Section 2 Authority of the Government (Article 55)

Section 3 Authority of the Provincial Government (Article 56)

Section 4 Authority of Regency/City Government (Article 57)

Chapter 4 Cooperation and Partnership

Section 1 Inter Region Cooperation (Article 58)

Section 2 Partnership (Article 59)

Chapter 5 Funding (Article 60)

Chapter 6 Guidelines and Supervision

Section 1 Guidance (Article 61 to 62)

Section 2 Monitoring (Article 63 to 65)

Chapter 7 Closing Provision (Article 66 to 68)

4．2 Presidential Regulation Concerning National Policy and Strategy of Waste Management

This National Policy and Strategy intends to stipulate sectoral policy that is related with waste management for each Ministry and Government agency; and to provide policy direction and program of waste management for local governments (Provincial Government, and Regency/City Government) in order to stipulate Jakstrada (Article 2 in Chapter 2). It has 7 chapters consisting of 17 articles.

Chapter 1 General Provisions (Article 1)

Chapter 2 Purpose (Article 2)

Chapter 3 National Policy and Strategy of Waste Management

Section 1 General Provisions (Article 3)

Section 2 Policy Direction (Article 4)

Section 3 Strategy and Target (Article 5 to 9)

Chapter 4 Monitoring and Evaluation

Section 1 Monitoring (Article 9 to 10)

Section 2 Evaluation (Article 11)

Chapter 5 Duties of Central Government and Local Government (Article 12 to 15)

Chapter 6 Financing (Article 16)

Chapter 7 Closing Provision (Article 17)

Especially as the direction of the policy, Article 4 indicates performance improvement of waste reduction (reducing waste generation, recycling and/or reusing) and waste handling (sorting, collecting, transporting, processing and final processing). For waste reduction, Article 5 (1) raised the following items strategies and goals:

a. Strengthening coordination and collaboration between Ministries/Agencies and between the Government and Local Government;

b. Application and development of investment scheme, operational and maintenance fund;

c. Improvement of legal enforcement;

d. Improvement of Norm, Standard, Procedure and Criteria (NSPK);

e. Strengthening commitment of executive and legislative agencies in the central and local level in providing budget;

f. Strengthening business commitment by partnering with the government;

g. Improving capacity of leadership, institution and human resources;

h. Creating information system;

i. Application of high-level technology that is environmental friendly and effective;

j. Application and development of incentive and disincentive system; and

k. Improving people's involvement by communication, information and education (KIE)

These policies will be improved by achieving the following targets (Article 6):

Policy direction as stated in Article 5 shall be improved to achieve the following target:

a. Reducing waste up to 30% (thirty percent) against waste generation in 2025, in the situation where there is no intervention in waste reducing policy; and

b. Handling waste up to 70% (seventy percent) against waste generation in 2025, in the situation where there is no intervention in waste handling policy.

4．3 Ministerial Regulation Concerning Leachate Quality Standards for TPA

This Ministerial Regulation aims to provide a reference regarding leachate quality standards to the governor in determining leachate quality standards; to the environmental permitting officer in issuing an environmental permit; and to the responsible person of TPA Business and/or Activity in planning leachate management and preparing environmental documents (Article 2).

Article 1 stipulates the definitions of terms. Article 2 (a) stipulate that the provided leachate quality standards shall at any time not be exceeded, and that these standards shall be the reference values for the governors in case to determine regional leachate quality standards. And the governor are able to determine more stringent regional leachate quality standards based on the scientific studies (Article 4). If there are regional leachate quality standards, the environmental permit for landfill (TPA) will be issued on the basis of these standards (Article 5(1)). In other cases, the environmental permitting officer shall use the leachate quality standards stipulated in this Ministerial Regulation (Article 5 (2)).

Any TPA Business and/or Activity shall obtain an environmental permit including leachate management (Article 7).

This leachate management shall be stipulated to include the following provisions:

- Ensuring that all leachates produced in TPA will go to the leachate treatment plant (Article 7(3)a);
- Separating between the leachate collection channel and the rain water channel (Article 7(3)c);
- Avoiding the thinning of leachate into the leachate effluent stream (Article 7(3)e);
- Setting the organizing points for leachate sampling and the organizing coordinates (Article 7(3)f);
- Installing a leachate discharge or flow rate measuring device at the organizing points (Article 7(3)g);
- Constructing and installing a number of monitoring wells at the TPA upstream and downstream in accordance with the applicable legislative regulations (Article 7(3)h);
- Making records of daily waste stockpiling (Article 7(3)i);
- Monitoring daily discharge and pH (Article 7(3)j);
- Checking the leachate parameter level on a regular manner at least 1 (one) time in 1 (one) month to an accredited and / or registered laboratory (Article 7(3)k);
- Monitoring the quality of groundwater every 3 (three) month (Article 7(3)l);
- And Submitting reports at least 1 (one) time in 3 (three) months to the regent / mayor with copies sent to the governor, the Minister, and any relevant agencies (Article 7(3)n).

Furthermore, the mayor shall perform inventory of the amount of waste generation in the administrative area; inventory of the type and amount of waste processed at the TPA; inventory of the waste processing and leachate treatment technology; and supervision of the waste processing, leachate treatment and leachate quality standards fulfillment (Article 8(1)). The results of TPA inventory and supervision shall be submitted to the governor with a copy sent to the Minister (Article 8(2)).

Attachment 1. Government Regulation Concerning Specific Waste Management (draft)

DRAFT OF GOVERNMENT REGULATION
NUMBER… YEAR 2016
CONCERNING SPESIFIC WASTE MANAGEMENT
WITH BLESSINGS OF GOD THE ALMIGHTY,
THE PRESIDENT OF THE REPUBLIC OF INDONESIA,

Considering: Whereas in order to implement the provision of Article 23 paragraph (2) Law Number 18 Year 2008 concerning Waste Management, it is necessary to establish Government Regulation concerning Specific Waste Management.

In view of:

1. Law Number 18 Year 2008 concerning Waste Management (Statute Book of the Republic of Indonesia Year 2008 Number 69, Supplement to the Statute Book Number 4851);
2. Law Number 32 Year 2009 concerning Protection and Management of Environment (Statute Book of the Republic of Indonesia Year 2009 Number 40, Supplement to the Statute Book Number 5059);
3. Law Number 24 Year 2007 concerning Disaster Management (Statute Book of the Republic of Indonesia Year 2007 Number 66, Supplement to the Statute Book Number 4723);
4. Law Number 12 Year 2011 concerning Stipulation of Laws and Regulation (Statute Book of the Republic of Indonesia Year 2011 Number 82, Supplement to the Statute Book Number 5234);
5. Law Number 23 Year 2014 concerning Local Government (Statute Book of the Republic of Indonesia Year 2014 Number 224, Supplement to the Statute Book Number 5587);

HAVE DECIDED:

To enact: GOVERNMENT REGULATION CONCERNING SPECIFIC WASTE MANAGEMENT

CHAPTER I
GENERAL PROVISION
First Section
Definition
Article 1

In this Government Regulation, the following terms shall have the meaning as assigned to them:

1. Waste is the residue of human's daily activities and/or natural process in solid form.
2. Specific waste is the waste requiring special management due to its nature, concentrate and/or volume.
3. Specific waste management is a systematic, thorough and continuous activity, including reducing and handling of specific waste.
4. Waste containing toxic and hazardous material, hereinafter referred to as B3 and or B3 waste is the waste containing material, energy and other components which due to its nature, concentrate and/or amount, whether directly or indirectly may contaminate and/or damage environment, and/or endanger environment, health as well as sustainability of human life and other life form.
5. Waste arising due to disaster is organic and anorganic solid material, available due to natural disaster, such as animal remains, building ruins in the form of debris, ashes, rocks, fallen tree trunks, leaves, waste from other city activity such as farming/gardening, farming, fishery, industry, tourism activity.
6. Building wreckage waste is the debris resulting from knocking down a part or the whole building, component, building material and/or its facilities and infrastructure.
7. Technologically challenged waste is the waste whose technology to process such waste is not available yet in Indonesia.
8. Non regular waste is the waste resulting from human activity which may occur at times in great volume and uncontrollable, such as ocean waste, waste resulting from natural factor, waste in the bordering area, waste due to mass activity.
9. Final Landfills hereinafter referred to as TPA is a place to process and return the waste to environment securely for human and the environment.
10. Dropping point is a location where the waste is collected before transported to collector, user, processing location and licensed final dumping.
11. Dropping point for waste containing B3 and or B3 west, hereinafter referred to as TPS B3 waste is a place for specific waste containing B3 and/or B3 waste transported to recycling, processing and/or dumping location for B3 waste.

12. Integrated waste processing location hereinafter referred to as TPST is the place where collecting, sorting, reusing, recycling, processing and final processing of waste is performed.

13. Waste bank is the place of waste sorting and collecting which may be recycled and/or reused, for waste with economical value.

14. Producers is the business entity producing, importing, using, distributing, selling goods and/or package, and/or provide container which is unable or difficult to be composted by natural process.

15. Person is individual, a group of people and/or legal entity.

16. Central government, hereinafter referred to as the Government is the President of the Republic of Indonesia having the authority to govern the Republic of Indonesia as stated in the Constitution of the Republic of Indonesia Year 1045.

17. Regency/City Government is the governor or regent/mayor and local officers as the implementer of local government.

18. Minister is the minister implementing government's business in managing environment and forestry.

Second Section

Purpose

Article 2

This Government Regulation intends to:

d. To implement specific waste management that is environmental friendly and sustainable as the realization of duties, obligation and responsibility of the government and regency/city government.

e. Provide legal basis in implementing specific waste management so that it will not result in pollution and environmental damage; and

f. To develop public's role and participation in household, community and business-based specific waste management.

Third Section

Types of Specific Waste

Article 3

Types of specific waste regulated in this Government Regulation are:

a. Waste containing toxic and hazardous material (B3) and/or waste containing toxic and hazardous material waste.

b. Waste resulting from disaster;

c. Building ruins/debris;

d. Technologically challenged waste; and/or

e. Non regular waste.

Fourth Section

Scope

Article 4

Scope of Specific Waste Management includes:

a. Reducing:

1. Limitation of waste generation;
2. Recycling of waste; and/or
3. Reusing waste

b. Handling;

1. Sorting;
2. Collecting;
3. Transporting;
4. Processing; and/or
5. Final processing.

CHAPTER II
IMPLEMENTATION OF SPECIFIC WASTE MANAGEMENT
First Section
Waste Containing Toxic and Hazardous Material and/or Toxic and Hazardous Material Waste

Article 5

(1) Waste containing B3 and/or B3 waste are:

a. Waste containing B3 and/or B3 waste from household and household-like; and

b. Electronic waste and electric household equipment resulting from household-like activities.

(2) Type of waste containing B3 and or B3 waste as stated in paragraph (1) point a are:

a. No longer used household items, and its packaging contains B3 waste, such as used oil, used battery, used paint, used cleaning products, disinfectant, used bleachers, insecticide-herbicide, chemical used in plumbing system, used thinner, rat poison.

b. Goods which may cause contagious disease, such as medical waste from household, among which diapers (pad), contaminated bandage, expired medicines, broken thermometer.

(3) Type of waste containing B3 and or B3 waste as stated in paragraph (1) point b is fluorescent lamp, electronic and electrical equipment, and isolated electric wire.

Article 6

(1) Waste management containing B3 and/or B3 waste in the source is done by :

a. Reducing waste including limiting waste generation; and

b. Waste handling starting from sorting and collecting.

(2) Further provision regarding waste management containing B3 and/or B3 waste as stated in paragraph (1) shall be regulated by a minister decision.

Article 7

(1) Waste management containing B3 and/or B3 waste as stated in Article 6 shall be performed from the resources until dropping point, and shall be under the authority of regency/city government in accordance with the prevailing regulation.

(2) Dropping point including TPS 3R, main waste bank, PDU and/or modern shopping centers (mall) as stated in paragraph (1) shall not require any permit.

(3) Technical requirements for dropping point as stated in paragraph (2) shall refer to the regulation concerning technical procedure and requirement of storing and collecting toxic and hazardous material.

(4) Waste management containing B3 and or B3 waste from the dropping point to the sorting, collecting, processing and final dumping shall be performed under the obligation of producers by reducing waste, CSR and/or volunteer from producers and/or scavengers, user, process and dumping of licensed B3.

(5) Waste management containing B3 and/or B3 waste from dropping point to the next process shall refer to the regulation regarding Management of Toxic and Hazardous Waste

Paragraph 1

Reducing

Article 8

(1) Reducing waste that contains B3 and/or B3 waste by limiting waste generation as stated in Article 6 paragraph (1) point a shall be conducted by:

a. Every person;

b. Producers; and

c. Management of housing complex, commercial area, industry area, special zone, public facilities, social facility and other facility.

(2) Limiting Waste generation containing B3 and/or B3 waste by every person and Management of housing complex, commercial area, industry area, special zone, public facilities, social facility and other facility as stated in paragaraph (1) point a and point c shall be conducted by:

a. Choosing goods and/or product with certain label on its packaging regarding environmental friendly chemical.

b. Choosing goods and/o product having information regarding the storing procedure, and preventive action if there is any misuse as well as after use direction.

c. Choosing goods and or products that can be recycled.

(3) Limiting waste generation containing B3 and/ or B3 waste by producers as stated in paragraph (1) point b shall be conducted by:

a. Drafting plan and/or program to limit generation of waste containing B3 and/or B3 waste as a part of its business and/or activity;

b. Using production goods containing B3 and/or B3 waste at the smallest possible.

c. Using environmental friendly production goods which contain B3 and B3 waste.

d. Importing, using and distributing goods and/or packaging which may result in waste containing B3 and/or B3 at the very least possible; and/or

e. Importing, using and distributing goods and/or packaging that may be recycled.

Paragraph 2
Handling

Subparagraph 1
Sorting
Article 9

(1) Sorting waste containing B3 and/or B3 waste as stated in Article 6 paragraph (1) point b shall be conducted by:

a. Any person in the direct source;

b. Management of dropping point;

c. Management of housing complex, commercial area, industry area, special zone, public facilities, social facility and other facility; and

d. Producers.

(2) Sorting as stated in paragraph (1) shall be conducted based on nature, type and characteristic of waste containing B3 and/or B3 waste.

Subparagraph 2
Collecting
Article 10

(1) Collecting waste containing B3 and/or B3 waste as stated in Article 6 paragraph (1) point b shall be conducted by:

a. Producer;

b. Management of housing complex, commercial area, industry area, special zone, public facilities, social facility and other facility;

c. Regency/City Government; and

(2) Producers, Area Management and or Regency/City Government in collecting specific waste containing B3 and/or B3 waste as stated in paragraph (1) shall provide facilities and infrastructure of for collecting sorted waste; and

(3) Further provision regarding technical requirements of facilities and infrastructure for collecting sorted waste as stated in paragraph (2) shall refer to the regulation regarding Management of Hazardous and Toxic Waste.

Article 11

Transporting, Utilizing, Processing and Dumping of waste containing B3 and/or B3 waste shall refer to the prevailing regulation concerning Management of Toxic and Hazardous Material.

Second Section
Waste Resulting From Disaster
Article 12

Waste resulting from disaster such as organic and an organic solid material are caused by natural disaster, such as animal remains, building ruins in the form of debris, ashes, rocks, fallen tree trunks, leaves, waste from domestic activity, market, commercial activity and other urban activities such as farming/gardening, animal farming, fishery and tourism activity.

Article 13

(1) Handling waste that results from disaster shall be conducted in stages:

a. Emergency situation

b. Post disaster

(2) Further provision regarding handling waste that results from disaster as stated in paragraph (1) shall be further regulated with a minister/agency regulation implementing government's affairs in natural disaster, after coordinating with the minister implementing government's affair in management and protection of environment.

Article 14

(1) Government and Regency/City Government are responsible in handling waste that results from disaster.

(2) Criteria and type of disaster as stated in paragraph (1) shall be in accordance with the regulations concerning disaster.

(3) Division of responsibilities in handling waste that results from disaster as stated in paragraph (1) shall be determined by status and level of disaster in accordance with laws and regulations concerning disaster.

Third Section

Building Ruins

Article 15

(1) Building Ruins include:

a. Structure;

b. Building;

c. Debris from park and recreational facilities;

d. Debris from transportation facilities; and

e. Debris from irrigation facilities

(2) Building ruins as stated in paragraph (1) shall be stated in Appendix I which forms an integral part of this Government Regulation.

Article 16

(1) Management of building ruins shall be conducted by:

a. Reducing the ruins, including recycling and/or reusing debris waste

b. Waste handling includes sorting, collecting, transporting, processing and final processing.

(2) Final provisions regarding procedure of managing building ruins as stated in paragraph (1) shall be regulated in a minister regulation.

Paragraph 1

Reducing Waste

Article 17

(1) Reducing building ruins as stated in Article 16 paragraph (1) shall be performed by any person.

(2) Reducing building ruins as stated in paragraph (1) shall be performed by:

a. Using environmental friendly building material;

b. Using building material that can be recycled and/or reused;

c. Using recycled building material; and/or

d. Recycle and/or reuse the building debris not containing B3 and or B3 waste.

(3) Reducing building ruins as stated in paragraph (1) shall be conducted in the wreckage area.

(4) In case the activity stated in paragraph (3) is unable to be conducted in the wreckage area, it may be conducted in the recycling location for debris.

Article 18

(1) In recycling and/or reusing building debris as stated in Article 17 paragraph (2) point d, everyone may appoint a business entity to recycle the debris.

(2) Business entity which recycles debris as stated in paragraph (1) shall have business permit and/or activity permit from regency/city government.

(3) Further provision regarding debris that can be recycled and/or reused as stated in Article 9 paragraph (2) point b and c shall be regulated in a Minister Regulation.

(4) Further provision regarding recycling and/or reusing building debris that contains B3 waste as stated in Article 17 paragraph (1) shall refer to the regulation regarding management of toxic and hazardous material.

Paragraph 2
Waste Handling

Subparagraph 1
Sorting
Article 19

(1) Sorting building debris as stated in Article 16 paragraph (1) point a shall be conducted by any person.

(2) Sorting building debris as stated in paragraph (1) shall be conducted by grouping building debris to be at least 5 types of waste, including:

a. Waste containing toxic and hazardous material and/or toxic and hazardous material waste;

b. Electronic – electric goods;

c. May be recycled;

d. May be reused; and

e. Others.

(3) The sorting process for building debris shall be conducted in the wreckage area and/or designated location.

(4) Sorting process for building debris as stated in paragraph (3) may be conducted by other party.

(5) Sorting building debris that is categorized as B3 waste as stated in paragraph (2) shall refer to the regulation concerning toxic and hazardous material.

Subparagraph 2

Collecting and transporting

Article 20

(1) Collecting and transporting of building debris as stated in article 16 paragraph (1) point b shall be conducted by any person.

(2) Collecting and transporting building debris as stated in paragraph (1), shall be conducted in the wreckage area and/or locations that is designated by the regency/city government.

(3) Collecting and transporting as stated in paragraph (2) may cooperate with third party.

(4) Collecting and transporting building debris containing B3 and/or B3 waste as well as electronic goods shall refer to the regulation concerning B3 management.

(5) Collecting and transporting of building debris residue shall refer to local regulation.

Subparagraph 3

Processing

Article 21

(1) Processing building debris as stated in Article 16 paragraph (1) point b shall include recycle of material and reuse the environmental friendly technology.

(2) Processing building debris as stated in paragraph (1) shall be conducted by :

a. Building owner;
b. Building management;
c. Business entity; and
d. Regency/city government

(3) Regency/city government shall provide facility to process building debris,

a. TPS 3R;
b. TPA; and/or
c. TPST.

(4) Regulation concerning processing building debris that is categorized as B3 waste as stated in paragraph (1) shall refer to regulation concerning toxic and hazardous waste management.

Subparagraph 4

Final Processing

Article 22

(1) Final processing of building debris as stated in Article 16 paragraph (1) point b shall be conducted by Regency/City government.

(2) In final processing building debris, the regency/city government shall provide and operate TPA and/or TPST.

(3) Regulation regarding final processing of building waste that is categorized as B3 waste shall refer to the regulation concerning toxic and hazardous material waste management.

(4) Further provision regarding final processing of building debris as stated in paragraph (3) shall be regulated in the related minister regulation.

Fourth Section
Technologically Challenged Waste
(consult this with legal division)
Article 23

(1) Technologically challenged waste is, among which, pampers, diapers and pads.

(2) Technology in this provision is waste management technology that is not yet available in Indonesia.

(3) Managing technologically challenged waste includes:

a. Reducing waste; and

b. Handling waste.

(4) Managing technologically challenged waste as stated in paragraph (3) shall be conducted by:

a. Every person

b. Producers

(5) Further provision regarding technologically challenged waste as stated in paragraph (3) shall be regulated in a minister regulation.

Paragraph 1
Reducing Waste
Article 24

Every person shall limit the usage of technologically challenged waste.

Article 25

Producer shall limit technologically challenged waste by:

a. Drafting plan and/or program to limit waste generation as a part of its business and/or activity; and/or

b. Produce, import, distribute, use and provide goods and/or packaging which can be processed technologically.

c. In producing, importing, distributing, using and providing goods and/or packaging which can be processed technologically as stated in paragraph (2), the active producers shall be given 5 year to adjust with the application of new technology.

d. New producers shall produce, import, distribute, use and provide goods and/or packaging which may be processed technologically as stated in paragraph (2).

Article 26

(1) Further provision regarding producers obligation as stated in Article 25 paragraph (2), (3) and (4) shall be regulated with a minister regulation.

(2) In drafting minister regulation as stated in paragraph (1), the minister implementing government business in protection and management of environment shall:

a. Coordinate with the minister implementing government's affairs in industry;

b. Coordinate with the minister implementing government's affairs in trade; and

c. Consult with producers and public.

Paragraph 2

Waste Handling

Article 27

Handling the technologically challenged waste is a series of activity, including:

a. Sorting;

b. Collecting;

c. Transporting; and

d. Final processing.

Subparagraph 1

Sorting

Article 28

(1) Sorting obligation for technologically challenged waste as stated in Article 27 point a shall be conducted by:

a. Every person at the source;

b. Management of housing complex, commercial complex, industrial area, special regions, public facilities, social facilities, and other facilities;

c. Producers; and

d. Regency/city government.

(2) The obligation of waste sorting as stated in paragraph (1) is to provide facilities to sort technologically challenged waste.

Subparagraph 2

Collecting

Article 29

(1) Collecting technologically challenged waste as stated in Article 27 point b shall be conducted by:

a. Management of housing complex, commercial complex, industrial area, special regions, public facilities, social facilities, and other facilities;

b. Producers; and

c. Regency/city government.

(2) Collecting waste as stated in paragraph (1) shall be conducted by providing the following facilities:

a. TPS;

b. TPS 3R; or

c. Waste Bank.

Subparagraph 3

Transporting

Article 30

(1) Transporting technologically challenged waste as stated in Article 27 point c shall be conducted by:

a. Management of housing complex, commercial complex, industrial area, special regions, public facilities, social facilities, and other facilities;

b. Regency/city government.

(2) Transporting waste as stated in paragraph (1) shall be conducted by:

a. Providing waste transportation facilities; and

b. Transporting waste from TPS, TPS 3R, waste bank to TPA.

Subparagraph 4

Final Processing

Article 31

Final processing of technologically challenged waste is still unable to be conducted in the TPA.

Fifth Section

Non Regular Waste

Article 32

(1) Non regular waste includes:

a. Waste from mass activity;

b. Large waste;

c. Waste from river, shore and/or beach, and open water; and

d. Junk vehicles.

(2) Management of non regular waste shall be conducted by:

a. Reducing; and

b. Handling.

(3) Further provision regarding management of non regular waste as stated in paragraph (1) shall be regulated with a regulation from the minister in charge.

Paragraph 1

Waste from Mass Activity

Article 33

(1) Reducing waste for mass activity shall be conducted by limiting waste generation.

(2) Waste handling for mass activity shall be conducted by:

a. Sorting;

b. Collecting;

c. Transporting;

d. Processing; and

e. Final processing

(3) Reducing and handling waste for mass activity as stated in paragraph (1) and (2) shall be conducted by the person in charge for such activity.

Subparagraph 1

Reducing

Article 34

Limiting Waste generation as stated in Article 33 paragraph (!) shall be conducted by:

a. Drafting plan and/or program to limit waste generation starting from preparation until finishes.
b. Using material that can be recycled and/or reused.
c. Using material which does not contain B3 and/or B3 waste.

Subparagraph 2

Handling

Article 35

(1) Sorting waste from mass activity as stated in Article 33 paragraph (2) point a shall be conducted by:

a. Sketching the location of garbage bin along with information that is clear in visual and audio.

b. Providing sorted waste in accordance along with the prevailing regulation.

(2) Sorting waste from mass activity as stated in Article 33 paragraph (2) point b shall be conducted in the dropping point in accordance with the sorted waste.

(3) Sorting and collecting waste from waste activity as stated in paragraph (1) and paragraph (2) shall be conducted in the location of mass activity.

(4) Person in charge of the activity shall distribute the sorted waste in the dropping point to the TPS, TPS 3R or waste bank.

Article 36

Procedures of transporting, processing and final processing of waste from mass activity shall be in accordance with the prevailing laws and regulations.

Paragraph 2

Large Waste

Article 37

(1) Large waste are bath tub, bed, bookshelf, cabinet, trolley, chair, bench, sofa, clothes, storing shelf, cooking table, decoration table, foam mattress, cotton mattress, spring bed, carpet, shoe rack, dining table, guest table, tv table, aquarium, baby stroller, baby walker, barbeque, bike, luggage, sewing machine, tent, indoor sport equipment, piano, organ, keyboard, guitar, drum, golfing equipment, children playing set and cooler box.

(2) Limiting large waste includes limiting waste generation and/or recycle and/or reuse them.

(3) Handling of large waste shall be conducted by every person, including:

a. Collecting;

b. Transporting;

c. Sorting;

d. Processing; and

e. Final processing

Subparagraph 1

Reducing

Article 38

(1) Limiting waste generation and/or recycling and/or reusing as stated in Article 37 paragraph (1) shall be conducted by:

a. Any person; and

b. Producers.

(2) Limiting waste generation as stated in paragraph (1) point a shall be conducted by using goods made from recyclable and/or reusable material.

(3) Limiting waste generation and/or recycling and/or reusing large waste as stated in paragraph (1) point b shall be conducted by:

a. Drafting program and/or activity to limit waste generation and/or reusing the waste as a part of its business and/or activity;

b. Reusing recyclable and/or reusable production raw material;

c. Reusing production material not containing B3 and/or B3 waste; and/or

d. Withdrawing inappropriate product from consumers to recycle and/or reuse them again

Sub Paragraph 2

Handling

Article 39

(1) Collecting large waste as stated in Article 37 paragraph (2) point a shall be conducted by:

a. Any person;

b. Producers; and

c. Regency/city government.

(2) Collecting large waste as stated in paragraph (1) shall be conducted by providing TPS, TPS 3R facilities or waste bank.

(3) Collecting location as stated in paragraph (2) shall be provided by producers and/or regency/city government.

(4) In providing place to collect large waste as stated in paragraph (3), the producers may conduct individually, cooperate with other producers, cooperate with regency/city government and/or cooperate with other party.

(5) Further provision regarding cooperation as stated in paragraph (5) shall be further regulated in a minister regulation.

Article 40

(1) Transporting large waste as stated in Article 37 paragraph (2) point b shall be conducted by:

a. Producers; and

b. Regency/city government.

(2) Transporting waste as stated in paragraph (1) shall be conducted by:

a. Providing facilities to transport waste; and

b. Transport waste from TPS, TPS 3R or waste Bank to TPA.

Article 41

(1) Waste remaining from recycling and/or reusing (residue) shall be dumped to the final processing location.

(2) Procedure to process and final processing of large waste containing B3 and/or B3 waste shall refer to regulation concerning B3 and/or B3 waste management.

Paragraph 3

River, Shore and/or Beach and Open Water

Article 42

(1) Reducing waste in river, shore and/or beach and open water shall be conducted by limiting waste generation.

(2) Handling waste in river, shore and/or beach and open water shall be conducted by:

a. Sorting;

b. Collecting;

c. Transporting;

d. Processing; and

e. Final processing

Subparagraph 1

Reducing

Article 43

(1) Limiting waste generation in river, shore and/or beach and open water as stated in Article 42 paragraph (1) shall be conducted by:

a. Any person; and

b. Regency/city government

(2) Limiting waste in river, shore and/or beach and open water as stated in paragraph (1) point a shall be conducted by:

a. Not throwing garbage in the river, shore and/or beach and open water

b. Applying 3R principles in waste management.

(3) Limiting waste generation in river, shore and/or beach and open water as stated in paragraph (1) point b shall be conducted by:

a. Educating the community to not throw garbage to the river, shore and/or beach and open water

b. Provide facilities and infrastructure for throwing sorted waste

c. Educating the community to apply 3R principles

d. Provide waste bank

Subparagraph 2

Handling

Article 44

Sorting the waste from river, shore and/or beach and open water as stated in Article 42 paragraph (2) point a shall be conducted by any person.

Article 45

(1) Collecting waste from river, shore and/or beach and open water as stated in Article 42 paragraph (2) point b shall be conducted by:

a. Any person; and/or

b. Regency/city government

(2) Collecting waste from river, shore and/or beach and open water as stated in paragraph (1) is an independent activity which is not included in the regular waste collecting system.

(3) Collecting waste in river, shore and/or beach and open water may be performed by using special equipment intended to collect waste from river, shore and/or beach and open water.

(4) Regency/city government shall determine location and provide TPS, TPS 3R and waste bank to collect waste from river, shore and/or beach and open water.

Article 46

(1) Transporting waste from river, shore and/or beach and open water as stated in Article 42 paragraph (2) point c shall be conducted by the regency/city government.

(2) Transporting waste as stated in paragraph (1) shall be conducted by:

a. Providing waste transporting facilities; and

b. Transport the waste from TPS, TPS 3R or waste bank to TPA.

Article 47

(1) Processing the waste from river, shore and/or beach and open water as stated in Article 42 paragraph (2) point c shall be conducted by regency/city government.

(2) Processing the waste from river, shore and/or beach and open water may be conducted by partnering with a third party who has a license.

(3) The residue of processing the waste from river, shore and/or beach and open water which do not contain any B3 shall be dumped in the final processing location.

(4) Final processing of residue from river, shore and/or beach and open water containing B3 shall refer to the prevailing regulation concerning B3 and/or B3 waste management.

Paragraph 4

Junk Vehicles

Article 48

(1) Reducing junk vehicles shall be conducted by limiting waste generation.

(2) Handling junk vehicles can be conducted by:

a. Sorting;

b. Collecting;

c. Transporting;

d. Processing; and

e. Final processing.

Subparagraph 1

Reducing

Article 49

(1) Limiting waste generation as stated in Article 48 paragraph (1) shall be conducted by any person.

(2) Limiting waste generation as stated in Paragraph (1) shall be conducted by recycling and reusing the junk vehicles.

(3) Recycling and reusing junk vehicles may be conducted by appointing recyclers with business /activity license from the regency/city government.

Subparagraph 2

Handling

Article 50

(1) Sorting junk vehicles shall be conducted by:

a. Producers; and/or

b. Collectors

(2) Sorting vehicles junk as stated in paragraph (1) shall be conducted by separating goods or material containing B3 and/or waste with goods or material not containing B3 and/or B3 waste.

(3) Sorting process may be conducted in the special collecting location for junk vehicles as stated in Article 50 paragraph (3).

(4) Waste sorting as stated in paragraph (2) for junk vehicles containing B3 and/or B3 waste shall refer to regulation concerning toxic and hazardous material waste management.

Article 51

(1) Collecting junk vehicles as stated in Article 39 paragraph (2) point a shall be conducted by:

a. Any person;

b. Producers; and

c. Regency/city government.

(2) Collecting junk vehicles as stated in paragraph (1) may cooperate with other party.

Article 52

(1) Transporting junk vehicles as stated in Article 39 paragraph (2) point b shall be conducted by:

a. Producers; and

b. Regency/city government.

(2) Transporting junk as stated in paragraph (1) shall be conducted by providing safe facilities and infrastructure for environment and human.

(3) Further provision regarding transporting as stated in paragraph (2) shall be regulated in a minister regulation.

Article 53

(1) Residue of recycling and reusing shall be dumped to the final processing location.

(2) Procedures of processing and final processing of junk vehicles containing B3 and/or B3 waste shall refer to the regulation regarding B3 and/or B3 waste management.

CHAPTER III
DUTIES AND AUTHORITY
First Section
Duties
Article 54

(1) The Government and provincial Government, and regency/city are obligated to ensure a good and environmental friendly management of specific waste in accordance with the purpose as stated in this Government Regulation.

(2) The duties of government and provincial government, and regency/city government as stated in paragraph (!) in specific waste management includes:

a. Developing specific waste management system that is environmental friendly and sustainable.

b. Implement effective, efficient, participative and accountable specific waste management in accordance with laws and regulation;

c. Empower the community;

d. Raising awareness of the community;

e. Develop and strengthen cooperation and partnership with business; and

f. Other duties in accordance with authority, needs and capability.

Second Section
Authority of the Government
Article 55

In implementing specific waste management, the Government has the authority to:

a. Establish norm, standard, procedure and criteria of specific waste management;

b. Facilitate and develop cooperation between regions, partners and network in waste management;

c. Implement coordination, guidance, and supervision of regency/city government's performance in specific waste management;

d. Publish permit;

e. Monitoring, and

f. Determine dispute settlement policy between regions in specific waste management.

Third Section

Authority of the Provincial Government

Article 56

In implementing specific waste management, provincial government has the authority to:

a. Facilitate cooperation between regions in a province, partnership and network in waste management;

b. Implement coordination, guidance, and supervision of regency/city government's performance in specific waste management;

c. Facilitate dispute settlement of specific waste management between regencies/cities in 1 (one) province.

Fourth Section

Authority of Regency/City Government

Article 57

(1) In implementing waste management, regency/city government has the authority to:

a. Determine policy and strategy of specific waste management based on the national and provincial policy;

b. Implement specific waste management in the regency/city scale in accordance with the norm, standard, procedure and criteria as determined by the Government;

c. Guide and supervise performance of specific waste management conducted by other party;

d. Determine the location of dropping point, integrated waste processing, and/or final processing of specific waste;

e. Monitor and evaluate regularly every 6 (six) months for 20 (twenty) years, on the final processing location for specific waste with the closed open dumping location.

f. Drafting and implementing emergency response system for specific waste management in accordance with its authority.

(2) Determining location for integrated processing of specific waste management, and final processing location as stated in paragraph (1) point d shall be a part of Spatial Planning of Regency/City in accordance with laws and regulations.

(3) Further provision regarding the guideline of emergency response system as stated in paragraph (1) point f shall be regulated with a minister regulation.

CHAPTER IV
COOPERATION AND PARTNERSHIP
First Section
Inter Region Cooperation
Article 58

(1) Regency/City government may cooperate with other regency/city government in performing specific waste management.

(2) Cooperation as stated in paragraph (1) may be in the form of cooperation with and/or joint business of specific waste management.

(3) Further provision regarding cooperation guidelines and joint business between regions as stated in paragraph (1) shall be regulated in a Regulation from a minister implementing internal government affairs.

Second Section
Partnership
Article 59

(1) Regency/City Government individually or collectively may partner with waste management business in implementing specific waste management.

(2) Partnership as stated in paragraph (1) shall be stated in the form of agreement between regency/city government and said business entity.

(3) Procedure of partnership as stated in paragraph (2) shall be conducted in accordance with laws and regulations.

CHAPTER V
FUNDING
Article 60

Funding on the implementation of this Government Regulation shall be borne by:

a. State Budget;

b. Regional Budget; and

c. Other valid and binding sources

CHAPTER VI
GUIDELINES AND SUPERVISION
First Section
Guidance
Article 61

(1) The Minister shall coordinate guidelines to the regency/city government in specific waste management.

(2) Guidelines to the regency/city government in specific waste management as stated in paragraph (1) is conducted by:

a. Providing norm, standard, procedure and criteria;

b. Dissemination of laws and regulations in waste management;

c. Education and training in specific waste management;

d. Facilitating settlement of dispute between regions;

e. Facilitating cooperation of regency/city government, business and community in implementing facilities and infrastructure of specific waste management; and/or

f. Facilitating technical support of development for specific waste management facilities.

(3) The Governor shall guide regency/city government in specific waste management by:

a. Technical support;

b. Technical guidance;

c. Dissemination of regional regulations in specific waste management;

d. Education and training in specific waste management; and/or

e. Facilitating settlement of dispute regarding specific waste management between regencies/cities.

Article 62

Minister, governor, and/or regent/mayor may provide guidance for community in specific waste management, by:

a. Technical support;

b. Technical guidance;

c. Dissemination of regulations and guidelines in specific waste management;

d. Education and training in specific waste management; and/or

Second Section

Monitoring

Article 63

(1) Government and Regency/City Government shall monitor the implementation of specific waste management in accordance with its authority.

(2) Monitoring as stated in paragraph (1) includes:

a. Reducing:
    1. Limiting;
    2. Recycling; and/or
    3. Reusing.
b. Handling:
    1. Sorting;
    2. Collecting;
c. Transporting;
d. Processing; and/or
e. Final processing.

Article 64

(1) Monitoring the policy of specific waste management by regency/city government shall be conducted by the Government.

(2) Monitoring the implementation of specific waste management in the regency/city level shall be conducted by the Governor.

Article 65

(1) Monitoring the implementation of specific waste management conducted by waste management shall be done by regency/city government, both individually or collectively.

(2) Monitoring that is conducted by regency/city Government as stated in paragraph (1) shall be based on the norm, standard, procedure and criteria of monitoring as stipulated by the Government.

(3) Further provision regarding monitoring of specific waste management as stated in paragraph (1) shall be regulated in a regional regulation.

CHAPTER VII
CLOSING PROVISION

Article 66

(1) The Minister Regulation as mandated by this Government Regulation shall be completed at least 2 (two) years upon the enactment of this Government Regulation.

(2) The Regional Regulations as mandated by this Government Regulation shall be completed at least 3 (three) years upon the enactment of this Government Regulation.

Article 67

At the time of the enactment of this Government Regulation, all regulations related with Government Regulation concerning specific waste management and its applicable implementing regulations shall remain to be valid provided that such regulation does not contradict any provision in this Government Regulation.

Article 68

This Government Regulation shall come into force upon the date of its enactment.

In order to have everyone aware of this regulation, commanding the promulgation of this law by placing a disposition in the Statute Book of the Republic of Indonesia.

Stipulated in Jakarta

On 2016

THE PRESIDENT OF THE REPUBLIC IN INDONESIA

JOKO WIDODO

Enacted in Jakarta

On 2016

THE MINISTER OF LAW AND HUMAN RIGHTS

YASONNA H. LAOLY

STATUTE BOOK OF THE REPUBLIC OF INDONESIA

YEAR 2016 NUMBER ....

Attachment 2. Presidential Regulation Concerning National Policy and Strategy of Waste Management (draft)

DRAFT OF THE PRESIDENTIAL REGULATION OF THE REPUBLIC OF INDONESIA
NUMBER YEAR 2016
CONCERNING
NATIONAL POLICY AND STRATEGY OF WASTE MANAGEMENT
WITH BLESSINGS OF GOD THE ALMIGHTY
THE PRESIDENT OF THE REPUBLIC OF INDONESIA,

Considering: Whereas in order to implement Article 6 of Government Regulation Number 81 Year 2012 concerning Household Waste and Household-like Waste Management, it needs to establish a Presidential Regulation concerning National Policy and Strategy of Waste Management;

In view of:

1. Law Number 25 Year 2004 concerning National Development Planning System (Statute Book of the Republic of Indonesia Year 2004 Number 104, Supplement to the Statute Book of the Republic of Indonesia Number 4421);
2. Law Number 17 Year 2007 concerning National Development Long Term Plan 2005-2025 (Statute Book of the Republic of Indonesia Year 2007 Number 33, Supplement to the Statute Book of the Republic of Indonesia Number 4700);
3. Law Number 18 Year 2008 concerning Waste Management (Statute Book of the Republic of Indonesia Year 2008 Number 69, Supplement to the Statute Book of the Republic of Indonesia Number 4851);
4. Law Number 32 Year 2009 concerning Environment Protection and Management (Statute Book of the Republic of Indonesia Year 2009 Number 140, Supplement to the Statute Book of the Republic of Indonesia Number 5059);
5. Law Number 23 Year 2014 concerning Local Government (Statute Book of the Republic of Indonesia

Year 2014 Number 244, Supplement to the Statute Book of the Republic of Indonesia Number 5587)

6. Government Regulation Number 81 Year 2012 concerning Household Waste and Household-like Waste Management (Statute Book of the Republic of Indonesia Year 2012 Number 188, Supplement to the Statute Book of the Republic of Indonesia Number 5347);

7. Presidential Regulation Number 16 Year 2015 concerning the Ministry of Environment and Forestry (Statute Book of the Republic of Indonesia Year 2015 Number 17);

8. Presidential Regulation Number 38 Year 2015 concerning Government Cooperation with Business Entity in Providing Infrastructure (Statute Book of the Republic of Indonesia Year 2015 Number 62);

HAVE DECIDED:

To enact: PRESIDENTIAL REGULATION CONCERNING NATIONAL POLICY AND STRATEGY OF WASTE MANAGEMENT

CHAPTER I
GENERAL PROVISION
Article 1

In this Presidential Regulation, the following terms shall have the meaning as assigned to them:

1. Waste is the residue of human's daily activities and/or natural process in solid form.
2. Household waste is the waste resulting from daily activities in the household, not including feces and specific waste.
3. Household-like waste is the household waste resulting from commercial area, industrial area, special area, social facilities, public facilities, and/or other facilities.
4. Waste management is a systematic, thorough and sustainable activity, including waste reducing and handling.
5. Minister is the Minister implementing government's business in environment management.

6. Minister / Head of Government Agency non Ministry is the head of Ministry and/or Agency whose scope, duties and responsibilities are in accordance with regulations.

7. Central Government is the President of the Republic of Indonesia holding the authority to govern the Republic of Indonesia, assisted by Vice President and Ministers as stated in the Indonesian Constitution Year 1945.

8. Local Government is the local leader as the implementer of Local Government, heading the implementation of government business which becomes the authority of autonomy region.

9. National Policy and Strategy of Waste Management, hereinafter referred to as Jakstranas, is the policy direction and strategy in the national level waste management, aiming to realize a national waste management system that is integrated and sustainable.

10. Regional Policy and Strategy of Waste Management, hereinafter referred to as Jakstrada, is the policy direction and strategy in the regional level waste management, aiming to realize a regional waste management system that is integrated and sustainable.

CHAPTER II
PURPOSE
Article 2

This Presidential Regulation intends to provide policy direction and program of waste management to:

a. Ministry and Government Agency non Ministry in stipulating sectoral policy that is related with Waste Management; and

b. Provincial Government, and Regency/City Government in stipulating provincial, regency/city level Jakstrada.

CHAPTER III
NATIONAL POLICY AND STRATEGY OF WASTE MANAGEMENT
First Section
General Provision
Article 3

(1) Jakstranas in this Presidential Regulation contains the policy direction, strategy, program and target of household waste and household-like waste management.

(2) Jakstranas as stated in paragraph (1) shall be implemented in the period of 2016-2015.

Second Section
Policy Direction

Article 4

(1) Policy Direction as stated in Article 3 shall include performance improvement in:

a. Waste reduction; and
b. Waste handling.

(2) Waste reduction as stated in paragraph (1) point a shall be executed by:

a. Reducing waste generation;
b. Recycling waste; and/or
c. Reusing waste.

(3) Waste handling as stated in paragraph (1) point b shall be executed by:

a. Sorting;
b. Collecting;
c. Transporting;
d. Processing; and
e. Final processing of waste.

Third Section
Strategy and Target

Article 5

(1) Policy direction of waste reduction as stated in Article 4 paragraph (1) point a shall be conducted by the following strategies:

a. Drafting and/or improvement of Norm, Standard, Procedure and Criteria (NSPK);
b. Strengthening coordination and collaboration between Ministries/Agencies and between the Government and Local Government;
c. Application and development of incentive and disincentive system;
d. Strengthening commitment of executive and legislative agencies in the central and local level in providing budget;

e. Strengthening business commitment by applying producer's obligation;

f. Improving capacity of leadership, institution and human resources;

g. Creating information system;

h. Improving people's involvement by communication, information and education (KIE).

(2) Direction of waste handling policy as stated in Article 4 paragraph (1) point b shall be conducted by the following strategies:

a. Strengthening coordination and collaboration between Ministries/Agencies and between the Government and Local Government;

b. Application and development of investment scheme, operational and maintenance fund;

c. Improvement of legal enforcement;

d. Improvement of Norm, Standard, Procedure and Criteria (NSPK);

e. Strengthening commitment of executive and legislative agencies in the central and local level in providing budget;

f. Strengthening business commitment by partnering with the government;

g. Improving capacity of leadership, institution and human resources;

h. Creating information system;

i. Application of high-level technology that is environmental friendly and effective;

j. Application and development of incentive and disincentive system; and

k. Improving people's involvement by communication, information and education (KIE)

Article 6

Policy direction as stated in Article 5 shall be improved to achieve the following target:

a. Reducing waste up to 30% (thirty percent) against waste generation in 2025, in the situation where there is no intervention in waste reducing policy; and

b. Handling waste up to 70% (seventy percent) against waste generation in 2025, in the situation where there is no intervention in waste handling policy.

Article 7

Jakstranas as stated in Article 3 to 6 shall be executed in a program elaborated in the Appendix, which forms an integral part of this Presidential Regulation.

Article 8

(1) Jakstranas as stated in Article 7 shall be the guideline for:

a. Drafting and/or evaluation of National and Regional Long Term Development Plan;

b. Drafting and/or evaluation of National and Regional Middle Term Development Plan;

c. Drafting Provincial level Jakstrada; and

d. Drafting Regency/City level Jakstrada.

(2) Drafting and/or evaluation as stated in paragraph (1) point a and point b shall be conducted in accordance with National Development Planning System.

(3) Drafting policy and strategy of waste management as stated in paragraph (1) point c and point d shall be conducted by assistance with the Minister.

CHAPTER IV

MONITORING AND EVALUATION

First Section

Monitoring

Article 9

(1) On the implementation of Jakstranas and Jakstrada, Waste Management shall be monitored to obtain information regarding achievement of reducing and handling of waste.

(2) Achieving waste reducing and handling as stated in paragraph (1) shall be measured by the following indicator:

a. The amount of waste generation reduced per capita;

b. The amount of sorted, recycled, and reused waste in the waste sources;

c. The amount of waste reduced to the final landfills (TPA);

d. The amount of waste processed to be raw materials;

e. The amount of waste reused to be energy sources; and/or

f. The amount of final waste processed in the final processing location.

Article 10

The result of monitoring as stated in Article 9 shall be drafted in the form of implementation report of Jakstranas and Jakstrada of Waste Handling.

Second Section

Evaluation

Article 11

(1) On the implementation report of Jakstranas and Jakstrada of Waste Handling, evaluation by the Minister shall be conducted by:

a. Comparing the achievement with planning target; and

b. Implementation obstacles.

(2) Evaluation result shall be conducted as the basis of improvement for Jakstranas and Jakstrada of Waste Handling.

CHAPTER V

DUTIES OF CENTRAL GOVERNMENT AND LOCAL GOVERNMENT

Article 12

(1) The Minister has the following duties:

a. Implementing and coordinating the Jakstranas;

b. Monitoring the implementation of Jakstranas;

c. Coordinating the evaluation implementation of Jakstranas; and

d. Drafting and reporting the implementation of Jakstranas to the President, at the least 1 (once) in 1 (one) year.

(2) Evaluation as stated in paragraph (1) point c shall be conducted by involving the related ministry and institution.

Article 13

(1) The Minister/Head of Agency non Ministry has the following duties:

a. Implementing Jakstranas in accordance with the duties and authorities;

b. Monitoring the implementation of Jakstranas; and

c. Drafting and reporting the implementation of Jakstranas in accordance with its duties and authority to the Minister at least 1 (once) in 1 (one) year.

(2) Implementation of Jakstranas as stated in paragraph (1) point a shall be further regulated by the minister/head of government agency non ministry in accordance with its duties and authority.

Article 14

(1) The Governor has the following duties:

a. Coordinating the drafting and implementation of Jakstrada in the provincial level;

b. Monitoring the implementation of Jakstrada in the provincial level;

c. Coordinating the evaluation of Jakstrada in the provincial level;

d. Drafting and reporting the implementation of Jakstrada to the Minister at least 1 (once) in 1 (one) year; and

e. Provide assistance to the regent/mayor in drafting Jakstrada in the regency/city level.

(2) Monitoring as stated in paragraph (1) point b shall be coordinated by the minister in charge internal government affairs.

(3) Evaluation as stated in paragraph (1) point c shall be conducted by involving regional work unit whose duties and authority is related with waste management.

Article 15

(1) Regent/mayor in accordance with its authority, has the following duties:

a. Drafting and implementing Jakstrada in the regency/city level;

b. Monitoring the implementation of Jakstrada in the regency/city level; and

c. Drafting and reporting the implementation of Jakstrada to the governor at least 1 (once) in 1 (one) year.

(2) Regent/mayor is in charge in land procurement to build facilities and infrastructure of waste management in accordance with laws and regulations.

CHAPTER VI
FINANCING

Article 16

Financing the implementation of Jakstranas and Jakstrada of waste handling shall be taken from State Budget (APBN), Regional Budget and other sources of fund that is authorized in accordance with laws and regulations.

CHAPTER VII
CLOSING PROVISION

Article 17

This Presidential Regulation shall come into force upon the date of its enactment.

In order to have everyone aware of this regulation, commanding the promulgation of this Presidential Regulation with a disposition in the Statute Book of the Republic of Indonesia.

Enacted in Jakarta,
On

The PRESIDENT OF THE REPUBLIC OF INDONESIA

JOKO WIDODO

Attachment 3. Ministerial Regulation Concerning Leachate Quality Standards for TPA

MINISTER OF ENVIRONMENT AND FORESTRY

OF THE REPUBLIC OF INDONESIA

REGULATION OF THE MINISTER OF ENVIRONMENT AND FORESTRY

OF THE REPUBLIC OF INDONESIA

NUMBER P.59/Menlhk/Setjen/Kum.1/7/2016

CONCERNING

LEACHATE QUALITY STANDARDS FOR

FINAL WASTE PROCESSING SITE BUSINESSES AND/OR ACTIVITIES

BY THE BLESSING OF THE ONE AND ONLY ALMIGHTY GOD

MINISTER OF ENVIRONMENT AND FORESTRY

Considering : a. that in order to implement the provisions of Article 20 paragraph (2) letter b

of Law No. 32 of 2009 concerning Environmental Protection and Management, the Minister needs to stipulate the waste water quality standards;

b. that the Final Waste Processing Site produces leachate which could potentially contaminate the environment, therefore it is necessary to perform leachate treatment before being discharged into the environment;

c. that based on such considerations as referred to in letter a and letter b, it is necessary to stipulate a Regulation of the Minister of Environment and Forestry concerning Leachate Quality Standards for Final Waste Processing Site Businesses and / or Activities;

In view of : 1. Law Number 32 Year 2009 regarding Environmental Protection and Management

(State Gazette of Republic of Indonesia Year 2009 Number 140, Supplement to State Gazette of the Republic of Indonesia Number 5059);

2. Law Number 18 Year 2008 regarding Waste Management (State Gazette of the Republic of Indonesia Year 2008 Number 69, Supplement to the State Gazette of the Republic of Indonesia Number 4851);

3. Presidential Regulation Number 16 Year 2015 regarding Ministry of Environmental and Forestry (State Gazette of the Republic of Indonesia Year 2015 Number 17);

4. Regulation of the Minister of Environmental and Forestry Number 18 Year 2015 regarding Organization and Work Procedure of Ministry of Environment and Forestry (State

Gazette of the Republic of Indonesia Year 2015 Number 713);

Article 1

In this Ministerial Regulation, the following terms shall have the following meanings:

1. Leachate shall mean the liquid resulting from the entry of external water into the trash heap that dissolves and flushes any dissolved materials, including organic matters produced from a biological decomposition process.

2. Final waste processing site (*tempat pemrosesan akhir sampah*) hereinafter abbreviated as TPA shall mean a site to process and return waste into the environment in such a manner that it is safe for humans and the environment.

3. Leachate quality standard shall mean the limit or level

of pollutant elements and / or the amount of pollutant elements that are tolerable in the leachate to be discharged or released into the water source from the TPA activities.

4. Environmental permit shall mean a license granted to any person running a Business and / or Activity subject to mandatory Environmental Impact Assessment (Amdal) or Environmental Management Efforts (UKL) – Environmental Monitoring Efforts Amdal (UPL) in the framework of environmental protection and management as a prerequisite for obtaining a Business and / or Activity permit.

5. Environmental Impact Assessment (*Analisis Mengenai Dampak Lingkungan Hidup*) hereinafter referred to as Amdal shall mean an assessment on the significant impacts of a Business and / or Activity planned on the environment required for the decision making process on the implementation of such Business and / or Activity.

6. Environmental Management Efforts (*Upaya Pengelolaan Lingkungan Hidup*) and Environmental Monitoring Efforts (*Upaya Pemantauan Lingkungan Hidup*), hereinafter referred to as UKL-UPL shall mean a management and monitoring of a Business and / or Activity that does not have any important impacts on the environment required for the decision making process on the implementation of such Business and / or Activity.

7. Environmental documents shall mean AMDAL or UKL – UPL documents.

8. Water pollution load capacity shall mean the ability of water at a water source to receive pollution load inputs without causing water pollution.

9. Water pollution load allocation shall mean the amount of pollutant load that is still allowed to be disposed of or the amount of pollutant load to be discharged in an administrative area and / or Watershed from each pollutant source.

10. Water source shall mean the water reservoir located above and below ground, including in this sense, aquifers, springs, rivers, swamps, lakes, reservoirs, and estuaries.

11. Highest level shall mean the highest limit of a pollutant element in water waste allowed to be discharged into water sources.

12. Abnormal event shall mean a condition in which the process of final waste and / or leachate treatment plant does not operate properly.

13. Responsible Person of TPA Business and / or Activity shall mean a person responsible in TPA management.

14. The Minister shall mean a minister who holds government affairs in the field of environmental protection and management.

Article 2

This Ministerial Regulation aims to provide a reference regarding leachate quality standards to:

a. the governor in determining leachate quality standards;

b. the environmental permitting officer in issuing an environmental permit; and

c. the Responsible Person of TPA Business and / or Activity in planning leachate management and preparing environmental documents.

Article 3

(1) Leachate quality standards shall at any time not be exceeded.

(2) Such leachate quality standards as referred to in paragraph (1) shall be as contained in Appendix that shall constitute an integral and inseparable part of this Ministerial

Regulation.

Article 4

(1) The governor may determine more stringent regional leachate quality standards.

(2) In determining such more stringent leachate quality standards as referred to in paragraph (1), the governor shall perform scientific studies that shall at least contain:

a. the availability of the best technology;

b. environmental characteristics;

c. waste characteristics; and

d. new leachate quality standards recommendation.

(3) Environmental characteristics as referred to in paragraph (2) letter b shall include among others:

a. climatology;

b. land and geohydrology; and

c.hydrology.

Article 5

(1) Leachate quality standards determined by the governor as referred to in Article 4 shall be used by the environmental permitting officer in issuing an environmental permit, unless other leachate quality standards that are more stringent are obtained through the results of environmental document review.

(2) In the event that the governor has not determined the more stringent leachate quality standards, the environmental permitting officer shall use the leachate quality standards stipulated in this Ministerial Regulation.

Article 6

(1) The environmental permitting officer shall, in determining quality standards in an environmental permit,

consider :

a. any environmental document that examines the impacts of leachate discharge;

b. water pollution load capacity and water pollution load allocation as stipulated by the Minister;

c. the characteristics of the water waste discharged;

d. waste characteristics and waste management process; and

e. regional leachate quality standards.

(2) Such environmental document that examines the impacts of leachate discharge as referred to in paragraph (1) letter a shall at least contain :

a. leachate source and its estimated amount;

b. leachate characteristics;

c. leachate management technology;

d. calculation of water pollution load capacity in the receiving media;

e. environmental baseline study;

f. environmental impact of leachate; and

g.the impact control effects and monitoring plan.

(3) In the event that water pollution load capacity and water pollution load allocation as referred to in paragraph (1) letter b has not been determined, the environmental permitting officer shall consider the calculation of water pollution load capacity in the receiving media.

(4) In the event that water pollution load capacity and water pollution load allocation as referred to in paragraph (1) letter b has not been determined, the environmental permitting officer shall consider the calculation of water pollution load capacity in the receiving media as referred to in paragraph (2) letter d.

(5) The environmental permitting officer shall state the leachate quality standards and the waste management technical requirements in the relevant environmental permit.

Article 7

(1) Any TPA Business and / or Activity shall obtain an environmental permit.

(2) In the case that such environmental permit as referred to in paragraph (1) has not stated the provisions on leachate management, the relevant environmental permit shall be amended.

(3) Such leachate management as referred to in paragraph (2) shall be conducted by the Responsible Person of TPA Business / Activity with the following provisions:

a. ensuring that all leachates produced in TPA will go to the leachate treatment plant;

b. using such leachate treatment plant and the leachate drainage equipped with waterproofing system so there is no seepage of leachate into the environment;

c. separating between the leachate collection channel and the rain water channel;

d.performing leachate treatment in such a manner that the quality of leachate discharged to water source is not exceeding the leachate quality standards;

e.avoiding the thinning of leachate into the leachate effluent stream;

f.setting the organizing points for leachate sampling and the organizing coordinates;

g.installing a leachate discharge or flow rate measuring device at the organizing points;

h.constructing and installing a number of monitoring wells at the TPA upstream and downstream in accordance with the applicable legislative regulations;

i.making records of daily waste stockpiling;

j.monitoring daily discharge and pH;

k.checking the leachate parameter level as contained in the

Appendix to this Ministerial Regulation on a regular manner at least 1 (one) time in 1 (one) month to an accredited and / or registered laboratory;

l.monitoring the quality of groundwater every 3 (three) months through test sampling at the monitoring wells / test wells with such parameters in accordance with the Appendix to this Ministerial Regulation;

m.having the Standard Operating Procedures for waste treatment and emergency system;

n.submitting reports on :

1. leachate daily discharge and pH;

2. recording of the processed daily waste;

3. climatological data that includes precipitation, and temperature;

4. the results of laboratory analysis on groundwater as referred to in letter l; and

5. the results of laboratory analysis on leachate

(including the sampling coordinates) as referred to in letter k,

at least 1 (one) time in 3 (three) months to the regent / mayor with copies sent to the governor, the Minister, and any relevant agencies according to their respective authority; and

o. reporting and submitting the pollution preventive activities due to any abnormal conditions to the regent / mayor, with copies sent to the governor and the Minister no later than 24 (twenty four) hours.

Article 8

(1) The regent / mayor shall perform:

a. inventory of the amount of waste generation in the administrative area according to its authority;

b. inventory of the type and amount of waste processed at the TPA;

c. inventory of the waste processing and leachate treatment technology; and

d. supervision of the waste processing, leachate treatment and leachate quality standards fulfillment.

(2) The results of TPA inventory and supervision of leachate quality standards compliance as referred to in paragraph (1) shall be submitted to the governor with a copy sent to the Minister.

Article 9

The Minister and / or the governor shall foster and supervise the regent / mayor with respect to the implementation of leachate quality standards licensing and application.

Article 10

This regulation shall take effect as of the date of enactment.

To promulgate this regulation to the public, it is hereby ordered to announce this Regulation of Minister by placing it in the State Gazette of the Republic of Indonesia.

Stipulated in Jakarta

On the date of July 12, 2016

MINISTER OF ENVIRONMENT AND FORESTRY OF THE

REPUBLIC OF INDONESIA

[signed]

SITI NURBAYA

Enacted in Jakarta

On the date of July 19, 2016

DIRECTOR GENERAL OF

LEGISLATIVE REGULATIONS

MINISTRY OF LAW AND HUMAN RIGHTS OF

THE REPUBLIC OF INDONESIA,

signed,

WIDODO EKATJAHJANA

STATE GAZETTE OF THE REPUBLIC OF INDONESIA YEAR 2016 NUMBER 1050

This Copy is in accordance with the original

HEAD OF LEGAL BUREAU

[*signed*]

KRISNA RYA

ATTACHMENT I

REGULATION OF THE MINISTER OF ENVIRONMENT AND FORESTRY

OF THE REPUBLIC OF INDONESIA

NUMBER P.59/Menlhk/Setjen/Kum.1/7/2016

CONCERNING

LEACHATE QUALITY STANDARDS FOR

FINAL WASTE PROCESSING SITE BUSINESSES AND/OR ACTIVITIES

LEACHATE QUALITY STANDARDS

Parameter	Highest Standard	
	Value	Unit
pH	6-9	-
BOD	150	mg/L
COD	300	mg/L
TSS	100	mg/L
N Total	60	mg/L
Mercury	0.005	mg/L
Cadmium	0.1	mg/L

This Copy is in accordance with the original

MINISTER OF ENVIRONMENT AND FORESTRY

OF THE REPUBLIC OF INDONESIA

HEAD OF LEGAL BUREAU

[signed]

[*signed*]

SITI NURBAYA

KRISNA RYA

ATTACHMENT II

REGULATION OF THE MINISTER OF ENVIRONMENT AND FORESTRY

OF THE REPUBLIC OF INDONESIA

NUMBER P.59/Menlhk/Setjen/Kum.1/7/2016

CONCERNING

LEACHATE QUALITY STANDARDS FOR

FINAL WASTE PROCESSING SITE BUSINESSES AND/OR ACTIVITIES

QUALITY PARAMETERS OF GROUNDWATER MONITORED

AT THE MONITORING WELLS/TEST WELLS

NO		PARAMETER	UNIT
A		PHYSICAL	
	1	Odour	-
	2	Total Dissolved Solids (TDS)	mg/L
	3	Turbidity	NTU Scale
	4	Taste	-
	5	Temperature	^{O}C
	6	Colour	TCU Scale
B		CHEMICAL	

NO		PARAMETER	UNIT
	a	Organic Chemistry	
		Mercury	mg/L
		Aluminium	mg/L
		Arsenic	mg/L
		Barium	mg/L
		Iron	mg/L
		Fluoride	mg/L
		Cadmium	mg/L
		Hardness ($CaCO_3$)	mg/L
		Chloride	mg/L
		6 Chromium Valence Electrons	mg/L
		Manganese	mg/L
		Sodium	mg/L
		Nitrate, as N	mg/L
		Nitrite, as N	mg/L
		Silver	mg/L
		Ph	
		Selenium	mg/L
		Zinc	mg/L
		Cyanide	mg/L
		Sulphate	mg/L
		Sulphide as H_2S	mg/L
		Copper	mg/L

NO		PARAMETER	UNIT
		Lead	mg/L
	b	Microbiology	
		Fecal Coliform	Amount /100ml
		Total Coliform	Amount /100ml

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HEAD OF LEGAL BUREAU

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KRISNA RYA

MINISTER OF ENVIRONMENT AND FORESTRY OF THE REPUBLIC OF INDONESIA

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SITI NURBAYA

２． Pilot Project Report

The Project for Capacity Development of Central and Local Governments for 3R and Solid Waste Management in The Republic of Indonesia

Pilot Project Report
Palembang City

Contents

1． Outline of the Pilot Project

1． 1　Condition of the Pilot Project Area before Implementation

Palembang commenced a pilot project at Alang Alang Lebar (hereafter, AAL) from June 2015, and then newly expanded the pilot project into the two areas of Sematang Borang (Srimulya administrative urban community) and Sukarami (Sukodadi administrative urban community). The locations of the pilot project areas and related facilities are shown in the following figure.

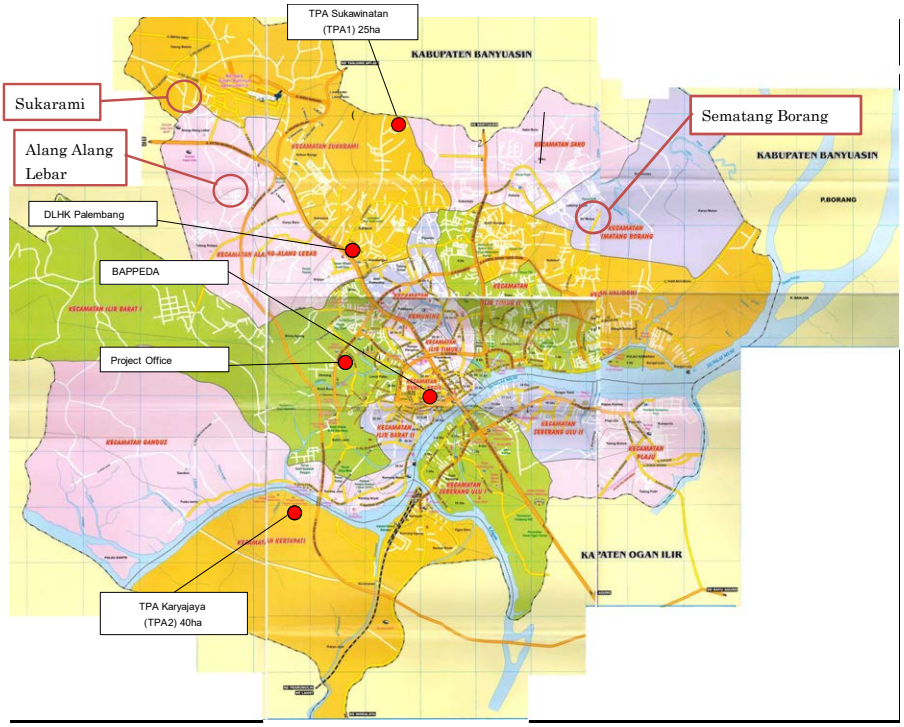


Figure 1　PP Area and Related Facilities

The AAL PP is targeted at 16RT, with a target population of 8,210 (1,642 households; calculated at 5 persons per household). The waste collection and transport system prior to implementation of the PP is shown in the following figure.

Prior to commencement of the PP, the situation in AAL was that there was an existing temporary dumping station (TPS) at one location within the administrative urban community and one unofficial waste transshipment location (primary collector→DKK collection vehicle), but each was in an unsanitary condition. In the PP area, primary collection was carried out by private individuals, and there were seven privately operated “Kaisers” (motorized three-wheeled trucks) that carried out primary collection individually. The residents either commissioned the primary collector (PC), or brought the waste by themselves to the TPS. In the interview survey carried out at that time, it was found that approximately 60% of the residents contracted with the PC to transport the waste from their home to the TPS. Within the administrative urban communities, there were no organized recycling activities, but recyclables were recovered by waste pickers or the primary collectors, who sold them to traders.

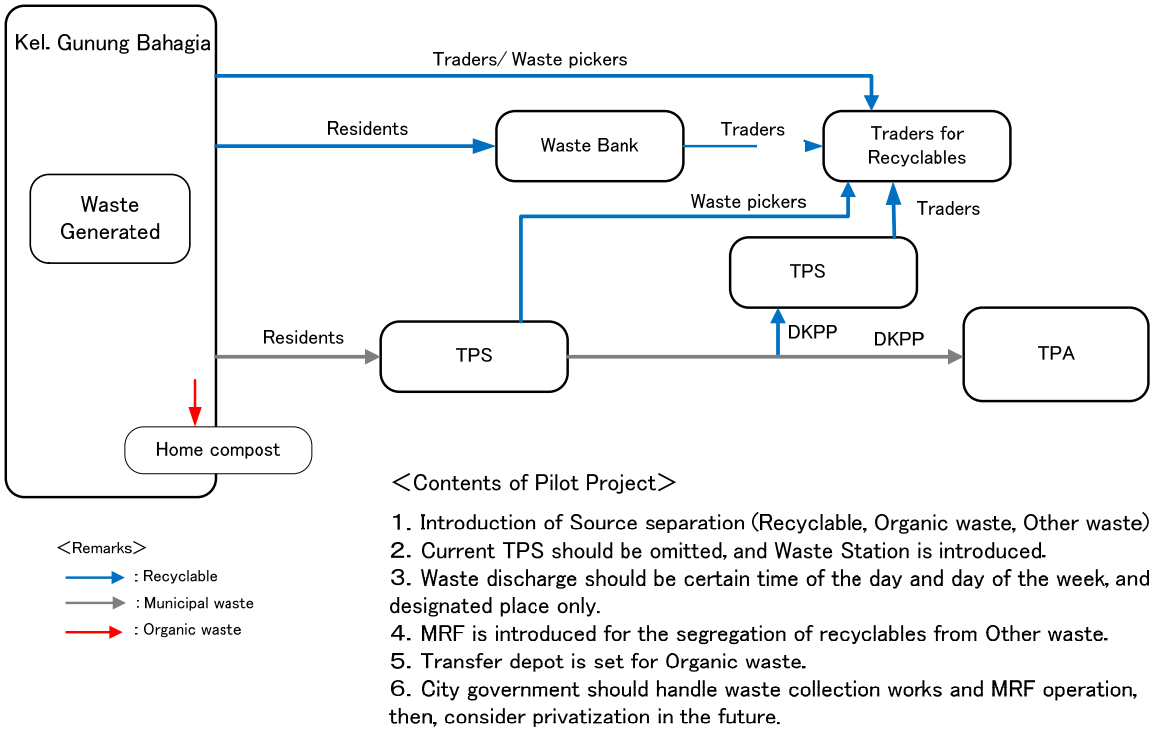


Figure 2　Waste Transfer System before Implementation of PP

1．2　Action Policy for the Pilot Project.

The action policy for the PP is as follows.

[Action policy for pilot project.]

・Residents carry out segregation at home into three categories of "recyclables", "organic waste" and "other waste" by distributing designated waste bags.

・The community manages Waste Bank and TPS-3R as the management entity, and promotes recyclables collection and recycling of organic waste.

・In Waste Bank, recyclables are collected by circulating the area using own Kaiser (Circulate Collection System (open-air weighing)).

・Under the instruction of the project team, activities of public awareness raising is conducted by the Environmental Cadre and KSM.

Through the above activities, the waste collection and transport system aimed for after the implementation of the PP is shown in the following figure.

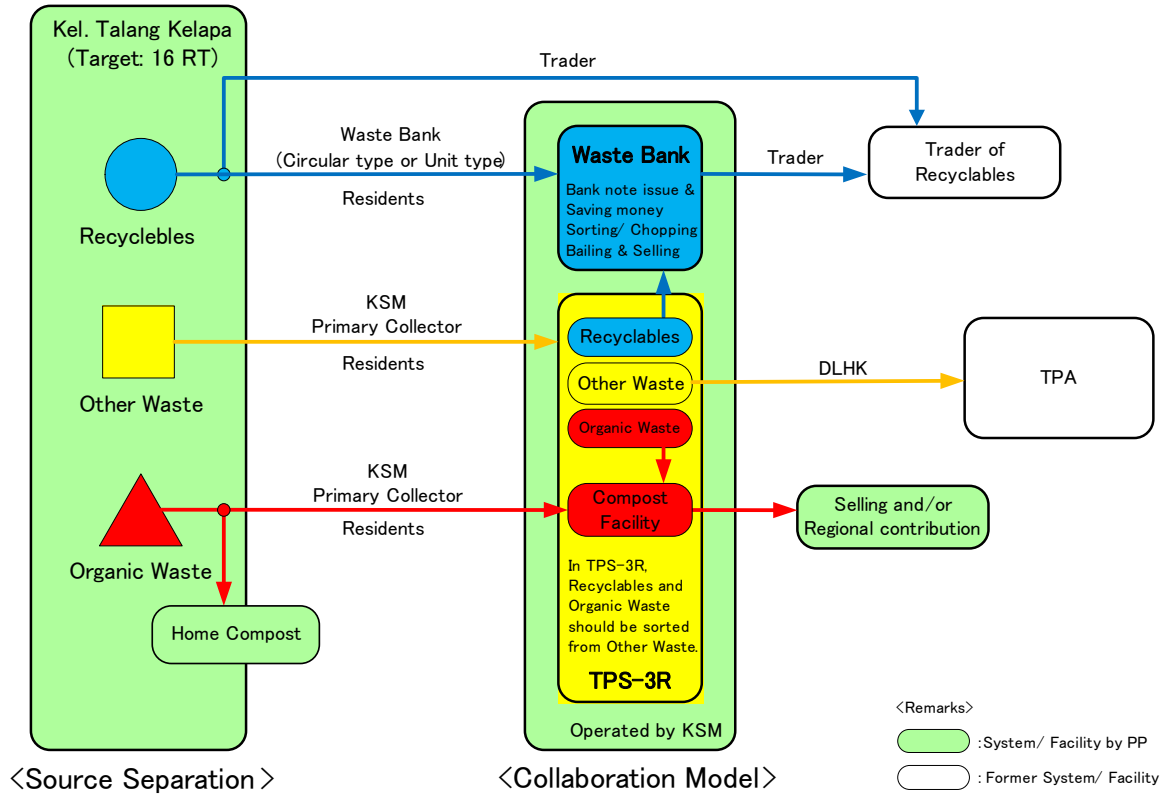


Figure 3　Waste Transfer System after Implementation of PP

The PP area is shown below.

Figure 4　PP area of Alang-Alang Lebar（Talang Kelapa District）

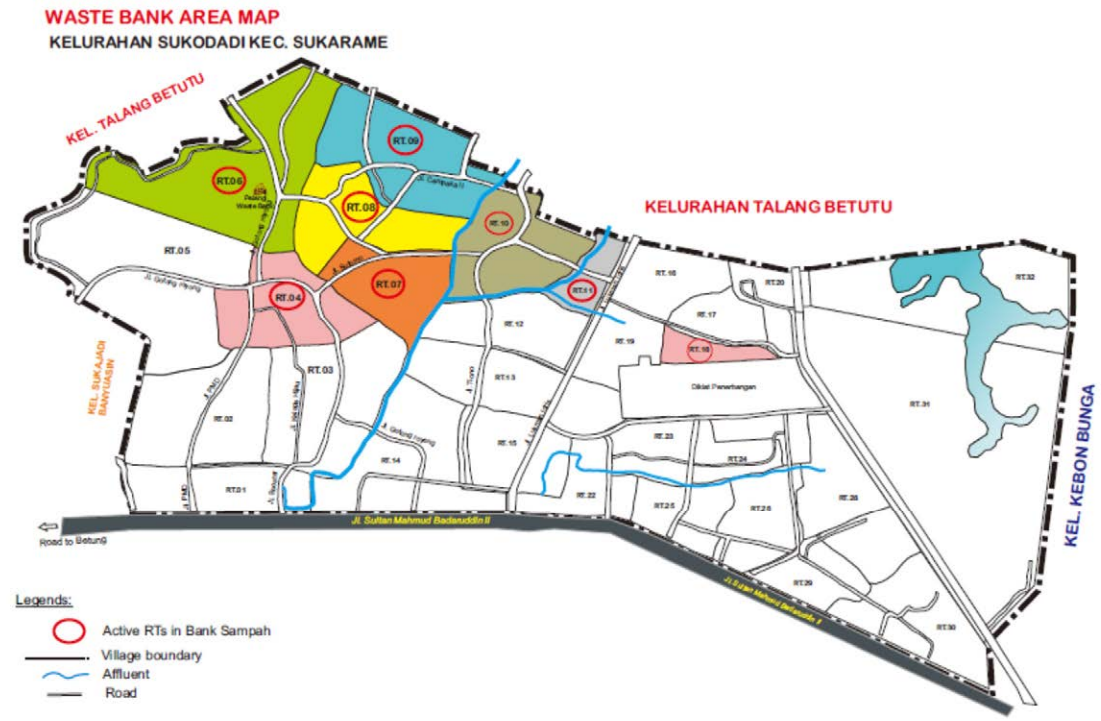


Figure 5　PP area of Sukarami（Sukodadi District）

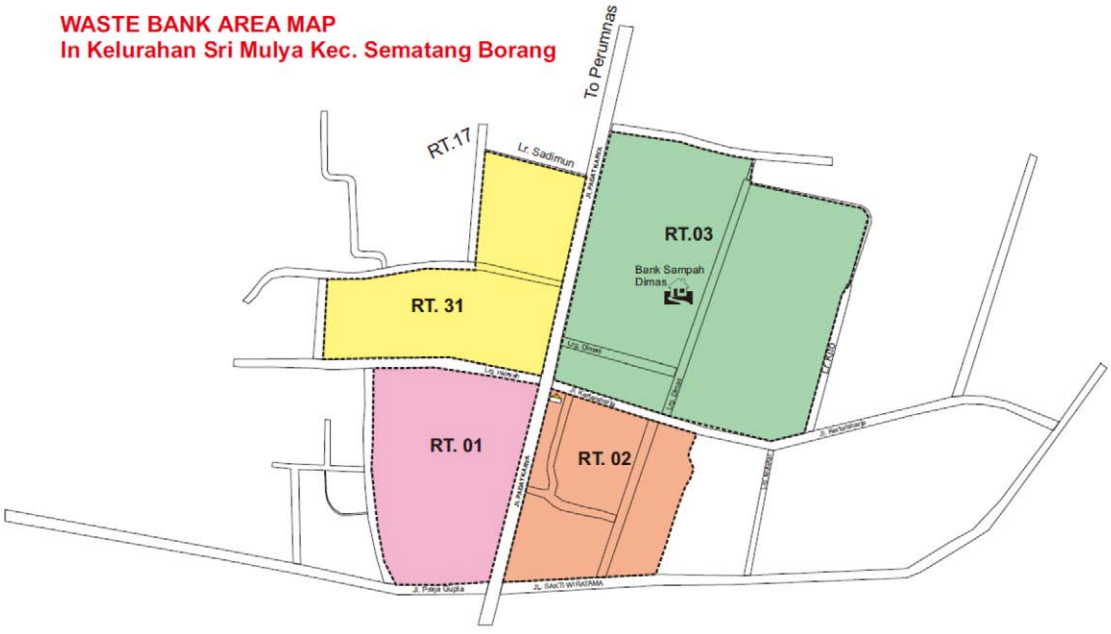


Figure 6　PP area of Sematang Borang（Srimulya District）

２．Pilot Project Activity Record

The main activities in each PP area are shown below.

２．１　Alang-Alang Lebar（Talang Kelapa District）

The main activities carried out at AAL are as follows:

[Main activity record]

- KSM was organized.
- Through the Environmental Cadre and KSM, raising awareness to residents (to separate waste into three types of organic waste, recyclables and other waste) was conducted. This activity is called "Public Awareness Patrol." The Environmental Cadre selected from the residents visits the target districts from door to door to check the status of source separation, to explain the necessity of separating the sources, and instruct the method of source separation.
- Waste Bank (building for storage) was established in the site of TPS-3R (The BLH budget).
- Machinery and equipment necessary for activities of primary collection and Waste Bank (Kaiser, container, passbook of Waste Bank and banner for advertisement) were provided.
- A bag for organic waste and other waste was distributed to residents.
- A bag for recyclables was distributed to Waste Bank customer.
- To promote home compost, compost container for Takakura method was distributed. (The BLH budget)
- Crushing machine for organic waste and plastic were installed.
- Primary collection and Collection of Collection Fee by KSM; Primary collection was conducted by KSM. Also, Collection Fee for primary collection was collected from residents by KSM (there was a reward system to the residents who conduct source separation).
- Sorting organic waste and recyclables by KSM: Organic waste and recyclables were sorted out from primary collected waste at TPS-3R. The recyclables were sold together with those collected at Waste Bank.
- Composting by KSM: In TPS-3R, compost was made from organic waste collected and sorted by KSM, and sold it.

２．２　Sukarami（Sukodadi District）

The main activities carried out at Sukarami (Sukodadi District) which is one of the expansion areas are as follows:

[Main activity record]

- Waste Bank (building for storage) was established (The BLH budget).

- Equipment necessary for activity of Waste Bank (passbook of Waste Bank and banner for advertisement) was provided.
- An advice on the operation and management of Waste Bank (checking of activity records, way of bookkeeping etc.) was made.
- The Waste Bank official concerned was invited to Waste Bank in Talang Kelapa and was conducted training.
- Public awareness about Waste Bank was implemented.
- The home compost using non-dedicated container was promoted.

（*Construction site for TPS-3R could not be secured, therefore, mainly activities related to Waste Bank was conducted in this area.）

２．３　Sematang Borang（Srimulya District）

The main activities carried out at Sematang Borang (Srimulya District) which is one of the expansion areas are as follows:

[Main activity record]

- Waste Bank (building for storage) was established (The BLH budget).
- The Waste Bank official concerned was invited to Waste Bank in Talang Kelapa and was conducted training.
- Public awareness about Waste Bank was implemented.
- An advice on the operation and management of Waste Bank (checking of activity records, way of bookkeeping etc.) was made.

（*Construction site for TPS-3R could not be secured, therefore, mainly activities related to Waste Bank was conducted in this area.）

３． Monitoring Results of the Pilot Project

Continuous monitoring was conducted at Waste Bank (SAKURA) and TPS-3R in Alang-Alang Lebar (Talang Kelapa District). The monitoring results of the PP are shown below.

３． １　Waste Reduction Ratio

As part of the PP monitoring, the amount of recyclable valuables and recycling amount of organic waste in Waste Bank and TPS-3R were collected and analyzed data. The trend of waste reduction ratio from February 2016 to May 2017 is shown below.

In addition, waste reduction ratio for the future estimated in consideration of the present situation is as follows.

Table 1　Waste Reduction Ratio Calculation Results（2016.2~2017.5）

Units: tons/week

Item	Target value	2016.2 WB:227 KSM:70 PC:0	2016.6 WB:243 KSM:121 PC:0	2016.12 WB:243 KSM:160 PC:0	2017.5 WB:255 KSM:357 PC:82
(1) Waste amount generated	14.94	14.94	14.94	14.94	14.94
(2) Collection amount of recyclables	0.20	0.26	0.31	0.27	0.41
Collection amount of recyclables by Waste Bank	0.20	0.24	0.28	0.21	0.36
Collection amount of recyclables by TPS-3R	—	0.02	0.03	0.06	0.05
(3) Recycling amount of organic waste	2.81	0.77	0.88	0.83	1.34
TPS-3R	1.93	0.30	0.41	0.36	0.64
Domestic compost	0.88	0.47	0.47	0.47	0.47
PC	—	—	—	—	0.23
(4) Total reduction quantity = (2) + (3)	3.01	1.03	1.19	1.10	1.75
(5) Waste reduction ratio = (4) ÷ (1)	**20.1%**	**6.9%**	**8.0%**	**7.4%**	**11.7%**

Note 1: WB is the number of Waste Bank registrant. KSM is the number of households contracted for collection.
Note 2: Numbers related to PC are calculated figures of households collected by PC.

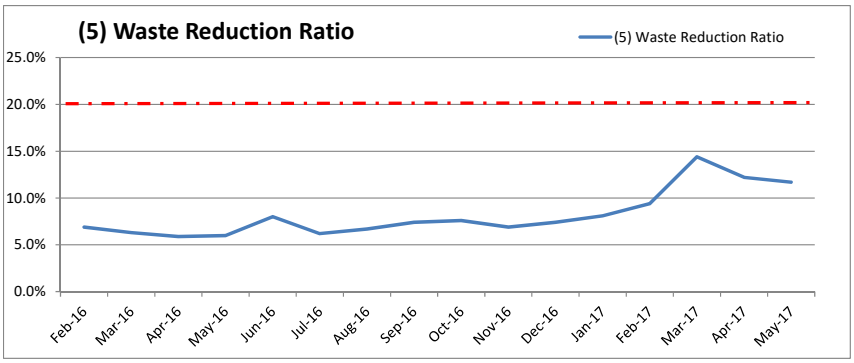


Figure 7　Calculation Results of Waste Reduction Ratio（2016.2~2017.5）

Table 2　Results of Prediction of Waste Reduction Ratio in the Future

Units: tons/week

Item	Target value	Record	Estimated figures	
		2017.5 WB:255 KSM:357 PC:82	2017.8 WB:278 KSM:437 PC:229	2017.11 WB:300 KSM:500 PC:335
(1) Waste amount generated	14.94	14.94	14.94	14.94
(2) Collection amount of recyclables	0.20	0.41	0.46	0.52
Collection amount of recyclables by Waste Bank	0.20	0.36	0.31	0.34
Collection amount of recyclables by TPS-3R	—	0.05	0.15	0.18
(3) Recycling amount of organic waste	2.81	1.34	2.09	2.57
TPS-3R	1.93	0.64	0.97	1.15
Domestic compost	0.88	0.47	0.47	0.47
PC	—	0.23	0.65	0.95
(4) Total reduction quantity = (2) + (3)	3.01	1.75	2.55	3.09
(5) Waste reduction ratio = (4) ÷ (1)	**20.1%**	**11.7%**	**17.1%**	**20.7%**

Note 1: WB is the number of Waste Bank registrant. KSM is the number of households contracted for collection.
Note 2: Numbers related to PC are calculated figures of households collected by PC.

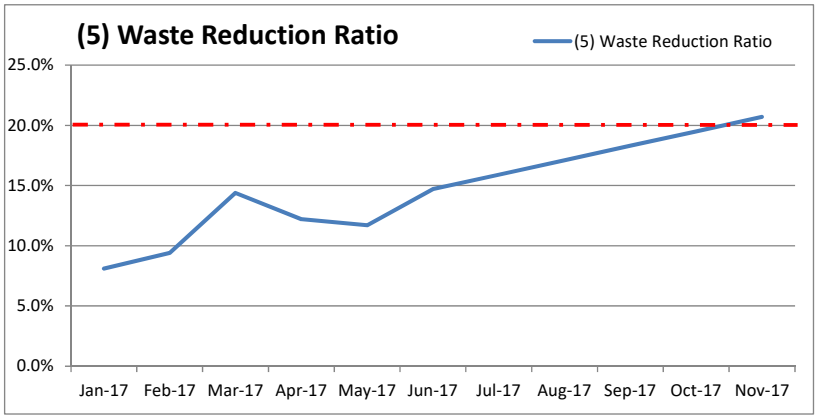


Figure 8　Results of Simulation of Waste Reduction Ratio in the Future

The solicitation activities to residents conducted in February and March 2017 were very effective, and the number of contracted households of TPS-3R increased significantly. As of May 2017, the number of contracted households is 357 households, an increase of 197 households compared with December 2016. In addition, the amount of recyclables recovered has increased steadily, by increasing the number of contracted households of TPS-3R and doing active recycling activities within the PP area. Particularly, in cooperation with the primary collector, purchasing organic waste from the primary collector (PC) has been able to start, that leads to an improvement in waste reduction ratio.

３．２　Financial Situation of TPS-3R and Waste Bank

The financial situation of TPS-3R until May 2017 (as of 2017.5.31) was as follows.

The balance of income and expenditure was a surplus of Rp. 13,494,225. The balance of income and expenditure at January 2017 was a surplus of Rp. 5,981,910. Compared with this, it can be said that the surplus amount is increasing steadily. An increase in the number of contracted households will be the main factor of the surplus increase.

Table 3　Income and Expenditure of TPS-3R (record until May 2017)

Summary

Category	Amount (Rp)
Income	55,219,775
Expenditure	41,725,550
Balance (Income - Expenditure)	**13,494,225**

Income

Category of Income	Amount (Rp)	
Retribution fee	47,615,000	86%
Compost sales	3,245,000	6%
Recyclables and handcraft sales	4,206,775	8%
Others	73,000	0.1%
Selling seeds of plants or plants	80,000	0.1%
Total	55,219,775	100%

Expenditure

Category of Expenditure	Expenditure(Rp)	Monthly expenditure(Rp)	
Allowance for operators	17,768,800	1,184,587	47%
Additional payment for operators	2,218,200	147,880	6%
Fuel	1,806,500	120,433	5%
Maintenance of facility and equipment	2,479,050	165,270	7%
Consumable goods	1,107,500	73,833	3%
Water and electricity	1,315,250	87,683	3%
Refreshment and food	6,516,500	434,433	17%
Retribution to City Government	1,988,000	132,533	5%
Others	2,603,000	173,533	7%
Buying organic from PC	401,400	26,760	1%
Stationary	459,350	30,623	1%
Allowance for members	3,062,000	204,133	8%
Total	41,725,550	2,520,185	100%

The balance of income and expenditure of Waste Bank as of December 2016 is a surplus of Rp. 5,208,966, as shown below. A Sale of recyclables in 2017 exceeds Rp 10,000,000 as of May. Compared with past results so far, it can be said that the activities of Waste Bank are being carried out smoothly.

Table 4 Income and Expenditure of Waste Bank as of May 2017

Units: Rp.

Item	2015	2016	2017 (Jan - May)	Cumulative
a. Revenue from sale of recyclables	5,371,940	11,373,605	10,541,770	27,287,315
b. Activity costs	1,270,000	4,758,000	3,139,000	9,167,000
c. Amount owned waste bank; a – b	4,101,940	6,615,605	7,402,770	18,120,315
d. Account balance		5,432,256		12,911,349
e. Activity profit (balance); c – d		5,222,289		**5,208,966**

Source: KSM data

TPS-3R and Waste Bank are actively activities, therefore expenditures of TPS-3R and Waste Bank also increase. However it has been able to remain a surplus in financial and stable operation is being carried out. This is because the number of contracted households with TPS-3R is 356 households, and stable revenue is stably secured. In the future, in order to further stabilize waste management, it is important to increase the number of contracted households with target of about 500 households.

3．3 Home Compost

270 home compost containers have provided by BLH (current DLHK); 48 for Environmental cadre and 270 for residents. In the follow-up and monitoring which is done on January 22nd 2016, 55% of residents were implementing home compost. Then in the 2nd monitoring on November 18th 2016, 42% of residents were continueing.

3rd monitoring for home compost was implemented for 4RT (RT22, RT66, RT67 and RT74) on March 8th 2017. Since it is carried out in the weekday morning, there were many absent households and 11 households were interviewed.

As the results of the survey, 46% of households (5 households out of 11 households) were continueing home compost. The collected major reasons to stop composting are as follows.

Table 5 Results of Monitoring for Home Compost

Date of interview	Interviewed RTs	Percentage of continuation
2016/1/22	5RT （RT20,RT22,RT71,RT70,RT74）	55%
2016/11/18	5RT （RT25,RT52,RT66,RT67, RT91）	42%
2017/3/8	4RT （RT22,RT66,RT67,RT74）	46% (5HH)

４．Lesson learned / Ingenuity, Future Issues / Improvement Points, Recommendations

Lesson learned / ingenuity, future issues / improvement points, and recommendations through pilot project are shown as follows.

４．１　Lesson learned / Ingenuity

(1) Introduction of Source Separation

In this project, waste separation system has not been established, in particular, cooperative relations with PC cannot be established, and furthermore, waste separation at source has been introduced with unclear process to destination for separated organic waste, it caused mixing organic waste in the collection process. In addition, primary waste collection is not carried out throughout the area (about 50% of contracted households with PC), there are some issues such as not regularly carrying out collection and transportation in the city itself, unofficial loading on the road for a long time.

When introducing source separation, we should have carefully verified existing collection and transportation systems and formulated a plan that fully consider both waste collection and organic waste collection. Also, since PC or a west picker collect valuables spontaneously, it is important of how to manage PC.

(2) Distribution of Designated Bag

Regarding designated bags, some of effects was confirmed in the separation of organic waste. Sack bags for other waste can also be used for waste discharge, sack bags are planned as not disposable, and it means sack bags are used repeatedly. But PC could not return it to residents, therefore lots of residents had shortage of sack bags. Also, in the lots of case, sack bags for other waste were used as bags for valuables more than other waste, so, as one of the possibility of effective use of sack bags, it was considered that sack bags were useful for valuables more than other waste. However, since designated bags were distributed to each resident through the RT leader by local government, when the RT leader was uncooperative, designated bags were not distributed to each resident. In addition to that, some cost is required to buy bags themselves, it was difficult for local government to secure the budget continuously, therefore, local government stopped distributing the designated bags after one year. If considering to secure budget for cost distribution of bags, it is realistic that distribution of bags should be carried out as kind of temporal campaign, not permanent task for local government, or it must be considered charging for waste collection as resident burden, like Japan, it is one of options to have ingenuity, such as putting a print of "Available for plastic bag for organic waste after use" on plastic shopping bag in cooperation with supermarket and/or retail store.

(3) Introduction of Segregation Containers

It was planned to introduce sorting containers for organic waste and other waste to ask residents to separate them in TPS-3R. But sorting containers could not installed because of delay of the construction of TPS-3R, activity for sorted collection could not be started. However, even though construction of TPS-3R is completed on schedule and sorting containers are set, it might be not working well, because lock of consciousness of residents for waste separation, no implementation of periodic waste transportation for containers, and to be mixed with separated wastes in the course of transportation to landfill. In view of the above, it can be said that it is precondition that (1) Having a strong intention of residents to separate waste at source, (2) Securing periodic waste transportation for containers, (3) Establishment of processing flow after sorting.

(4) Utilization of the Environmental Cadre for Public Awareness

In order to thoroughly separate waste and improve discharging manners, continuous grass-root level activities of public awareness is necessity. But DLHK does not have enough staffs and it is not easy for municipal officials themselves to conduct detailed activities of public awareness. For this reason, in this project, we utilized the Environmental Cadre who are registered in the city regarding public awareness for residents. The Environmental Cadre is local resident and have the merit of being able to talk and tell residents about waste separation in the daily life. On the other hand, activities by the Environmental Cadre depends on their autonomy, so there is concern about the stagnation of activities due to individual autonomy. In order to utilize the Environmental Cadre, it is required to provide incentives, such as rewards/products, training/site-visit in other city so that their motivation for activities will maintain.

(5) Implementation of Public Awareness Patrol

As public awareness activities related to source separation, public awareness patrols by the Environmental Cadre selected from residents were conducted. As a result, at RT where the activities of the selected Environmental Cadre are active, the number of households conducted source separation is increasing, and it found out that the effect was different by depending on the discretion of the Environmental Cadre. Also, at RT with many high-income groups, they work so hard, and in many case, their servants actually handle waste, not themselves, therefore, it is difficult to enhance their consciousness of source separation for waste. It was shown that income as well influences the effect of public awareness.

(6) Introduction of Feedback Meeting and Consultation Meeting

The feedback meeting was planned as reporting and discussing the current situation

with city officials, and consultation meeting was planned to inform results of feedback meeting and to consult with questions of residents. In fact, however, the initial plan was excessive to the capacity of residents, so it was a heavy burden for residents to hold these meetings individually, and virtually both meetings were held almost at the same time without distinction. In such community meetings, it was necessary to prepare snacks and drinks in Indonesia, and it was found that a certain amount of budget had to be secured for that. From this finding, in an area of new PP site, by taking free ride on the religious residents 'meeting etc., a meeting for public awareness was carried out with no costs of snacks and drinks.

(7) Encouragement of Community's Motivation

PP in Palembang City, "Communal 3R model" is adopted. Under local government support, main entity of PP is residents, it means community. To establish PP, function well, and to develop sustainably, it is necessary to establish the mechanism to foster and maintain motivation of the community. BLH provided rewards for operation of Waste Bank to the community member as an incentive for the operation. As a result, motivation of community member has improved markedly. Although it seems to be difficult for the city to provide rewards continuously, giving kind of rewards or training/site-visit in other city as incentives at important period such as beginning of activities is very effective.

(8) Support for Establishment of Waste Bank

Circulate Collection System and conventional system of Waste Bank was established, but in any system of Waste Bank, it is absolutely necessary of storage place for the collected recyclables. Also, for operation, bank passbooks, database books, scales, transport vehicles, their fuels etc must be prepared. For this reason, in order to open Waste Bank, it is important to develop Waste Bank (including storage place) and secure necessary initial funds for procuring needed equipment. As it is not easy for residents to secure necessary initial funds independently, economic support is required for residents to open Waste Bank.

(9) Introduction of Circulate Collection System (open-air weighing) in Waste Bank

In this PP, due to the delay of construction of Waste Bank, Circulate Collection System (open-air weighing) which is to collect recyclables by circulating by kaiser was introduced. In Circulate Collection System, residents do not need to bring recyclables to Waste Bank, so it was a convenient and accessible system for residents. However, not only fuel cost but also driver's wage need to be taken into consideration, and staff is required to long time work to patrol and carry out some works such as kind confirmation, weighing, bookkeeping, etc at several places. Therefore, it is difficult to work voluntary and it is

necessary to consider the wages and allowances of staff, especially driver.

(10) Introduction of Unit (group customer) System in Waste Bank

Unit (group customer) System was one of the useful systems for residents as recyclables collection system. Unit (group customer) System is; residents themselves organize group (unit) voluntarily, and select storage place, and keep recyclables at storage temporarily, and then when amount of recyclables is much enough to transport, ask Waste Bank to collect recyclables by kaiser. This system contributed to the efficient collection of Waste Bank as it is possible to collect a lot of recyclables at once. Also, for residents, it contributed to leads to active activities of residents since there is place where residents can store recyclables temporarily.

(11) Distribution of Bag for Valuables (Eco-bag) to Waste Bank Customer

In order to further activate activities of Waste Bank by residents, eco bag was made for recyclables bag and distributed to residents who has more than three activities of Waste Bank. This idea is coming from a result that other waste sacks are used for recyclables. Because the distributed eco bag was well received by the residents, it led to the promotion of motivation for residents' activities. In addition, eco bags was distributed to new customers, it was also contributed to the acquisition of new customers. However, reportedly if the eco bag is too good, some of residents do not want to use it for recyclables and are being used for other purposes. It is better to avoid using the eco bag that is too stylish for the promotion of collection of recyclables.

(12) Installation of Roof for Sorting Place

Although it is not specified in the Waste Bank guidelines, a place for sorting and selecting recyclables is indispensable. Also, considering the climate of Indonesia, working under the scorching sun is extremely difficult in reality. In this PP, a roof for work place was installed from the viewpoint of work environment and work efficiency of sorting and selecting workers. It has been used as a very effective facility.

(13) Development of TPS-3R

Treatment of organic materials in TPS-3R was planned to be as small as necessary to promote compost to residents. In fact, it was not able to treat at the planned composting facility, it had to be changed the plan to treat all incoming organic materials in TPS-3R. Treatment capacity required for all incoming organic materials could be secured by increasing the number of cells up to 18 cells. On the other hand, it cannot secure enough place for sorting in waste. As a result of this change, the amount of compost treatment of organic materials in TPS-3R, increased significantly compared with the original plan,

and the amount of waste transported from TPS-3R to landfill could be drastically reduced.

(14) Introduction of Promotion for Segregation by Setting Different KSM Collection Fee

KSM collects Collection Fee from residents. To promote sources separation, Collection Fee was set two types, one is Rp.10,000 (about 80 Yen) for residents who segregates at home, the other is Rp.20,000 (about 160 Yen) for residents who does not segregate at home. Initially, about 60% of the residents chose to the fee for type with waste segregation, but in fact there was a big difference between situation of participation and implementation of waste segregation, and waste separation was not promoted by setting different Collection Fee. Amount of Collection Fee with waste segregation is set half of with no waste segregation, but since the fee itself is inexpensive, economic incentives did not work. In addition, it can be said that the lack of residents' awareness for necessity of source separation is one of the major factors not to lead to promotion of source separation. For this reason, when differentiation of Collection Fee is introduced for promotion of waste segregation, it is also important to improve the awareness of residents at the same time.

(15) Expansion of Contracted Household of TPS-3R

In this PP, solicitation activities to households was conducted by using the Environmental Cadre. As for the solicitation method, five groups of three persons was made, pamphlet for solicitation and solicitation script were prepared in advance, and then the Environmental Cadre had a practice so that they could solicit in the same way.For solicitation, three teams are set up, key point of first team is to emphasizes only the explanation of KSM and TPS-3R, key point of second team is to emphasizes the future using a pamphlet with photos to associate with the image of the future in addition to the explanation of KSM and TPS-3R, key point of third team is to emphasizes the future using a pamphlet with photos of environmental pollution in addition to the explanation of KSM and TPS-3R, It was verified whether the effect of each key point of solicitation was different. Although the results of the effect are currently being analyzed, it seemed that the success or failure of the solicitation was influenced by the character and atmosphere of solicitors of team (the Environmental Cadre) rather than the difference in explanation.

(16) Introduction of Crushing Machine for Compost and Plastic Chip

In the TPS-3R supported by PUPR, a crushing machine for compost is introduced in order to carry out more efficient treatment of organic waste. By introducing a crushing machine, it is possible to carry out more proper stirring at the initial stage by mechanical crushing, and it is possible to further shorten the fermentation process period of organic

waste because it can be made finer.
Regarding crushing machine for plastics, it is possible to make the plastic chips from pet bottle by introducing crushing machine, it can be sold about three times as expensive as usual, so that it can be expected to contribute to stable management of Waste Bank. But fuel cost is required for crushing machine, and maintenance cost is often required as well. Securing these budgets is directly linked to the sustainability of activities. In addition, most of crushing machine for plastics are crushed while flowing water, so budget considering the cost of water as well as the power of the pump is necessary. In this way, it can be said that it is important to fully consider the income plan that can generate the budget for crushing machine.

(17) Cooperation of the Primary Collector (PC)
It is recognized that responsibility of local government is to collect and transport the discharged waste at TPS, and then to dispose in TPA properly and responsibility of residents is to discharge the waste to TSP from household (primary collection). In order to ensure the consistency of waste management, DLHK should manage from primary collection, but actually there is no waste management system. Therefore, PC involved with primary collection to TPS is important stakeholder to establish an appropriate collection and transportation system.

(18) Purchase of Organic Waste from the Primary Collector (PC)
Since PC is important stakeholder to establish an appropriate collection and transportation system, cooperating with PC is one of the major issues. However, KSM competes with PC in primary collection, it is not easy to cooperate with PC in reality. For this reason, as one of the way that can be useful and cooperative for each other, purchase of organic waste from PC has been started. By doing this, compost productivity is improved and waste reduction of organic waste is promoted. Meanwhile, expenses for purchase of organic waste occurred, but it led to the first step of cooperative relationship with PC.

(19) Introduction of Collaboration Management of TPS-3R and Waste Bank
Waste Bank aims to collect separated recyclables, TPS-3R aims to collect recyclables from mixed waste and treat organic waste (composting), therefore, it might be said that there are similar facilities to compete in terms of collection of recyclables. This PP aimed for a synergistic effect by integrally operating the Waste Bank under KLHK and the TPS-3R under PUPR.
The effects (merits) of the integrated collaboration are followings below;
/ To be able to support financially each other,

/ To be able to share profit of facility,
/ To be able to share expenditure of facility including the cost for staff,
/ To be able to share the skilled staff,
/ To be able to sell large amount of recyclables at once by efficiently collecting them from both facilities,
/ To be able to easily supervise the activities of TPS-3R and Waste Bank by local government.
On the other hand, in Malang Province and others, the demerit that TPS-3R competes with Waste Bank has been pointed out. In order to achieve the above effects, this PP was carried out with efficient activities of both facilities utilizing the fact that operating organization of both facilities are the same. However, in reality there are institutional barriers, the members of the management entities of both facilities are the same members, but they are separate organizations. Also, with respect to operation cost, it cannot be interchanged with each other, and it has not created synergistic effects yet. In order to create synergistic effect of the facilities of the different ministries concerned, a strong initiative from the ministries concerned was required but this PP had not been able to explain sufficiently.

(20) Introduction of the Entry Form of Monitoring Results
The report of monitoring results is very important not only for the city but also for central government to grasp the activities of the Project which is conducted by each city. It was planned to introduce an entry form of report of monitoring results to reduce the burden on city staff and encourage to report results efficiently. However, the report of monitoring results by CP has not been prepared as of July 2017.

(21) Production of Good Quality Compost
In the compost producing process, crushed organic waste is mixed with wood chips generated from furniture shops as debris, and then it is added fermentation accelerator, which is made of fermented food (Tempe, lactobacillus beverage etc.) available at local area, this idea of fermentation accelerator is coming from Takakura method. By doing so, the production period is about two weeks, and it is possible to produce good quality

(22) Introduction of Home Compost
When introducing home compost, it is effective to prepare a plan in consideration with the followings.
・Some of the residents who started home compost are not able to conduct well and need some advice.
・As a regular follow-up, if the producing situation of home compost is checked and

consultation regarding producing compost is carried out, it is highly possibility that the motivation of residents will be raised and will lead to continuous activities. (Not only PP but also examples of NGO in Surabaya City.)

・There is a high possibility that residents who is conscious of the environment, such as registrant of Waste Bank, continue home compost.

・Most compost are used for home plantation. For this reason, there is a high possibility that residents who enjoy plantation at home continue home compost.

・Home compost are conducted by housewives or women. Therefore women who cannot spend much time at home due to work has stopped it regardless of their interest in home compost.

(23) Promotion of Home Compost using Non-dedicated Container

In order to start home compost, one of the challenges is to secure home compost containers. It is required for cost to distribute it. In the new site of PP, in order to solve this issue and to promote home compost, the product method of home compost which does not use exclusive containers, only with cardboard boxes, is enlightened. Although it has not been able to verify the continuity, it can be expected to contribute to the promotion of home compost, because the residents who are interested in home compost can start conducting home compost activities with reduction of initial cost.

4．2　Future Issues / Improvement Points

(1) Management of Waste Transportation Vehicles of DLHK

The transporting vehicles used by DLHK are not adequately managed and periodic transporting work in the area has not been implemented, so the collection activities by TPS-3R are also affected. Lots of issues such as driver's management are raised to improve the transport vehicle management of DLHK, but in order to stabilize the collection activity by TPS-3R, it is required to transport waste by DLHK periodically and in a planned way.

Particularly, in order to start source separation, it is essential to establish transportation structure to TPS,that DLHK vehicles can transport with keeping separated state.

(2) Illegal Dumping around TPS-3R

Currently, the waste container is installed on the access road of TPS-3R, not within the site of TPS-3R. DLHK is not periodically carried out waste transportation, so waste is overflowing from waste container.

Also, even at night it can be thrown away, nobody is there to monitor, so waste including construction waste is thrown around the TPS and situation of TPS and surroundings is like an illegal dumping site.

When installing TPS on the road, nobody can monitor, waste is continuously throwing away at container and surroundings, which is one cause of induction of illegal dumping of construction waste.
For TPS, it is necessary to have a mechanism to manage and monitor TPS on the site like TPS - 3R.

(3) Management of KSM Operator/ Staff
Since KSM is an organization by community, it is impossible to always manage the workers' activities, and it is inevitable to leave them to the voluntary of the employees.
In order to maintain the motivation of workers, measures such as profits sharing are also made, but it has not obtained sufficient effect.
For stable operation of KSM, it is necessary to establish a method of continuous management of workers, which is less economic burden, such as arranging KSM and DLHK (UPTD) staff in TPS-3R.

(4) Support for Operation and Management of TPS-3R
It is important to promptly transfer proprietary right from the city to DLHK to make DLHK fully recognize the responsibilities of management and supervision of TPS-3R.
Also, as support to TPS-3R from local government, it is necessary for sustainability of TPS-3R to provide not only construction cost of facilities but also continuation of assistance of operation expenses (such as compensation for personnel expenses, electric and water costs).
In addition, even when the community is carried out activities by itself, it is necessary for local government to conduct periodic monitoring, and give advice and instruction.

(5) Improvement of TPS-3R Guideline
From the experience of operating the TPS-3R in PP, some unpractical contents is shown in TPS-3R guideline. For example, the UPPR facilitator does not provide any instruction for TPS-3R management of KSM. In most cases, it is only involved in the construction work of TPS-3R. It is unclear of the role of local government in operation, it means concrete method for local government support.
Therefore, in managing the TPS-3R, it is necessary to improve TPS-3R guidelines to ensure that local government can be involved in the support on capacity development of KSM by clarifying the mechanism of confirming the activities of the facilitator and the description of the role of local government.

(6) Improvement of Waste Reduction Ratio
In order to achieve 20% waste reduction, the following activities are required.

① Increase of the number of registrants of Waste Bank and the number of households contracted with TPS-3R

Regarding the registration of Waste Bank and the contract of households with TPS-3R, various activities to acquire new registrants and contractors are carried out. Solicitation activities by community itself is conducted continuously by using Environmental Cadre, based on the results and experience of recruitment activities to residents in February and April 2017. In particular, regarding the contract of households with TPS-3R, the better services, such as daily, properly and surely collection, compared with primary collectors should be provided to increase the number of contracted households.

② Waste separation and sorting

Waste separation by residents in generation point has a very high contribution in weight reduction, but since it is not easy to obtain residents' understanding at present, it is necessary to raise residents' awareness continuously based on a long-term point. On the other hand, efficient waste reduction by collecting recyclables and organic waste at TPS-3R are required.

③ Cooperation with Primary Collector (PC)

Reduction of organic waste is indispensable to achieve 20% waste reduction. Collection of organic waste coordinated with Primary Collector (PC) has a great impact on weight reduction and can be said to be a very efficient method. From now on, in order to promote the recycling of valuable waste including organic waste, cooperation with Primary Collectors (PC) should be expanded.

4．3 Recommendations

(1) Utilization of the Environmental Cadre for Public Awareness

The Environmental Cadre is not own system adopted by Palembang City, it is widely used in Indonesia and in the future, it becomes human resources to complement the activities of local staff in implementation of public awareness in other cities.

However, there is a limit to the utilization as a volunteer, and it is required to make a mechanism to provide incentives for compensation for activities.

(2) Cooperation of Primary Collector (PC)

PC are important stakeholders for establishing a proper collection and transportation system, but it is not easy to cooperate with PC. As a way of cooperation, it is effective not only to introduce PC registration system by ordinance, but also to purchase organic waste from PC by KSM as well..

(3) Establishment of Waste Bank

In order to open Waste Bank by residents, it is required to prepare not only the buildings but also the equipment necessary for the operation such as bank book. Therefore, local government should support residents to secure initial funding.
In addition, in order to ensure continuous and stable operation, it is required to provide financial assistance such as personnel expenses and utilities costs as well as technical advice on the operation of Waste Bank.
Also from the case of Makassar City, local government stabilize a price of recyclables and establish a central Waste Bank with a function of gathering recyclables on a permanent basis, and then, to buy recyclables which should be higher than the market price and not be fluctuated over a period of time, from residents and other Waste Bank, local government provides subsidies to the central Waste Bank. If it is possible to establish such kind of system, Waste Bank will become rather sustainable.

(4) Introduction of Circulate Collection System (open-air weighing) in Waste Bank
Circulate Collection System is a convenient and accessible system for residents. For this reason, when promoting the collection of recyclables in an area where Waste Bank facilities cannot be installed, Circulate Collection System can be one of useful collection methods.
However, because of long time work to patrol, it is required to secure budget enough to keep fuel cost, drivers and staff.

(5) Utilization of Unit (group customer) System in Waste Bank
For residents who are relatively far away from Waste Bank, the utilization of Waste Bank is not easy in terms of collecting recyclables. Also, even from Waste Bank side, it is difficult to collect recyclables in districts that are away from Waste Bank, because of constraint on collection costs.
In this way, in districts which has a distant from Waste Bank, it is possible to participate in Waste Bank activities by applying Unit (group customer) System for collection of recyclables.

(6) Dissemination of Home Compost
When disseminating home compost, it is effective to prepare a plan in consideration with the followings.
【Correspondences/proposed countermeasures concerning home compost container distribution】
/ When distributing home compost containers, it can be improve efficiency of dissemination by distributing them to only residents who are likely to use it continuously. (It is irrational to distribute randomly or to all residents.)

/ It is one of the idea to reduce the cost of containers by teaching methods that do not use containers.

【Correspondences/proposed countermeasures concerning continuation / retention of home compost】

/ It is very important for sustainability of home compost to continuously practice and explain the method of compost produce process, not only when distributing containers but also following up continuously until the residents are able to conduct it appropriately. It is vital if it is just to distribute them.

/ As in the case of Surabaya City, if home compost can be bought by local government, the possibility is increased that residents will continue to carry out.

【Findings concerning distribution method】

It is helpful to limit residents who it is distributed in the following ways, in order to avoid jealousy among the local residents.

○ Distribution criteria items is set and it distribute to residents who meet criteria.
(Valid draft items: doing a home garden, being a housewife, participating in voluntary activities related to the environment etc.)

○ Before distribution, explanation meetings are hold several times on weekdays during the daytime, and then containers are distributed to residents who have been able to participate continuously.

Appendix1: Flowchart

1．Flowchart of activities in each PP area

Table　Flowchart of Activities in Alang-Alang Lebar（Talang Kelapa district）

Activity		Responsible agencies and role			Year 2015									Year 2016											Year 2017				
		PLM	JICA		4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5
1.Pilot Project in **Talang Kelapa＜Alang Alang Lebar＞**(16RT)																													
1.1	Preperation and Review of PP Implementation Plan	DLHK		Plan																									
				Actual																									
1.2	Socialization	DLHK(BLH)																											
a)	Preparation of socialization materials and tools	DLHK(BLH)		Plan																									
				Actual																									
b)	Selection and providing training to Cadre PP	DLHK(BLH)		Plan																									
				Actual																									
c)	Implementation of Socialization Activities for 1st stage 8RTs (treatment); including Source Seperation for 16RTs	DLHK(BLH)		Plan																									
				Actual																									
d)	Implementation of Socialization Activities for 2nd stage 8RTs (control)	DLHK(BLH)		Plan																									
				Actual																									
e)	Implementation of Socialization Activities for all 16RTs	DLHK(BLH)		Plan																									
				Actual																									
1.3	Waste Bank (WB)	DLHK(BLH)																											
a)	Operation of the temporary waste bank	KSM, DLHK(BLH)		Plan																									
				Actual																									
b)	Construction of a new waste bank	DLHK(BLH)		Plan																									
				Actual																									
c)	Establishment of operation mechanism	KSM, DLHK(BLH)		Plan																									
				Actual																									
d)	Operation of the new waste bank (incl. open-air WB)	KSM, DLHK(BLH)		Plan																									
				Actual																									
1.4	Home compost	DLHK(BLH)																											
a)	Procumement of composter	DLHK(BLH)		Plan																									
				Actual																									
b)	Socialization and distribution of composter	DLHK(BLH)		Plan																									
				Actual																									
1.5	TPS-3R	DLHK(DKK)																											
a)	Preparation of the construction work (inclu. Establishment of KSM)	DLHK(DKK), PU		Plan																									
				Actual																									
b)	Construction	DLHK(DKK), PU, KSM		Plan																									
				Actual																									
c)	Establishment of operation mechanism	DLHK(DKK), KSM		Plan																									
				Actual																									
d)	Operation	KSM, DLHK(DKK)		Plan																									
				Actual																									
1.6	Monitoring	BAPPEDA, DLHK		Plan																									
				Actual																									

: Plan
: Actual

KSM: Community Self-Help Group

Table　Flowchart of Activities in Sukarami（Sukodadi district）

Activity		Responsible agencies and role			Year 2015									Year 2016											Year 2017										
		PLM	JICA		4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11
2.Pilot Project in **Sukodadi＜Sukarami＞**																																			
2.0	Preparation for PP Implemetation	DLHK																																	
a)	Nomination and selection of expand area(s)	DLHK		Plan																															
				Actual																															
b)	Survey on existing condition in other area(s)	DLHK		Plan																															
				Actual																															
c)	Building consensus and establishing community group for PP	DLHK		Plan																															
				Actual																															
d)	Preparation of procurement plan	DLHK		Plan																															
				Actual																															
e)	Procurement work	DLHK	○	Plan																															
				Actual																															
2.1	Preparation of PP implementation plan	DLHK	○	Plan																															
				Actual																															
2.2	Socialization	DLHK																																	
a)	Preparation of socialization materials and tools	DLHK(BLH)	○	Plan																															
				Actual																															
b)	Selection and providing training to Cadre PP	DLHK(BLH)	○	Plan																															
				Actual																															
c)	Implementation of Socialization Activities(such as patrol, to promote Source Seperation and Waste Bank)	DLHK(BLH)	○	Plan																															
				Actual																															
d)	Hold the feedback & consultation meeting	DLHK(BLH)	○	Plan																															
				Actual																															
2.3	Waste Bank	DLHK(BLH)																																	
a)	Preparation of the construction work	DLHK(BLH)		Plan																															
				Actual																															
b)	Construction	DLHK(BLH)		Plan																															
				Actual																															
c)	Establishment of operation mechanism	DLHK(BLH)	○	Plan																															
				Actual																															
d)	Preparation of materials and tools (Bank note, Banner etc)	DLHK(BLH)	○	Plan																															
				Actual																															
e)	Operation	VR, DLHK(BLH)		Plan																															
				Actual																															
2.4	Home compost	DLHK(BLH)																																	
a)	Socialization	DLHK(BLH)	○	Plan																															
				Actual																															
2.5	TPS-3R	DLHK(DKK)																																	
a)	Budgetary steps for the construction	BAPPEDA, DLHK		Plan																															
				Actual																															
2.6	Collection improvement	DLHK(DKK)																																	
a)	Survey on existing condition in the area	DLHK(DKK)		Plan																															
				Actual																															
b)	Establishment of operation mechanism	Kel		Plan																															
				Actual																															
2.7	Monitoring	BAPPEDA, DLHK		Plan																															
				Actual																															

: Plan
: Actual

VR: Volunteers from residents
Kel: Kelurahan

Table Flowchart of Activities in Sematang Borang (Srimulya district)

Activity		Responsible agencies and role			Year 2015												Year 2016												Year 2017				
		PLM	JICA		4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5
3.Pilot Project in **Srimulya＜Sematan Borang＞**																																
3.0	Preparation for PP Implemetation	BLH, DKK																														
a)	Nomination and selection of expand area(s)	DLHK		Plan																												
				Actual																												
b)	Survey on existing condition in other area(s)	DLHK		Plan																												
				Actual																												
c)	Building consensus and establishing community group for PP	DLHK		Plan																												
				Actual																												
d)	Preparation of procurement plan	DLHK		Plan																												
				Actual																												
e)	Procurement work	DLHK	○	Plan																												
				Actual																												
3.1	Preparation of PP implementation plan	DLHK	○	Plan																												
				Actual																												
3.2	Socialization	DLHK(BLH)																														
a)	Preparation of socialization materials and tools	DLHK(BLH)	○	Plan																												
				Actual																												
b)	Selection and providing training to Cadre PP	DLHK(BLH)	○	Plan																												
				Actual																												
c)	Implementation of Socialization Activities(such as patrol, to promote Source Seperation and Waste Bank)	DLHK(BLH)	○	Plan																												
				Actual																												
d)	Hold the feedback & consultation meeting	DLHK(BLH)	○	Plan																												
				Actual																												
3.3	Waste Bank	DLHK(BLH)																														
a)	Preparation of the construction work	DLHK(BLH)		Plan																												
				Actual																												
b)	Construction	DLHK(BLH)		Plan																												
				Actual																												
c)	Establishment of operation mechanism	DLHK(BLH)	○	Plan																												
				Actual																												
d)	Preparation of materials and tools (Bank note, Banner etc)	DLHK(BLH)	○	Plan																												
				Actual																												
e)	Operation	VR, DLHK(BLH)		Plan																												
				Actual																												
3.4	Home compost	DLHK(BLH)																														
a)	Socialization	DLHK(BLH)	○	Plan																												
				Actual																												
3.5	TPS-3R	DLHK(DKK)																														
a)	Budgetary steps for the construction	BAPPEDA, DLHK		Plan																												
				Actual																												
3.6	Collection improvement	DLHK(DKK)																														
a)	Survey on existing condition in the area	DLHK(DKK)		Plan																												
				Actual																												
b)	Establishment of operation mechanism	DLHK(DKK)		Plan																												
				Actual																												
3.7	Monitoring	BAPPEDA, BLH, DKK		Plan																												
				Actual																												

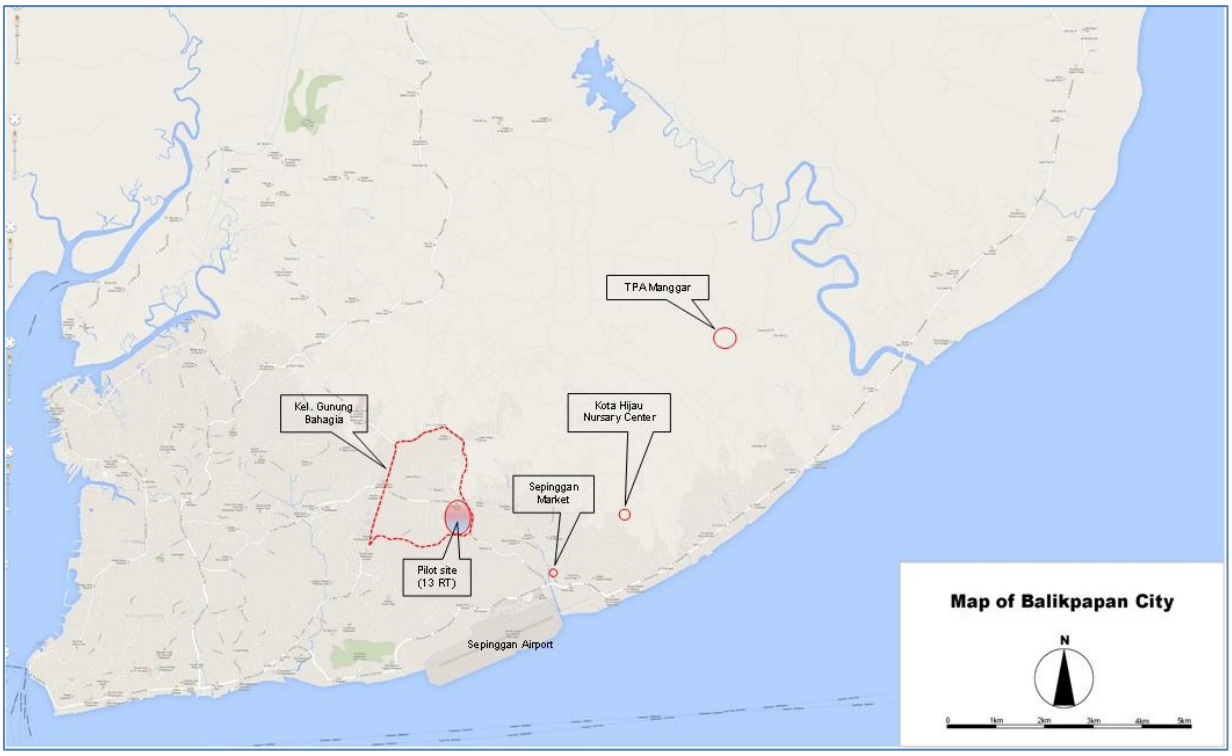
: Plan
: Actual

VR: Volunteers from residents
Kel: Kelurahan

The Project for Capacity Development of Central and Local Governments for 3R and Solid Waste Management in The Republic of Indonesia

Pilot Project Report
Balikpapan City

Table of Contents



Location of Pilot Project Sites and Related Facilities

Note:

In Balikpapan city, Department of Environment (BLH) and Department of Cleansing, Parks and Cemetries (DKPP), both of which were the counterpart agencies, combined in January 2017 to become Department of Environment (DLH). In this report, the organization names at the time of activities were used; in other words, BLH and DKPP were used to descirbe their activities by the end of 2016 and DLH was used afterwards.

Part 1. Source Separation and Separate Collection Pilot Project (SS-PP)

1. Outline of the Pilot Project

1.1 Background and Objectives

The waste reduction action plan, developed in the JICA project, proposes "Action 1: Development of Segregate Discharge and Collection System". The objectives of Action 1 are to carry out waste collection, transportation and disposal according to the types of waste separated at generation sources, waste banks and material recovery facilities (MRFs), to comply with the law stipulating waste separation and waste reduction and to reduce the final disposal amount at TPA. First, a model (source separation pilot project or SS-PP) is to be developed in part of the city and next, the model will be extended to the whole city in a long term.

This pilot project was carried out with an aim to develop a model of the source separation and separate collection system.

1.2 Basic Policy of the Pilot Project

A model area is determined and the model of the source separation and separate collection system is introduced in that area. The system introduction contains the following activities.

1.2.1 Development of New Waste Discharge and Collection System

Each waste generators are encouraged to bring salable and recyclable waste to waste banks and to treat organic waste by composters.

Waste, which do not go to waste banks nor home composters, will be segregated at source into two categories, organic waste and other waste, and put into different waste bags. Organic waste is then collected five days a week, while other waste once a week, according to the predetermined weekly schedule.

The conventional way to discharge waste to the TPS is not suitable to develop a mindset of waste segregation and the TPS often remains unsanitary with accumulated waste. Therefore, waste stations will be newly set near houses as waste discharge points. The collection vehicles will be motored three-wheeled carts and/or small trucks, which are suitable for the local road condition.

1.2.2 Development and Operation of MRF

Waste reduction through material recovery in Balikpapan mostly depends on informal sectors, with very scarce contribution of waste banks and private entities. On the occasion of the introduction of source separation and separate collection, the city considered that it was necessary to prepare a facility with enough capacity to receive large amount of inorganic waste. Consequently, the city decided to initiate a material recovery facility (MRF) as a pilot project. In the model development, because of the time limitation for site selection, a MRF will be developed by transferring the usage of existing building.

1.2.3 Awareness Raising

All the activities associated with the model development needs the understanding and cooperation of local residents. People are required to conduct home composting, bring recyclable items to the waste banks and waste discharge under the instruction of DLH.

1.2.4 Promotion of Household Composting

Organic waste composting can be most effective at generation sources when daily care including careful segregation is ensured by the motivation of the generators for better final output. In this light, household composting will be promoted in the model area together with awareness raising activities of 1.2.3.

1.2.5 Segregation and Isolation of Hazardous/Toxic Waste

Hazardous and/or toxic items will be specified and those will be segregated at the MRF. They will be delivered to the TPA in an isolated manner, and stored in a predetermined container.

1.2.6 Monitoring and Evaluation

Monitoring should take data of the following items.

- Amount of segregated items at MRF according to their types per month
- Sales of recyclable/reusable items per month
- O&M cost at MRF per month
- Performance of collection (qualitative evaluation)
- Performance of discharge (qualitative evaluation)
- Number of households which keep practicing household composting
- Amount and sales of recyclable/reusable materials collected at waste banks
- Final disposal amount from the model area and amount of organic waste composted at TPA

The model system will be evaluated from these indicators and the system will be improved and optimized by reviewing such aspects as collection methods, MRF operation procedures and awareness raising approaches.

1.2.7 TPST (Additional)

PUPR selected Balikpapan as one of the pilot cities to construct TPST, integrated waste treatment facility and Kota Hijau was determined as a site in 2015. Further, the city and PUPR decided that the organic waste which is separately collected in the separate collection system in the model area and the organic waste which is separated in Sepinggan market would be treated at the TPST.

1.2.8 Responsibilities of Key Players for Implementation

The responsibilities of related agencies are as shown below.

Table 1 Role Allocation of Implementing Agency

Activities	Responsible Agencies	Supporting Agencies
A1-1: Development of a model		
A1-1-1: Development of new discharge and collection system	DLH	BAPPEDA, DPU
A1-1-2: Development and Operation of MRF	DLH	BAPPEDA
A1-1-3: Awareness Raising	DLH	Kelurahan, NGO, BPMPPKB, Dept Edu.
A1-1-4: Promotion of household composting	DLH	KLH and PUPR
A1-1-5: Segregation and isolation of hazardous/toxic waste	DLH, BAPPEDA	Kelurahan office, NGO, Environmental Cadres
A1-1-6: Monitoring and Evaluation	DLH	Kelurahan office
A1-1-7: Operation of TPST	DLH	BAPPEDA, Kelurahan, BPKAD (Asset dept.)
A1-2: Expansion of the model system to other area in the city (Also refer to A1-1)	DLH	BAPPEDA, DPU

DPU: Dinas PU (Department of public works) , BPMPPKB : Agency for Community Empowerment, Women Empowerment and Family Planning), BPKAD: Department of Asset

1.3 Site Selection of the Pilot Project and Its Implementation Steps

1.3.1 Site Selection

Considering future expansion, the city considered that the pilot project to develop the model should be carried out in a scale of Kelurahan. In order to promote waste reduction effectively with co-exist community-based 3R activities, a site where waste banks, compost houses and/or TPS-3R[1] were located was looked for.

The following four candidate sites with the facilities mentioned above were nominated.

Table 2 Candidate sites for SS-PP

Kecamatan	Kelurahan	Population 2014*	TPS-3R (DKPP)	Waste Bank	Compost house
Balikpapan Barat	Baru Ilir	21,895	1	1	
Balikpapan Barat	Baru Tengah	23,703		3	1
Balikpapan Utra	Gunung Samarinda	23,342		1	2
Balikpapan Selatan	Gunung Bahagia	22,148	1	2	2

* Population data of 2014 from BAPPEDA

For the segregation of waste collected from an area at the Kelurahan scale, a material recovery facility (MRF) with a certain size of capacity is necessary. The JICA short-term experts, DKPP, BLH

[1] This is not the TPS-3R promoted by PUPR but the one built by DKPP. It is the place where waste collection workers extract salable items from collected waste.

and BAPPEDA visited all the sites above and searched for an existing building that could be converted to the MRF in a short time. As a result, it was found that Kelurahan Gunung Bahagia has a building of city property that used to be a market. The JICA short-term expert studied the building and concluded that its conversion to the MRF was possible. Finally, the city decided to select Kelurahan Gunung Bahagia as a pilot project site.

1.3.2 Implementation Steps

The source separation and separate discharge system proposed in the SS-PP is a very new attempt and its implementation in a whole Kelurahan at a time can be risky. Therefore, it was decided to implement it in a step-wise manner. It would start in part of area of Kelurahan to see its practicability and then it would extend to the whole Kelurahan.

2. Implementation

2.1 SS-PP Concept

The system to be achieved in the SS-PP is shown below, in comparison with the current waste collection system.

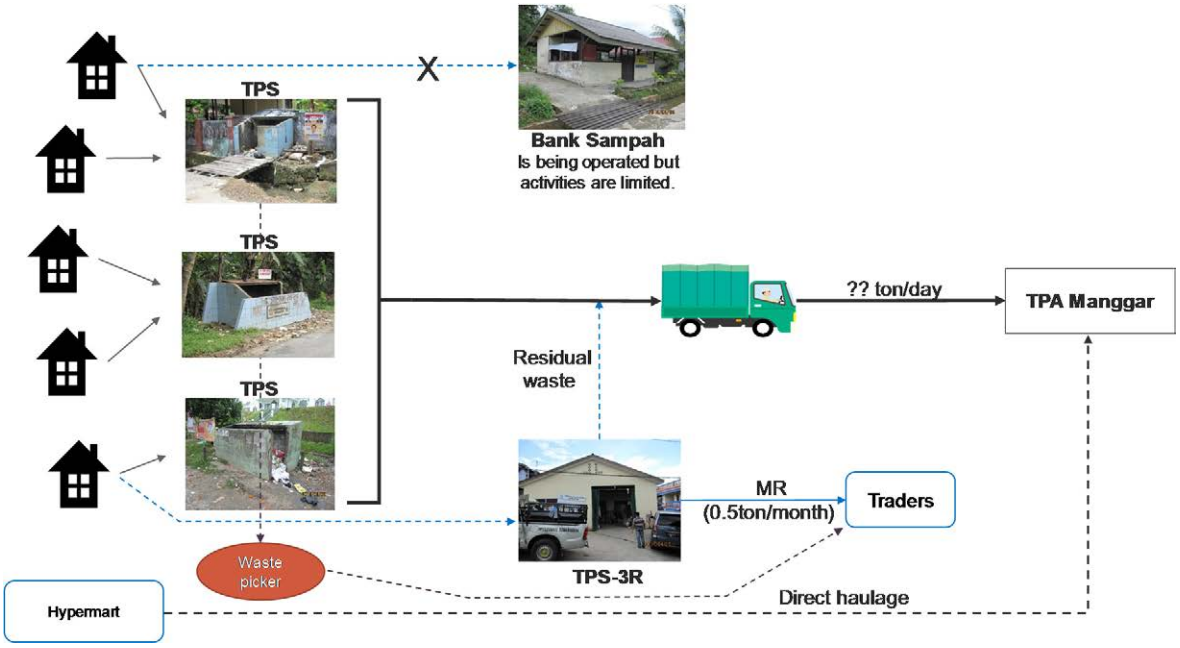


Figure 1 Waste Collection System in Kel. GB before SS-PP

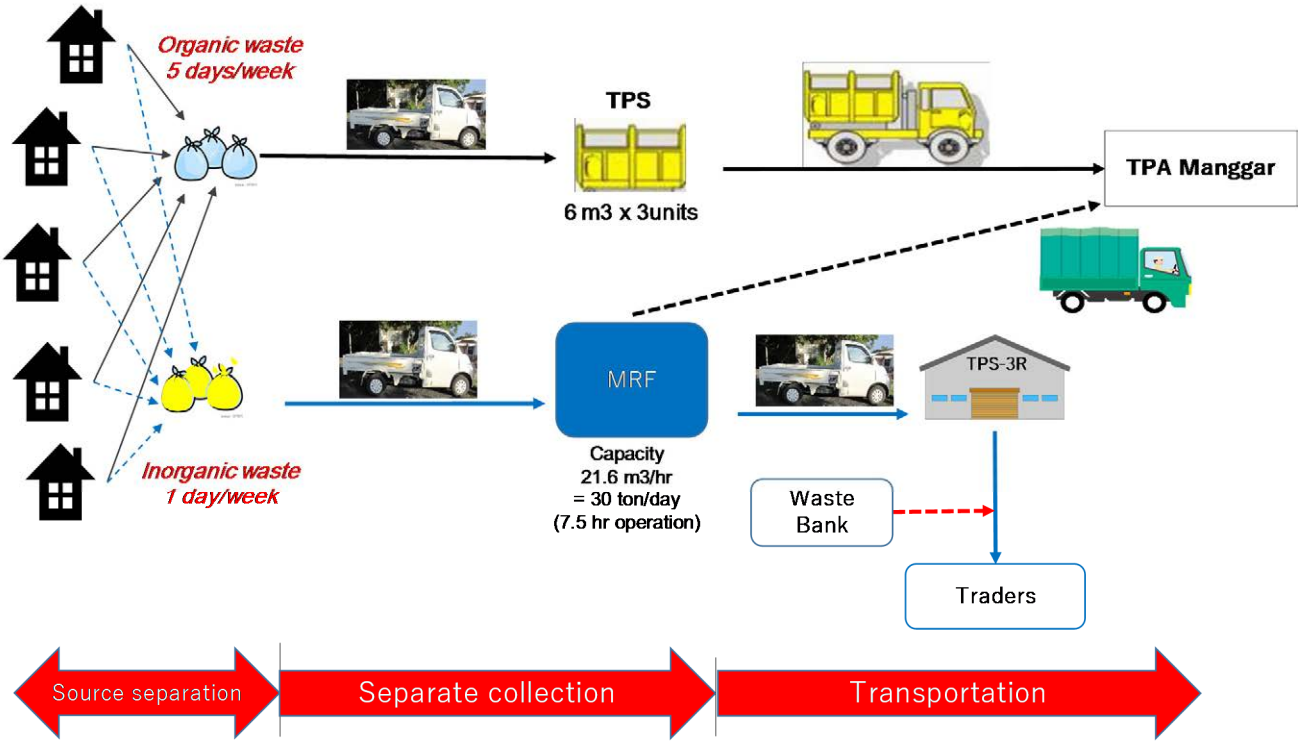


Figure 2 Source Separation and Separate Collection System in Kel. GB

2.2 SS-PP in 13RTs (13RT SS-PP)

(1) Outline of 13RT SS-PP

13RT SS-PP is the project in a limited area of Kelurahan Gunugn Bahagia (Kel. GB) for the first step of the SS-PP in the Kelurahan. Its implementation was from April 2015 to the end of January 2016. In February 2016, it became part of the SS-PP.

For the implementation of the SS-PP of the Kelurahan, the area would be divided into six zones, each of which would have different weekly collection schedule. For the first stage, one of the six zones, called Zone 1 where other waste is collected on Thursday while organic waste on days other than Thursday and Sunday, was selected as the site of the 13RT SS-PP.

Basic data of the site of 13RT SS-PP (statistics of 2014 from the Kelurahan office)

Population: 4,763

Number of households: 1,597 (source: City Population Department, 2014)

Number of RTs: 13

The East and West borders of Kel. GB are trunk roads running from South to North. The south and north borders are also major roads and these four roads define its area of 368.64ha. Another trunk road runs from west to east in the middle of Kelurahan, along which are commercial developments. There are relatively newly developed residential areas where roads with 4-6 m width were built on a grid.

Zone 1 was on the southeast corner of Kel. GB with an area of about 30 ha. It was mostly residential

area, in its north part in particular. There was a non-active waste bank and a TPS-3R.

Figure 3 Location of 13RT SS-PP

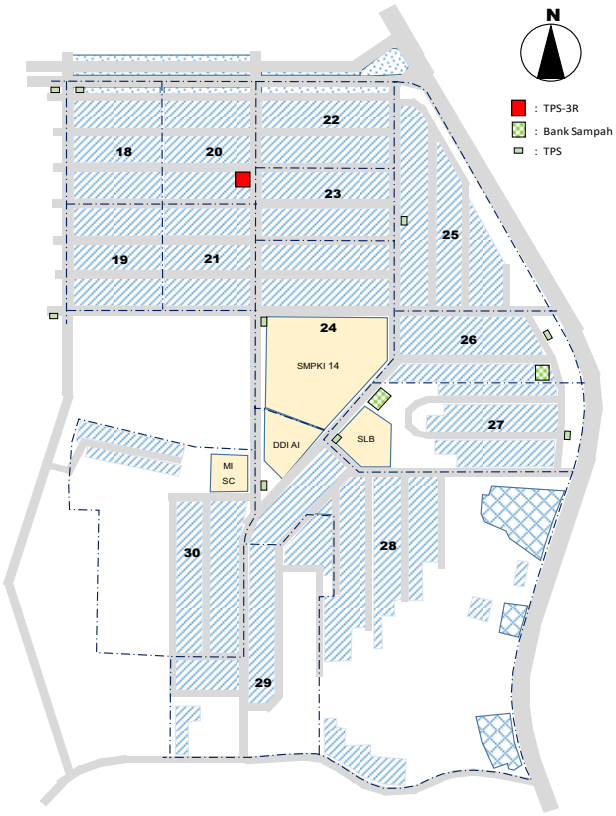


Figure 4 Roads in the Site of 13RT SS-PP

The waste collection system before the implementation of 13RT SS-PP was that each household should bring waste to TPS at about 20 locations in the Kelurahan from 6 pm to 6 am, and waste should be collected by DKPP from TPS. In practice, the residents did not necessarily brought waste to TPS during the determined time period. Therefore, waste could be seen in the TPS at any time or even outside of the TPS.

Figure 5　Existing TPS in the PP Site

The activity of the waste bank was very limited because it had few customers as a result of unclear accounting. Some residents living near the TPS-3R had brought their waste to TPS-3R and the staff of DKPP had segregated salable materials. However, its amount was small as 0.5 ton/month.

	
TPS-3R in the 13RT SS-PP Site	Waste Bank in the 13RT SS-PP Site

The waste management system of the 13RT SS-PP is illusrtrated below. As the MRF and the Transfer Depo (TD) , which would be developed for the Kelurahan-scale SS-PP, were out of Zone 1, TPS-3R would be used as a temporal MRF and TD.

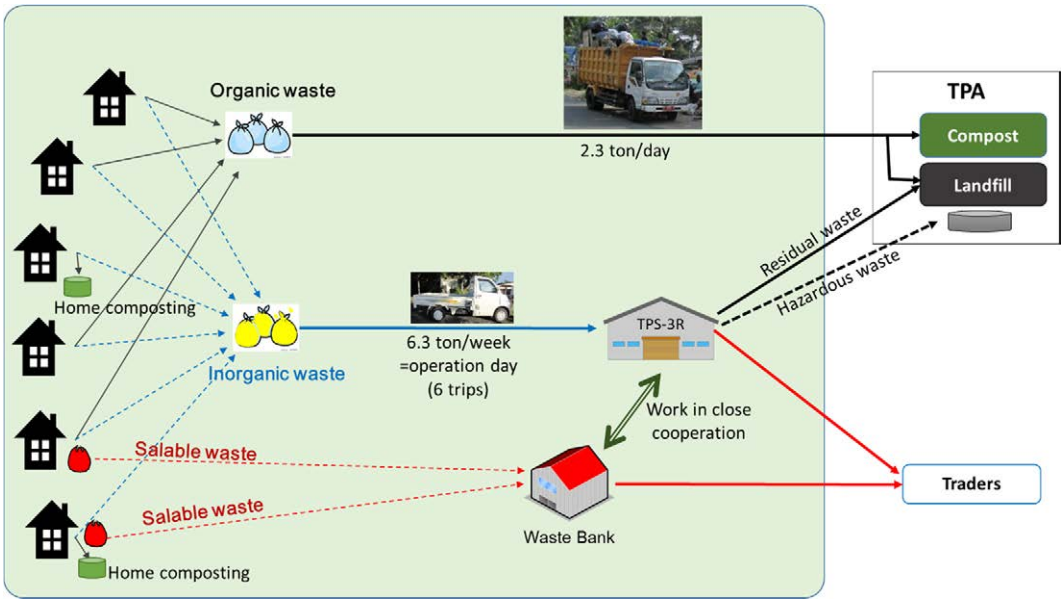


Figure 6 Schematic Illustration of 13RT SS-PP

(2) Development of Source Separation and Separate Collection

a. Source Separation

At waste generation sources, waste separation into organic waste, recyclable waste and others were instructed and the use of the waste banks for recyclable waste and home composting for organic waste were promoted. After these reduction efforts at home, other inorganic waste should be put into rice bags and organic waste into plastic bags then these bags should be discharged according to the collction schedule of DKPP (once a week for other inorganics and five times a week for organic waste).

The city procured and distributed waste discharge rice bags and plastic bags for the use of the starting period of the PP in order to raise waste separation awareness. Shopping bags were allowed to use after using up all the distributed waste bags.

The place of waste discharge was changed from TPS to waste discharge points (waste station, or Halte Sampah), whose location had been determined by the community. The use of the TPS was prohibited.

b. Separate Collection

The planned amount of waste collection was calculated using data of 2015. The waste generation rate at 558 g/person/day, obtained from the waste amount and composition survey, and the population of the site (4,763 people) gave 2.66 ton/day of waste generation amount. In calculating the waste collection amount, it was assumed that 10 % of inorganic waste would be collected with organic waste.

Table 3 Planned Waste Amount

Items	Unit	Quantity		Notes
Gunung Bahagia	Person	22,768		
Target population	Person	4,763	= A	2015
Generation rate	g/person/day	558	= B	
Waste generation amount	ton/day	2.66	= A*B=C	
Organic waste	ton/day	1.51	= C*56.9% = D	
Inorganic waste	ton/day	1.15	= C-D = E	
Wet waste	ton/day	1.63	= C+E*0.1 = F	Incl. 10% of inorganic waste
	ton/operation	2.28	= F*7/5	5 days a week
Dry waste	ton/day	1.04	=E*90%=G	
	ton/operation	7.25	= G*7	

The width of most of internal roads of the pilot area was 4-6 m and it was confirmed that the small truck same as one owned by DKPP (1ton/5.3m3 of loading capacity) could run through, and such small trucks were selected as collection equipment. Assuming the specific gravity of organic waste (0.5 ton/m3) and other inorganic waste (0.2 ton/m3), it was calculated that organic waste collection would need three trips (1.5 hours) while other inorganic waste seven trips (3.5 hours).

Organic waste collected by the small trucks were transferred to a big dump truck at the TPS-3R, while other inorganic waste were delivered to the TPS-3R for material recovery.

Waste collection time was scheduled in the morning and adjusted so as to collect waste within one hour after waste discharge.

(3) Support for the Reactivation of Waste Banks

In the site, there were one waste banks in RT27 and also in RT26 later on. The former was built by DKPP and operated by the community, but its activity was stagnant due to the poor transparency of accounting and operation rules. It was necessary to re-build the trustful relation between the community and to activate it as part of community-based 3R. To begin with, the operation manager of the waste bank and the Keluraha chief had meetings, but it was still difficult to recover residents' confidence, and the price slump of used plastics further made it hard to activate the bank.

The latter one in RT 26 was newly established with a support of NGO Walibar at the end of December 2014. This waste bank has been also influenced by the price decline, but it kept its activity only intermittently, though.

(4) Waste Separation at the TPS-3R

From the other inorganic waste delivered to the TPS-3R, salable items such as plastics and cardboard were extracted and sold to traders. The residue was transported to the TPA.

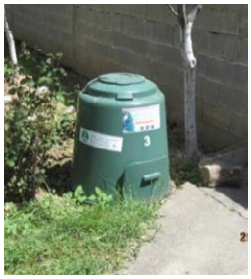
As stated in (7), specific hazardous items were also separated.

(5) Promotion of Home Composting

In the PP area, detached houses with gardens were popular. Because of this, ground-type composters, which are placed on the ground directly, were planned to be promoted as one of the options, in addition to Takakura type, which had been popular in Indonesia.

The number of households in the area was 1,597. Aiming at 5% of households utilizing home composters, the city procured 50 Takakura-type and 50 ground-type composters by the budget of fiscal year 2015. By the end of the 13RT SS-PP (end of January, 2016), however, no composters were distributed.






Takakura Type Composter	Ground Type Composter

(6) Awareness Raising

BLH trained at least five environmental cadres for each RT in the site which has 13RT in total, and the cadres instructed to the neighbors to separate and store waste at home, to follow the discharge schedules and to encourage the use of home composters.

(7) Separation of Hazardous/Toxic Waste

KLHK is preparing the regulation on specific hazardous and/or toxic waste and will list up various hazardous and toxic waste. As it is not finally issued, the SS-PP specified dry batteries, fluorescent lamps, and thermometers using mercury as hazardous waste, and stored them in a plastic drum at the TPS-3R. When the drum became full with these waste, it will be conveyed to the TPA, and DLH will manage it in the isolated compartment to avoid contamination to other waste at TPA.

Figure 7 Three Types of Hazardous/Toxic Waste Specified

(8) Monitoring and Evaluation

The baseline of the SS-PP was studied as shown in the table below. The PP monitoring is also outlined in the same table.

Data collection for the monitoring was done, during the 13RT SS-PP, by the local project staff hired by JICA by contacting with TPS-3R workers and the waste bank operators.

Table 4 Baseline Survey and Monitoring Plan

Items	Baseline survey	Monitoring
Timing	• By the end of March, 2015	• After commencement of PP (April, 2015 – March, 2016)
1. Basic data	• Population, Number of households • Number of waste generation sources to estimate waste generation amount in the pilot site	
2. Final disposal amount	• Final disposal amount transported from the PP site during one week before commencement of PP (weighbridge data at TPA)	• Waste amount to be transported from PP site to TPA (TPA's weighbridge data)
3. Salable items collection amount	• Amount of salable items which Waste bank sold • Amount of salable items collected at TPS-3R (sale amount obtained by the records)	• Amount of salable items sold by Waste Bank • Amount of salable items sorted and sold at TPS-3R
4. Compost amount	• To be estimated from the number of households using home composter.	• Same as the left
5. Separation manners	• None	• Observation at waste stations to see to what extent waste is properly separated
6. B3 collection amount	• None	• Amount of B3 waste collected at TPS-3R

2.3 SS-PP in Whole Kelurahan Gunung Bahagia

In parallel with the PP in 13RT, the C/P prepared for the expansion of the PP to whole Kelurahan Gunung Bahagia, which had 57 RTs.

The main features of the source separation and collection system to be implemented in 57 RT are as described below and illustrated in Figure 8.

- As in 13RT, waste collection stations are located in the residential area and household waste and household-like waste from business activities are discharged at the waste collection stations.
- Waste discharge at the waste collection stations should be from 7:00 to 9:00 on designated days of the week of each zone. The collection of organic waste is 5 days of a week and that of other waste once a week. DKPP's waste collection starts at 9:00 with a small truck.
- Collected organic waste is transferred to a waste container from the small trucks at the TD in the PP area and transported to the TPA.
- Collected other waste is brought to the MRF in the PP area and recyclable items in the other waste are recovered. The residue goes to the TPA using waste containers and arm-roll trucks.

- Household-like waste generated by the relatively small business entities along the main streets are collected according to the collection rules applied to each zone where those entities are located.
- Business entities which produce large amount of waste (more than 1 m^3 per day) should bring waste to the TPA by themselves or by entrusted third parties instead of using the communal TPS according to the city ordinance. With an intention of transportation cost saving and an economic incentive, it is assumed that the source separation and recyclable waste trade have been taking place at maximum extent. Accordingly, the expansion of the PP do not interfere the waste flow of such large waste generators.

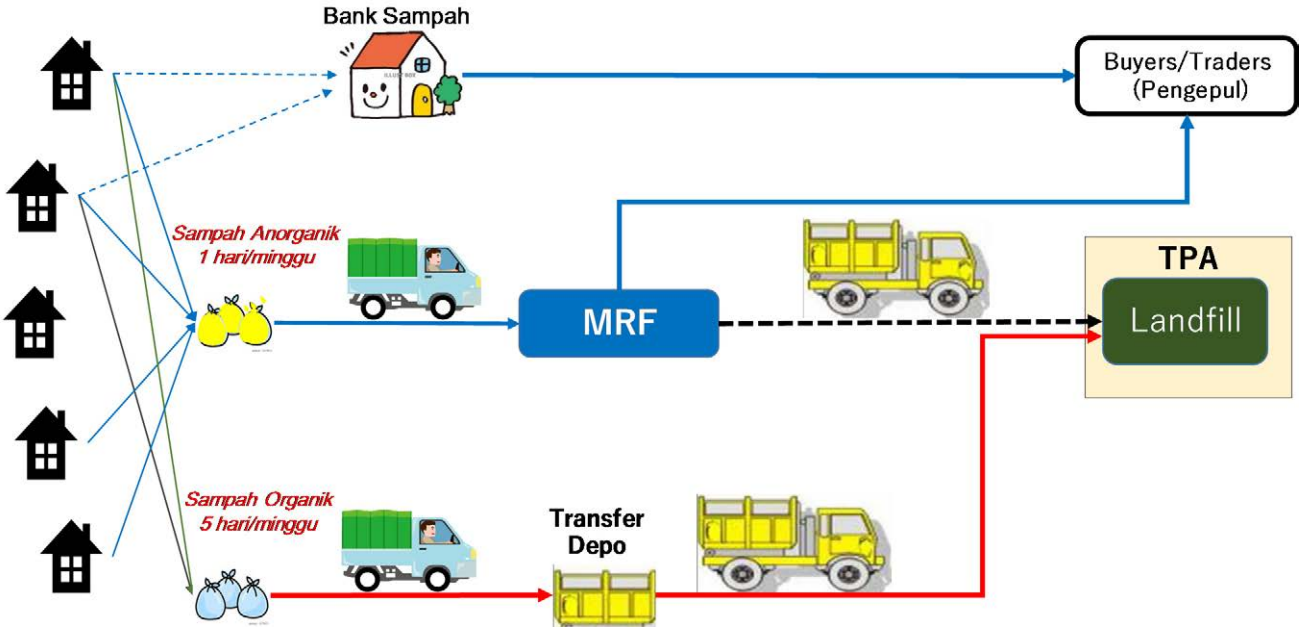


Figure 8 Source Separation and Separate Collection System in Kel. GB

(1) MRF Development and Equipment Procurement

MRF was constructed with the city budget by renovating the former traditional market and a belt conveyor was installed in the center. As it was built of wood, some of the pillars needed reinforcement.

The area was 750m2 (25m x 30m) and the facility layout plan was developed by the JICA short-term expert from the on-site observation as shown below. The city, based on this plan, secured the budget from the budget of fiscal year 2015 and started renovation in April. The renovation work was carried out by Department of Public Works (Dinas PU) of the city and equipment such as wired containers and a belt conveyor were procured by DKPP as scheduled by December 2015.

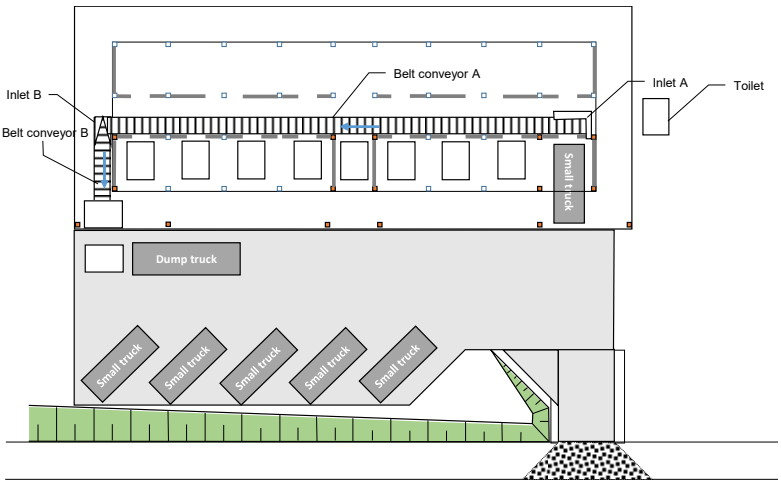


Figure 9 Layout Plan of MRF

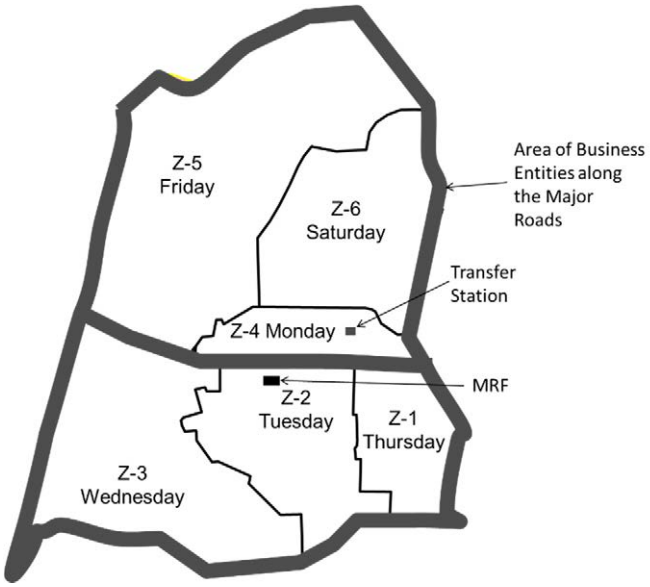
MRF after the Renovation

Belt Conveyor Installed in MRF

(2) Waste Collection Zoning, Public Awareness Raising and Determination of Waste Station Location

To collect two types of waste on different days of week, 57RTs were divided into 6 zones. The zoning and waste collection schedule of each zone are shown in Figure 10.

Further, BLH trained five environmental cadres for each RT, or about 250 cadres in total, and informed the new waste collection system to the residents through the cadres and/or by having RT meetings. Each RT determined the location of waste stations, while the city closed the existing TPS in the Kelurahan.



Z-1 is the area of 13RT SS-PP, and its collection schedule did not changed after PP expansion。

Figure 10 Six Collection Zones in 57RT and the Days of Other Waste Collection

(3) MRF Operation Structure

The figure below is the organization chart for MRF operation (as well as waste collection within the PP area and waste haulage to TPA).

An officer of DKPP works as a MRF coordinator, who takes care of its whole operation. Most manpower including sorting workers and security is hired by DKPP on a contract basis. BAPPEDA, DKPP and BLH will act as advisors to the MRF coordinator.

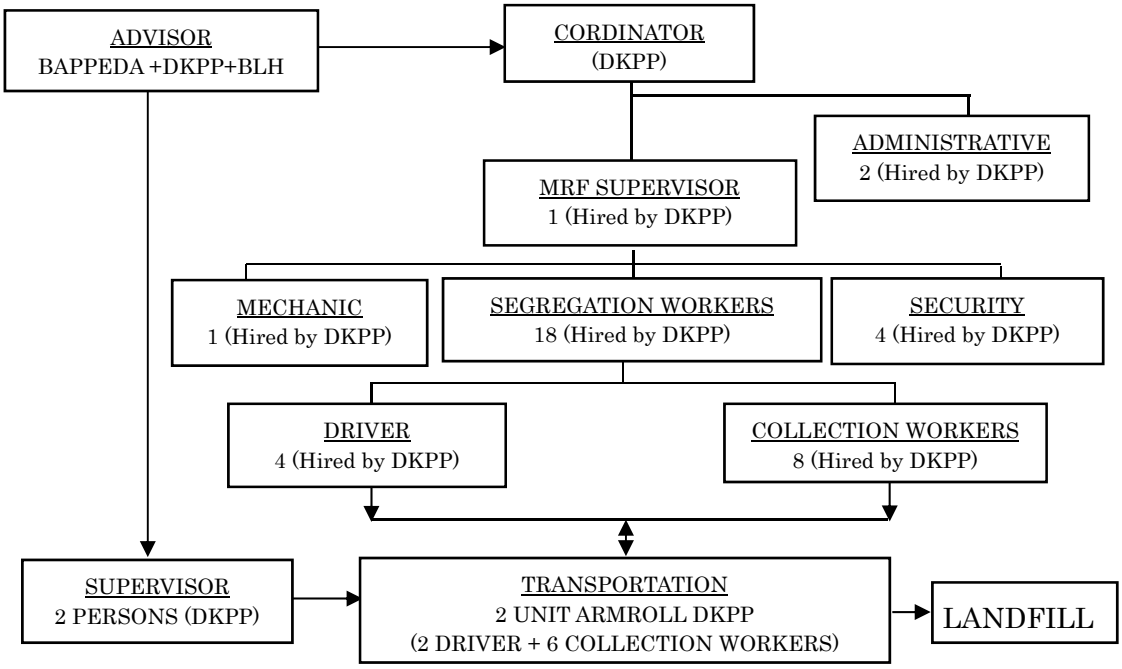


Figure 11 Organization Chart to Operate MRF and its Affiliating Waste Collection

Newly employed sorting workers and waste collection workers attended trainings by DKPP on 27 and 28 January 2016, where they leaned the waste collection system in the extended PP and operation procedure at MRF.

MRF workers unloading “Other waste” in rice sacks at MRF

Recovered materials to be bound according to the types

(4) Material Recovery at MRF

In the MRF, nine types of waste were extracted from the delivered waste (paper 1, paper 2, plastic cups, plastic bottles, other plastics, can, glass, hazardous items and others), and these were further segregated into 39 items.

Table 5 Waste Classification at MRF

Category	Sub-category	Category	Sub-category
Paper I	Carton	Can/Steel	Can
	Duplex		Iron (porous)

Paper II	Magazine		Iron (super)
	White paper (HVS)		Soft drink can (aluminium)
	Blur paper	Glass Bottle	Big glass bottle (soy sauce)
	Newspaper		Big glass bottle (bintang beer)
	Mix paper		Small glass bottle (bintang beer)
Plastic non Bottle	Emberan (thick plastic)		Glass bottle
	Kerasan (Hard plastic)		Glass bottle (guinness)
	Blowing (thick plastic)		Red wine glass bottle
	Ps Bening	Others	Aluminum
	DVD Cassette		Aluminum Super
	Wrapping oil (plastic)		Copper (Clean)
Plastic Cup	Soft drink cup		Copper (Dirty)
	Cup (clean)		Gallon bottle
	Cup (dirty)		Egg plate
	Bottle cap (Blue)	B3	Battery, Fluorescent lamp, Clinical thermometer containing. mercury
	bottle cap (Mix color)		
Plastic Bottle	Plastic bottle (clean)		
	Plastic bottle (dirty)		
	Plastic bottle (colored)		
	Jerry can (White)		
	Jerry can (colored)		

(5) Monitoring System

The monitoring system in the expanded PP was almost the same with the PP in 13RT, but the persons in charge were re-assigned in order to ensure the data collection by the C/P. The data collected by each assigned persons were integrated by DLH.

Table 6 Monitoring System of Expanded PP

Types of Data	Collected by	How to Collect Data
Final disposal amount of organic waste from the transfer station	DLH	From the truck scale record, the vehicle registration number of the trucks assigned for the PP should be identified. (Frequency: every day (but data collected monthly)
Final disposal amount of residue from MRF	DLH	Ditto (Frequency: every day)
Material recovery amount at MRF	MRF Director (DLH)	From the sales record of recyclable trade (Frequency: every time of trade)
Material recovered at waste banks in the PP area	DLH	Data of trade at the waste banks are collected. (Frequency: every month)
The number of households	DLH	Information will be occasionally collected from RT

who is composting organic waste at home		leaders, environmental cadres and/or Kelurahan leader. Home composters provided by the city will be monitored after distribution. (Frequency: every month)

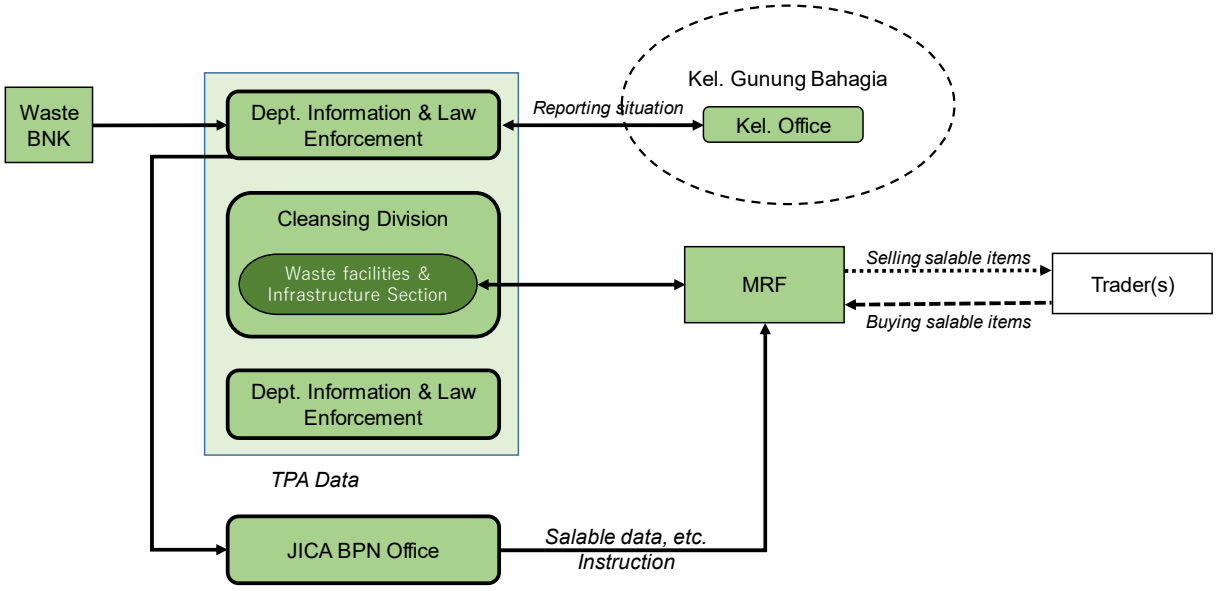


Figure 12 SS-PP Monitoring System of Balikpapan City

(6) Separate Collection and Start of MRF Operation

Following the implementation plan, Balikpapan City procured three small trucks for waste collection (4 trucks in total). The city, by the end of January 2016, employed collection workers (four drivers and eight collection crews) and MRF workers (one chief, one administrator, one O&M technician, 13 segregation workers, two guards and 10 other staff) for a limited term. The city also appointed transportation staff (belonging to DKPP, three for arm roll trucks) and established the SS-PP implementation system with 43 personnel. The training to the MRF workers was given on 27 and 28 January 2016, with attendance of the JICA short-term expert.

DKPP started separate collection and material sorting at MRF on February 1, 2016. However, the use of the belt conveyor at MRF started on February 6 because of the necessity of adjustment of the conveyor and the physical modification of the inlet and outlet. DKPP also tried to have the electricity connected to PLN (power company), but its work was supposed to take 4 weeks.

Balikpapan city hold an inauguration ceremony of the MRF with attendant of City Mayor on February 21, which is the “Waste Day” of Indonesia. This ceremony was part of Waste Day Event organized by KLHK, and the waste management activities in Balikpapan was introduced to the event site in Jakarta through TV connection between the Balikpapan City Mayor and the Minister of KLHK in Jakarta.

	
Inauguration Ceremony	Waste sorting on the belt conveyor

Although once started in this way, the operation using the belt conveyor was suspended due to several reasons; the delay of electricity works, malfunction of the belt conveyor, and the high composition of organic waste in the delivered waste collected as other inorganics. The recovery works were carried out not on the belt conveyor but on the trucks when the waste was transferred from the small truck to the waste container with the capacity of 6m3. The material recovery using the belt conveyor practically started when the curbside collection system was introduced and waste sorting manner was improved.

(7) Change of Waste Collection Zone

Based on the experience in the 13 RTs (RT18-RT30), separate collection in the whole Kelurahan started on 1 February 2016 with an aim to develop the skillful workers, and the SS-PP in Kel. GB was officially launched on 21 February with a witness of the City Mayor. The area was divided into six zones, and one of the four small trucks should collect only other inorganic waste from Monday to Saturday in different zones every day throughout the week, and the remaining three trucks should only collect organic waste in the organic waste collection zones of the day. It was found, however, that the four trucks did not follow such collection plan but divided the Kelurahan into four with roughly same waste amount. Each truck did waste collection in the one same area every day. The area assigned to each truck included two or more waste collection zones and this caused the situation where one truck collected organic waste and other inorganic waste together. Accordingly, source separation turned to be vain.

As a result of series of discussion with collection workers and DKPP officers, it was concluded that six zone collection should be changed to four zone collection. In six zone collection the drivers had to change the collection routes every day, while the four zone collection was very simple as one truck served for one same area. The former was considered more realistic than the latter.

Table 7 Comparison between Four Zone Collection and Six Zone Collection

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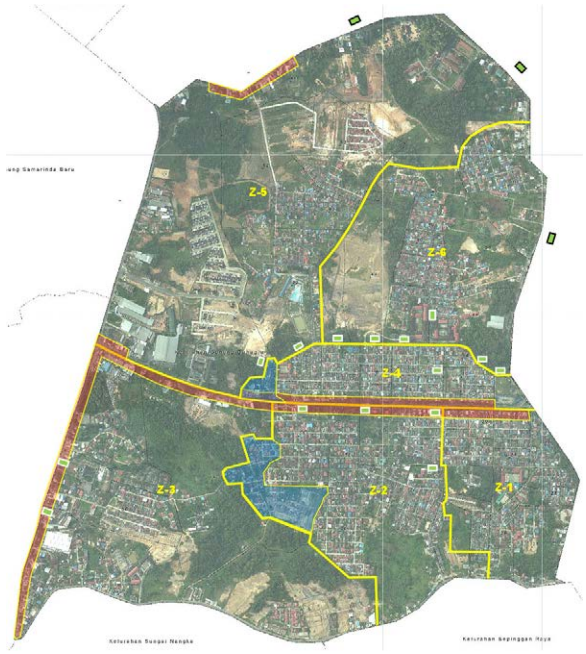
<tr><th>Six Zone Collection</th><th>Four Zone Collection</th></tr>
<tr><td> 
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<tr><td>Collection schedule
O: Organic waste,
R: Other inorganics including recyclable waste
<table>
<tr><th>Zone</th><th>Mon</th><th>Tue</th><th>Wed</th><th>Thu</th><th>Fri</th><th>Sat</th><th>Sun</th></tr>
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<tr><td>MRF Operation Days: Monday-Saturday</td><td>MRF Operation Days: Tuesday-Friday</td></tr>
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(8) Ensuring the Discharge Rule

Prior to the expansion of the SS-PP to the whole Kelurahan, BLH trained the 232 environmental cadres of Kel. GB by giving lectures about waste items, discharge rules and waste collection rules from October 2015 to January 2016. But only a few environmental cadre conducted awareness raising activities to the residents, so the waste discharge rule did not disseminate thoroughly. The waste discharge behavior of the residents was not adequate and waste were mostly mixed. The rule of waste discharge time was not obeyed either, and some of the waste stations became similar to TPS, where waste was found at any time.

To combat to this unsatisfactory condition, JICA procured waste bags in different colors for four zones at the time of system change. The JICA expert also proposed the introduction of the bell collection system, were waste collection trucks play music during the collection work, and the city agreed. Two melodies were prepared, one being for other inorganic waste collection and the other for organic waste collection. In practice only the melody for other inorganic waste collection was used to avoid confusion.

Waste Discharge Bags with Different Colors According to the Zone
JICA provided 6,000 bags in December 2016, and did so another two times in February and March 2017.

(9) Introduction of Curbside Collection

In order to avoid the organic waste from being brought to the MRF, the JICA expert, collection workers and drivers together chose 12 RTs to start the curb-side collection system. In this system, the waste generators discharge their waste according to the discharge rule in front of their houses and the collection workers collect waste along the curb-side. When organic waste is mixed in recyclable waste, such mixed waste will remain not collected but only recyclable waste without organic portion will be collected and brought to the MRF, where the belt conveyor can be operated as expected. In this system, it is also effective to enforce the proper discharge rule by rejecting the mixed waste.

(10) Implementation of Four Zone Collection and Curbside Collection in 12RT

The four zone collection system in (8) and the curbside collection system in (10) started on December 8, 2016.

The JICA short-term expert observed the project activities from January 9 to February 4, 2017, and found the following.

a. The better source separation, the more recyclable recovery.

In SS-PP which expanded to the whole Kel. GB, source separation and separate discharge were not thorough and most of the recyclable waste was discharged as mixed waste. For this reason, salable item extraction had been done by collection workers when they were transferring mixed waste to containers at MRF.

JICA experts compared the two data of material recovery amount by converting them into recovery amount per person per day. One was the recyclables amount sorted from the mixed waste during waste transferring to the container, and the other was that the recyclables amount sorted from the recyclable waste forcibly separated by curb collection in 12 RTs by using belt conveyer, in addition to the conventional way. The recyclables amount from mixed waste adopts the average value from June to November 2016, when the workers involved in SS-PP became accustomed to work and the sorting volume stabilized. The other recyclables amount data was from the value in December 2016.

Table 8 Increase in Material Recovery

Material recovery amount at MRF		Material recovery amount per person per day	Note
1. June – November (183 days)	6,337.4 kg/month	2. 12.659 g/person/day	Whole Kel. GB (16,687 persons)
3. December	7,576.5 kg/month		Separate discharge is forced in 12 RTs
4. Increase (3 - 1)	1,239.1 kg/month	5. 12.242 g/person/day	Increased amount in 12RT (3,265 persons)
6. = 2 + 5		24.901 g/person/day	Recovery amount per resident in 12RT

Material recovery amount per person per day in the PP site from June to November was 12.659 g. Assuming that the increase of 1,239.1 kg (= 7,576.5 - 6,337.4) in December is due to improved waste separation practices in 12 RTs, the increase of material recovery amount per person per day in 12 RTs (3,265 persons) becomes 12.242 g. In other words, the amount of material recovery per person per day in 12 RTs is 24.901 g, which is about twice as large as in November. Clearly the material recovery amount will increase as a result of practice of appropriate separate discharge.

b. Source separation still needs improvement.

In the 12 RTs where curb collection being provided, the generation amount of salable items was estimated to be 0.3 ton / day, therefore, it was expected that 2.1 tons (643 g / person / day) of salable items accumulated for one week was recovered on the other waste collection day. On the other hand, the material recovered amount in December was 24.9 g / person / day, only about 4% of material was recovered. This meant that the residents of 12 RTs were separating recyclable waste and discharging it only on the other waste collection day, but it was also incomplete. It seems that recyclable waste is also discharged together with organic waste. Source separation and separate discharge of the residents in SS-PP site were still at a very low level, so further public enlightenment seemed necessary.

c. Curbside collection from the viewpoint of drivers and collection crew

The drivers and collection crew considered the curbside collection as follows.

(Advantages)

- Collection work is easy.
- It is clean and sanitary.

(Disadvantages)

- The collection crew have to work long distance.
- Fuel consumption is higher than station collection system.
- It takes more time compared to the collection work at the station with properly discharged waste bags.

As shown above, the curbside collection had improved the waste awareness to some extent, but not satisfactorily. This is presumably because of the difficulty to strictly execute the waste return rule (not to collect improperly separated waste), which is further attributed to the facts that the collection

workers are often looked down and hesitate to leave improper waste and that the collection workers thinks waste return rule only end up with more waste next day.

The curbside collection system was introduced only for the awareness raising purpose. As its awareness raising effect was not high as expected and it forced had work of collection crew, it was changed back to the station collection system in August 2017.

(11) Development of Transfer Depo (TD)

In the original plan, only inorganic waste should go to MRF and organic waste needed to be moved to containers at the Transfer Deport (TD) and transported to the TPA. However, the planned location of the TD was formerly the place of TPS and the neighboring residents often discharged waste. Therefore, the organic waste transfer to the 6m3 containers was carried out not at the TD but at the MRF. To make the TD functional as supposed, the waste discharge practices of the residents must be stopped, and a gate was considered necessary. As the city budget of 2016 was not available for this purpose, JICA decided to allocate its budget for gate construction.

Based on the outline design prepared by the JICA short-term expert, JICA contracted out the gate construction at the TD to the contractor, which was selected by DKPP. The construction started on 23 November 2016, and the JICA short-term expert inspected to check the work completion on 13 December. The expert instructed the contractor to manage such problems as (i) insufficient wall thickness, (ii) unfixed rails of the gate and (iii) defect of the pillar on the right. The expert inspected again on 24 January 2017, confirmed that those issues were solved, and approved the work completion.


完成した中継基地ゲート

For the TD to be functional adequately, its ground must be flat and paved so that the containers can be smoothly uploaded and downloaded. This work was planned to be done by the city, but the budget for the work was not scheduled in the budget of 2016, and the city put it off until 2017. In the C/P meeting in January 2017, it was confirmed that DLH would complete the paving work by the end of February.

The TD finally started to be used in April 2017. Since then, organic waste has been delivered to the TD and transported to the TPA. Furthermore, after the commencement of TPST operation due in October 2017, organic waste will be transported to the TPST.

(12) Home Composting

The SS-PP also expected waste reduction by the dissemination of home composting activities. The city purchased 100 composting tools (50 Takakura baskets and 50 ground-type bins) in 2015. For home composting dissemination, BLH was expected to select some households with interest in home composting and to give them training, but BLH did not do so, and there was no households to be trained as of the end of 2016. In order to get ready for the future opportunity of giving instructions to interested residents, the JICA short-term expert decided to transfer the methodology of the use of ground-type composting bins to the cleaning staff of DLH and maintenance workers.

On January 24, 2017, the compositing bins stored at TPA were moved to DLH and on January 26 the workers placed two bins in the backyard of DLH. Cooperation was asked for three restaurants nearby for the provision of

organic waste. The JICA local staff and the workers are together maintaining the compost bins.

As of September 2017, there are 21 home composters of ground type distributed and each is used by several households.



After preparing the land with round garbles, the ground-type composting bins we placed. The composting bins are made from waste bins.

(13) TPST

The PUPR's construction work of TPST started in 2015 and its operation was planned to start by the end of 2016. The work was, however, delayed due to financial shortage. According to what the Balikpapan city has been informed, the construction work will finish by the end of September 2017, test operation and worker training will be carried out from October to December with a support of PUPR, and the full operation by the city start in January 2018. Accordingly, the city has been transporting the organic waste delivered to the TD to the TPA.

3. Monitoring Results

3.1 Monitoring Results of 13RT SS-PP

The result of monitoring from July to December 2015 of the pilot project in 13RT was as shown below.

Table9 Waste Flow Data in 13RT (July-December 2015)

(1)	Waste generation amount	9.56	Average from July to December 2015
(2)	Recyclables collected	0.41	
	(2)-1 By waste banks	0.02	Average from July to December 2015
	(2)-2 Recovery at TPS-3R		
	(i) At TPS-3R	0.13	Average from July to December 2015
	(ii) from waste collected on “organic waste collection days”	0.12	Average from July to December 2015
	(2)-3 Sold to traders	0.05	4.9% of households sell recyclables to traders.
	(2)-4 Given to Waste pickers	0.05	5.0% of households give recyclables to waste pickers.
	(2)-5 By communities	0.02	Average from July to December 2015
	(2)-6 Recyclables stored	0.01	Some recyclables are stored in the area.
(3)	Organic waste recycling		
	(3)-1 Home composting	0.02	0.00171 ton/person/week x 4.66 person/household x 2 households
	(3)-2 TPST		
(4)	Others		
	(4)-1 Waste reduction effect by the introduction of source separation	0.96	
(5)	Waste reduction total	1.39	
(6)	Waste reduction rate = (5) / (1)	14.5%	
(7)	Waste taken out from the 13RT	0.83	61.0% of households in the area discharge waste even on Sunday.
(8)	Final disposal amount	7.34	Average from July to December 2015

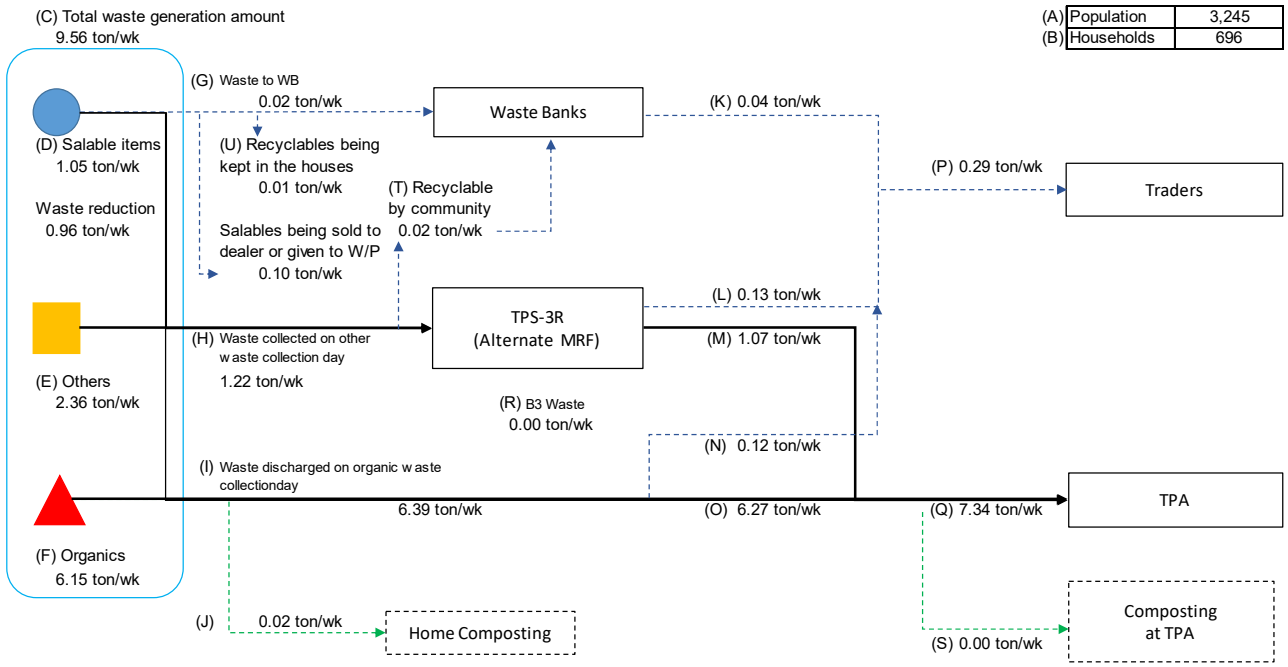


Figure 13. Waste Flow Data in 13RT (July-December 2015)

a. Calculation using the result of Questionnaire Survey

On the table above, "(2)-4 Sold to traders", "(2)-5 Given to waste pickers" and "(7) Waste taken out from the 13RT" are the figures calculated from the following result obtained from the questionnaire survey carried out in October 2015.

- 61% of households answered that they discharge waste every day. Since the PP does not provide collection service on Sundays, those households are supposed to discharge waste outside of the PP area on Sundays. Therefore, 61% of waste generated on Sundays (waste generation amount / 7 days x 61%), i.e. 0.83 ton/week, is considered to be taken out from the area ((7) of the table above).
- 2-7.7% of households (depending on types of waste items) sell recyclables to traders by themselves, and about 5% of households give recyclables to waste pickers. Salable items account for 11.3% from the results of WACS in 2015. Therefore, salable items traded or given by the households were calculated as below.

  Waste to traders: Waste generation amount x 11.3% x 4.9% (average of 2% and 7.7%)
  Waste to waste pickers: Waste generation amount x 11.3% x 5%

b. Result of Monitoring

The PP has been monitored since 13 April 2015. However, data taken during the first three months were not considered reliable enough due to improper data collection. Data taken since July were used for the drawing of waste flow and the calculation of waste reduction rate.

The amount of recyclables collected at TPS-3R, recyclables traded at waste banks and final disposal amount from the PP area are all measured by scales.

c. Examination of waste unidentified

Using the data of (1), (2)-1, (2)-2, (2)-3, (2)-4, (2)-5, (3), (7) and (8), the waste flow in the PP area was calculated, but the destination of 0.97 ton/week of waste could not be identified. Since illegal dumping was not observed in the PP area, the existence of unidentified waste was considered to be attributed to waste storage or waste generation reduction due to the promoted waste reuse and/or waste dewatering as a result of instruction of source separation.

The JICA experts visited an RT where is a waste bank and another where recyclables are separated by the community, and asked the environmental cadres about the situation. It was found as shown in the following photos that some salable items had been stored until they reached to a certain volume or their price rose to an expected level due to the fact that the oil price, hence recyclables' price, had remained low. Therefore, it was concluded that part of unidentified waste was the waste stored in this manner. The amount of stored waste was estimated at the half of waste amount traded by the waste banks, i.e. 0.01 ton/week ((2)-6).

	
The community in RT24 is storing recyclables, which were taken from waste discharged on "other waste collection days". They sell it to NGO Walibar, which are leading waste banks, when the volume of recyclables is large enough.	The waste bank in RT25 is storing recyclables in storage due to low price of recyclables.

Remaining 0.96 ton/week of unidentified waste was considered to be caused by the waste generation reduction effect brought by the introduction of source separation, which has been also experienced in some municipalities in Japan. This amount is about 10.1 % of waste generation amount.

For verification, the case in Yokohama City in Japan was taken as reference.

Yokohama City introduced source separation and separate collection in 2003 for waste reduction. The amount of household waste (including recyclable items) from April to August 2005 was 344,000 ton, which is less than that in 2001 by 60,000 ton, or 14.9%. Therefore, unidentified waste, which is 10% of waste generation, will be reasonably considered to be the waste generation reduction.

In case of Yokohama City, it is also reported that source separation activity has encouraged the communication among families and communities as a secondary effect. This may also appear in the PP area.

As a result, the waste reduction rate in 13RT through the PP-SS was 14.5%. The waste reduction activities in 13RT have the following points for improvement.

- According to the city-scale WACS carried out in 2014, the proportion of recyclable waste (paper, PET, metal and glass) in household waste was 26.03%. On the other hand, in the WACS in 2015 carried out only in the 13RT, only waste items which were recyclable in terms of material and salable in terms of condition were categorized as "Salable Items" (indicated as D in Figure 13), and its proportion was about 11%. These imply that not a small proportion of waste, which are recyclable in terms of material, are too poor in condition due to the contamination with foreign or organic fraction to be cauterized as "other waste". This further suggests that it is important to improve the source separation behavior.
- Among the arrows shown in Figure 13, Arrow L is the recyclable amount recovered on "other waste collection days" and Arrow N on "organic waste collection days". According the monitoring results from July to December 2015, those two show close figures. This means, half of recyclable and salable waste is found in "organic waste".
- In the WACS in 13RT, recyclable and salable waste accounted for 24.8% of waste discharged on "other waste collection day". This figure and Arrow H in Figure 13 suggest that recyclable and salable waste that could be recovered from waste delivered to TPS-3R on "other waste collection day" is 1.22 ton/week

x 24.8%＝0.32 ton/week. Further, this figure and Arrow L tells that the recyclable recovery rate at TPS-3R is 0.13/0.31＝42%. This is not very high probably because recyclable recovery work is done from a pile of waste and all the recyclable items are not visible.

3.2 Monitoring Results of Extended SS-PP

3.2.1 Baseline Survey

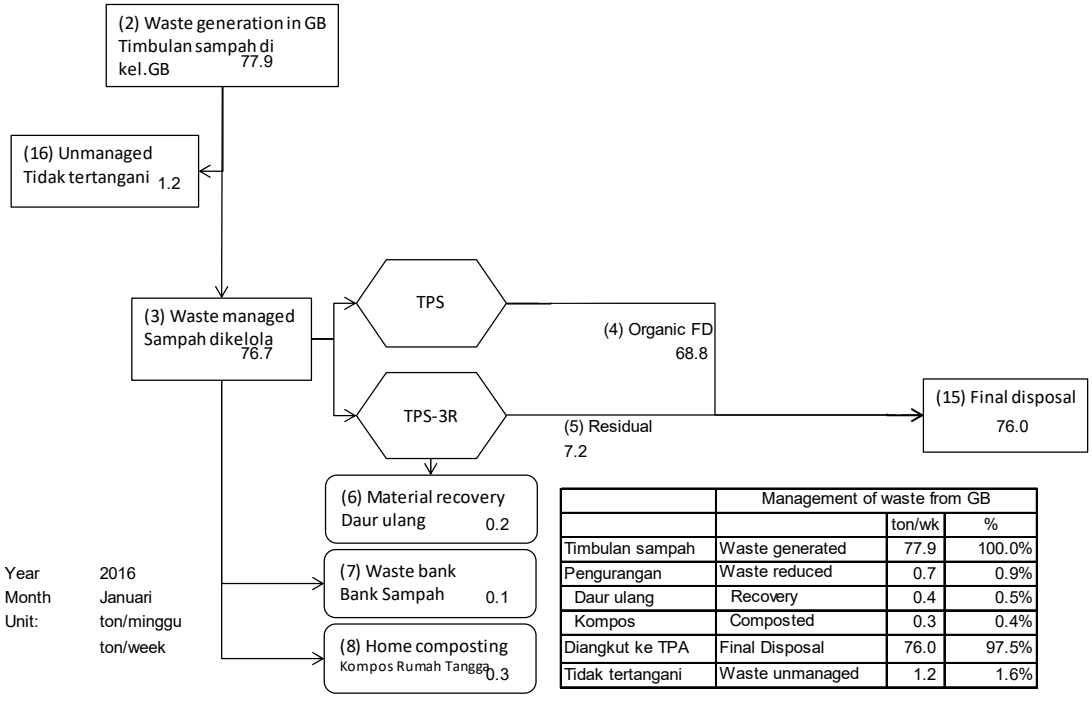
(1) Waste Flow of 57RT in January 2016 (Baseline)

During a week from 25 to 31 January 2016, DKKK carried out a baseline study whereby the disposal amount of waste from TPS in the extended PP area excluding 13RT was recorded. As a result, it was calculated to be 9.83 ton/day on average (or 68.8 ton/week). In January 2016, the amount of final disposal of waste from TPS-3R was 7.2 ton/week. Therefore, the total amount of final disposal from the extended PP area was 76.0 ton/week.

The average weekly amount of recyclable recovered at TPS-3R and the waste banks was also calculated from monitoring record.

To estimate the amount of waste generation, the waste generation rate of 2016 was first estimated using the figure 468 g/person/day obtained from WACS at the commencement and at the end of impact study in 13RT. This was multiplied with population to obtain waste amount from household. It should be noted that the expanded system includes household like waste from business entities unlike the case in 13RT. The ratio of household waste and household like waste was obtained from the result of WACS in 2014, and this ratio was used to estimate the total waste generation amount including household and household-like waste. It turned to be 77.9 ton/week.

As a result, the waste flow just before the PP expansion to 57RT (or baseline flow) is estimated as below.



	Management of waste from GB		
		ton/wk	%
Timbulan sampah	Waste generated	77.9	100.0%
Pengurangan	Waste reduced	0.7	0.9%
Daur ulang	Recovery	0.4	0.5%
Kompos	Composted	0.3	0.4%
Diangkut ke TPA	Final Disposal	76.0	97.5%
Tidak tertangani	Waste unmanaged	1.2	1.6%

Figure 14 Baseline Waste Flow of Whole Kelurahan Gunung Bahagia

3.2.2 Monitoring Results from February 2016 to May 2017

(1) Material Recovery Amount at MRF

At the MRF, nine categories of waste (which was eight in the first six month as "other waste" and "hazardous/toxic waste" was a same category) have been segregated and they are further classified into 39 kinds. Each waste group is measured by the scale installed by JICA.

As mentioned earlier, waste separation work at the MRF took place during waste transfer from the small collection trucks to the containers from February to the beginning of December. Since December 8, recyclable waste collected by curbside collection in the 12 RTs has undergone waste separation on the belt conveyor, while recyclable items mixed in organic waste has been separated in the same way as before. All the salable waste segregation processes were at the MRF and measured there. Since April 2017, when the TD started operation, salable items segregated at the TD has not been recorded.

Table 10 Amount of Each Separated Items at MRF (kg/month)

Year	Month	Paper I	Paper II	Plastic Cup	Plastic Bottle	Plastic non Bottle	Can/ Steel	Glass Bottle	B3 (Hazardous/ Toxic)	Others	Total*
2016	2	492	1,264	140	872	932	620	0		154	
	3	505	1,458	93	848	993	486	0		206	
	4	341	1,093	55	569	658	234	19		235	
	5	434	1,180	51	573	686	297	60		160	3,440
	6	981	2,262	114	855	1,031	286	167		322	6,018
	7	1,159	2,801	161	929	911	411	138		231	6,740
	8	692	2,283	163	1,419	831	451	199	16	282	6,335
	9	555	2,183	199	1,481	775	460	206	5	255	6,117
	10	665	2,140	234	1,513	844	609	200	9	258	6,470
	11	608	2,409	235	1,363	807	562	110	5	247	6,345
	12	814	3,271	214	1,172	1,002	581	208	6	310	7,577
2017	1	832	3,373	249	1,429	1,142	698	249	7	330	8,308
	2	532	2,941	175	1,180	923	651	177	23	314	6,915
	3	298	2,076	129	733	750	411	108	8	169	4,682
	4	271	1,422	116	488	513	320	59	4	142	3,334
	5	333	1,551	166	551	673	340	65	11	106	3,795

*Note: The total amount was not available as some of the waste items only had data of "number of units" instead of weight in kg.

(2) Recyclables Collection at Waste Banks

There were four waste banks in Kel. GB. The amount of recyclables collection at those waste banks is as shown below. After May 2016, three of them, except for the one in RT26, has stopped operation.

Table 11 Recyclables Collection at Waste Banks in Kel. GB (kg/month)

Year	Month	Berkan Jaya Bersama (RT26)	Bank Sampah RT25	Bank Sampah Beriman	Bank Sampah RT36	Total
2016	1	4.52	0.00	10.04	6.77	21.33
	2	2.10	0.00	0.00	0.00	2.10
	3	5.81	0.00	7.10	0.00	12.91
	4	11.23	0.00	2.83	0.00	14.06
	5	0.00	0.00	0.00	0.00	0.00
	6	0.00	0.00	0.00	0.00	0.00
	7	0.00	0.00	0.00	0.00	0.00
	8	7.10	0.00	0.00	0.00	7.10
	9	4.83	0.00	0.00	0.00	4.83
	10	0.00	0.00	0.00	0.00	0.00
	11	0.00	0.00	0.00	0.00	0.00
	12	4.55	0.00	0.00	0.00	4.55
2017	1	0.00	0.00	0.00	0.00	0.00
	2	0.00	0.00	0.00	0.00	0.00
	3	4.81	0.00	0.00	0.00	4.81
	4	0.00	0.00	0.00	0.00	0.00
	5	0.00	0.00	0.00	0.00	0.00

(3) Home Composting

Five composters were distributed in the SS-PP area as of May 2017.

(4) Final Disposal Amount (TPA data)

The final disposal amount of waste from the SS-PP area has been measured at the TPA as shown below.

Table 12 Final Disposal Amount of Waste from SS-PP(2016)

Year	Month	Disposal amount (kg/day)	Note
2016	1	9,829*[1]	Baseline: Average disposal amount from January 25 to 31
	2	3,938	
	3	7,851	
	4	6,428	
	5	7,036	
	6	7,743	

	7	7,136	
	8	7,679	
	9	7,573	
	10	7,004	
	11	7,304	
	12	6,633	Maintenance of Weighbridge from 24th (average disposal amount for 23 days)
2017	1	6,812	Maintenance of Weighbridge until 16th (average disposal amount for 15 days)
	2	6,371	
	3	6,197	
	4	9,289	DKPP started using transfer depo.
	5	6,555	

*1: Waste from the large shopping malls is excluded (as in the same condition of SS-PP).

3.2.3 Waste Reduction Rate

Waste reduction rate was calculated as below and reported at the final evaluation in June 2017.

Table 13 Calculation of Waste Reduction Rate (as of April 2017)

	Unit	Figures	Notes
Population	Person	18,094	Using the population growth data of the city, population of the kelurahan of 2017 is estimated.
Number of households	House-holds	5,303	Average family size (3.4 people/family) is assumed to be stable.
Waste amount generated	ton/day	9.40	
Recyclable waste amount	ton/day	1.22	
Other inorganic waste	ton/day	2.35	
Organic waste	ton/day	5.83	
Recyclables collected	ton/day		
Collected by Waste Banks	ton/day	0.00	
Collected at the MRF	ton/day	0.11	TD started in April. Since then, waste collected on organic waste collection days has been transported to the TPA via TD and material recovery from organic waste has not been recorded.
Total of recyclables collected	ton/day	0.11	
Residue from MRF	ton/day	1.73	* 1

Organic waste composted	ton/day		
Home composting	ton/day	0.01	
Composted at TPST	ton/day	0.00	TPST is not yet operated.
Total organic waste composted	ton/day	0.01	
Residue of TPST	ton/day	4.48	* 2
Waste reduction amount	ton/day	0.12	
Final disposal amount	ton/day	6.20	Weighbridge data at TPA
Reduction rate (waste reduction / waste generation)		1.3%	
(waste generation – final disposal amount) / waste generation		34.0%	

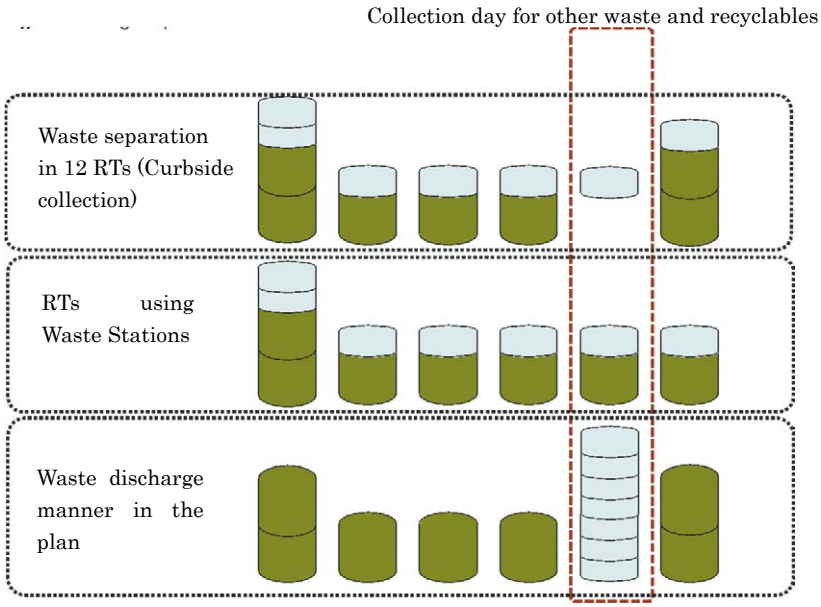
*1 Residue from MRF is remained waste after segregation at MRF.

*2 As of April 2017, TPST is not yet operated. This is, in reality at present, waste that is collected on organic waste collection day and transported to the TPA.

(1) Examinations

The results of the monitoring up to December 2016 of the SS-PP in the whole Kel. GB were examined, providing the following conclusions.

- The curb-side collection is effective to avoid organic waste from being mixed into the inorganic waste and to collect only recyclable waste.
- The separation work efficiency at MRF improves drastically with the use of the belt conveyor. The working hours of the belt conveyor as of January 2017 is about a half to one hour per day (from Tuesday to Friday).
- Even in the 12 RTs with the curb-side collection system, it seems that the residents discharge mixed waste on the organic waste collection day. For the awareness raising activities in future, it is recommended that the real situation should be understood through a questionnaire survey.



Note: It is only schematic and the size of figures is not proportional to the waste amount.

Figure 1 Separate Waste Discharge (in Practice and in a Plan)

- As of April 2017, the rate of waste reduction to the total waste generation (reduction rate) was 1.3%. Salable items segregated from organic waste is not included in waste reduction afte the commencement of TD operation. This affected the reduction rate.
- If the equation "(waste generation – final disposal amount) / waste generation" is applied, this gives 34.0 %.
- The operation of TPST will largely improve the reduction rate. After its operation, the target figure of reduction rate, i.e. 20%, will be achieved.
- Even after the TPST starts, it is important to improve waste separation manner for the increased material recovery amount at the MRF and for the effective composting work at the TPST.
- To ensure proper waste separation at source, it is also important to encourage home composting.

(2) Further Improvement of the SS-PP

With understanding of the current situation of the SS-PP as explained above, the JICA expert and the C/P understood the following activities are needed for further improvement.

- The majority of the residents in the SS-PP area do not follow the rule of source separation and separate discharge. The awareness raising activities must be strengthened. Awareness raising will be more effective when it is done to the residents directly than through the environmental cadres.
- It is desired that the area with curb-side collection be extended even with the consideration of work load of the workers, time requirement, fuel consumption and other factors.

- After the completion of the TD (in the middle of February), the transfer of waste collected on the organic waste collection day will be done at the TD. For the efficient waste transfer, it should not be allowed to take out the salable items from waste at the TD. This may reduce the amount of recyclable waste collection, but this can be raised by improving the waste separation rate at source.
- Waste source separation is important not only for the recyclable waste collection at the MRF but also the compost production at the TPST.
- Public mindset and behavior takes time to change, but still DLH needs to continue its awareness raising activities with perseverance.

3.2.4 Financial analysis of MRF Operation

The JICA short-term expert analyzed the cost spent for the SS-PP from February to December 2016.

The table below shows the summary of implementation cost for the SS-PP. Since there were expenditure for procurement of recyclable waste discharging bags, etc. in the first 4 months after the start of operation, the unit price was unstable from 316,121 to 901,328 Rp / ton, but since June it has stabilized from 270,000 to 293,000 Rp.

Table 14 Summary of Cost for the SS-PP (Feb – Dec, 2016)

Cost Items	Unit	Average Feb-Dec	Average Feb-May	Average June-Dec
Cost for collection	Rp/ton	173,304	292,147	105,393
Cost for transportation	Rp/ton	35,984	41,737	32,696
Cost for MRF operation (intermediate treatment)	Rp/ton	171,339	211,136	148,597
Total Cost for SS-PP	Rp/ton	379,651	543,977	285,750

The cost for salable waste separation was also analyzed. The cost required to separate 1 kg of salable waste dropped from 6,000 Rp/kg to 4,000 Rp/kg in May. In December, when the belt conveyor started to operation, cost to separate salable waste at the value of 1,000 Rp was 4,030 Rp. This means the cost is four times larger than the benefit. At the time of December 2016, most of residents in the Kelurahan do not properly separate waste at source, and cost saving can be expected by the active awareness raising and improved discharge manner.

Table 15 Operation Cost for the SS-PP (February to December, 2016)

	Unit	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Amount of recyclables = amount of waste sold *1	kg/月	4,319	4,590	3,204	3,440	6,018	6,740	6,335	6,117	6,470	6,345	7,577
Final disposal amount	ton/月	110.3	243.4	192.8	218.1	232.3	221.2	238.0	227.2	217.1	219.1	205.6
Waste collection cost	1,000Rp	24,612	177,835	24,612	24,612	24,612	24,612	24,612	24,612	24,612	23,037	23,037
Waste transportation cost	1,000Rp	7,275	7,275	7,275	7,275	7,275	7,275	7,275	7,275	7,275	7,275	7,275
MRF operation cost	1,000Rp	37,425	38,393	37,425	38,151	35,004	34,934	37,683	36,454	33,721	30,549	30,550
Total expenditure	1,000Rp	69,312	223,503	69,312	70,038	66,891	66,821	69,570	68,341	65,608	60,861	60,862
Recyclable sales	1,000Rp	425	3,293	3,834	5,624	7,718	7,865	9,796	5,394	6,437	7,550	7,580
Budget allocated by the city	1,000Rp	68,888	220,211	65,478	64,414	59,173	58,956	59,774	62,946	59,172	53,311	53,282
Unit cost of collection *2	Rp/ton	214,796	717,161	125,544	111,087	103,278	107,968	100,710	105,492	110,075	102,176	108,054
Unit cost of transportation *3	Rp/ton	65,978	29,891	37,726	33,354	31,319	32,886	30,561	32,022	33,506	33,201	35,380
Unit cost of MRF Operation *2	Rp/ton	326,618	154,828	190,901	172,198	146,884	153,248	154,195	156,247	150,815	135,495	143,294
Unit cost of SS-PP *2	Rp/ton	604,905	901,328	353,554	316,121	280,690	293,130	284,674	292,921	293,427	269,937	285,471
Cost for 1kg of salable waste	Rp/kg	8,665	8,364	11,682	11,092	5,816	5,183	5,948	5,959	5,212	4,815	4,032
Cost for salable waste at the value of 1,000Rp	Rp/1000Rp	88,163	11,661	9,762	6,783	4,535	4,442	3,847	6,758	5,239	4,046	4,030

*1 : This includes B3 (hazardous/toxic), but it is negligibly small.

*2 : Cost was divided by the sum of final disposal amount and recovered recyclables.

*3 : Cost was divided by the final disposal amount.

4. Lessons, Issues and Recommendations

4.1 Lessons Leant

4.1.1 Modification of Waste Collection Zoning

The collection system of the Kelurahan-scale SS-PP from February 2016 followed the practice of the 13RT SS-PP, where no collection service was given six days a week except Sunday, other waste collection was once a week, and six zones had each own collection schedule. The operation of six zone collection with four collection trucks was, however, found confusing and did not work. The JICA short-term expert, drivers and collection workers had a discussion to modify the system, but it did not function, either. After further discussion, the four zone collection system, in other words one truck-one collection zone system, was adopted and started on December 8, 2016.

The planning of six zone collection and its modification were the results of meetings with collection work members and the C/P, but complex operation was not functional. The four zone collection system has been working smoothly, which proves a simple system is preferable.

4.1.2 Improvement of Waste Separation Rate

The use of the belt conveyor installed at the MRF was expected to drastically improve the material recovery rate. The incoming waste to the MRF was, however, so mixed that the use of the belt conveyor had to be halted for nearly 10 months after the establishment of MRF.

BLH had assumed that the environmental cadres were working on awareness raising as they were paid incentives. It was found, however, that there were not a few residents who did not know about the waste discharge rules and that the activities of some of the environmental cadres were not adequate. Moreover, BLH had not kept sufficiently monitoring their awareness raising activities.

When the six zone collection system was changed to the four zone collection system, the JICA short-term expert proposed the curbside collection method in order to collect well-separated recyclable waste and the C/P agreed its introduction to 12 RT.

From the MRF's monitoring data, material recovery amount per resident of the 12 RT is calculated as below.

Table16 Change of Material Recovery Amount per Resident of 12RT

	Unit	Before curbside collection	December 2016	January 2017
Material Recovery Amount	g/person/day	12.7	24.9	32.1
Growth since the Introduction of Curbside Collection	%	-	97 %	154 %

Curbside collection was found to have an effect to encourage source separation to a certain extent, it can be considered as one of the approaches of awareness raising.

4.2 Issues for Improvement

4.2.1 Further Awareness Raising

The SS-PP stands on the source separation by citizens. To raise waste awareness, the SS-PP intended to utilize environmental cadres, but the continuation of their activities depended on the continuation of incentives. The city called for cooperation in such occasions as RT leaders gathering at the Kelurahan office or meetings of some active cadres, but city's intervention was only ad-hoc basis. In the station collection and the curbside collection systems, inappropriate waste bags left not collected should have reminded the community of the right rule, but such wrong bags would be simply collected on the following day and the educational effect was limited.

The JICA short-term expert and the CP tried to find resolutions, and decided to carry out school education. One of the primary school in the Kelurahan was selected, and a waste separation was explained to the children. It was found that the waste separation manner that the school had adopted (i.e. dry waste and wet waste) and that of the SS-PP were different. According to the DLH, the waste education at school is under the instruction of Department of Education of the city, and the DLH intends to discuss with Department of Education and to make the school education in consistent with the SS-PP.

Also, DLH expects to acquire cooperation of PKK (Women's Association) as a means of awareness raising among households. PKK is an active society in various themes such as child raising and living environment, and if waste source separation is incorporated into their daily activities, waste awareness can be effectively raised.

4.2.2 Issues of Waste Bag Distribution

When the four zone collection system started, rice bags for other inorganic waste were distributed to all the households. Those bags were printed in different four colors according to the collection zones so as to make it easy for the collection workers to return the bags to their original RTs. The use of the rice bags, however, was not as planned, as many residents use the rice bags for the discharge of organic waste, no names were written on the bags, and others. Some bags have been still returned to the original RTs from the MRF, but it is not known to what extent the bags are surely returned to the original users. There should be further improvement to establish the bag reuse system.

4.2.3 Issues of Home Composting

The city has procured 100 home compost bins (50 of Takakura type and 50 of ground type) by the budget of 2015. BLH, which were responsible to explore the households with interest in home composting, had not started necessary action for long time. The instruction materials for home composters of Takakura type were available as Kitakyushu city provided assistance for compost dissemination before. The home compost bins of ground type were, however, new for the city and no counterpart knew how to use them. The JICA short-term expert had transferred the methodology of ground-type composting to the cleaning staff of DLH and maintenance workers since January 2017 using two bins.

The identification of residents that wanted to use composters and the distribution of home composters finally started in February 2017 and five bins were delivered to different RTs. JICA local staff keep updating the guidance of ground type composting based on their experience of seven bins. Now that the preparation for composting dissemination has been done either for Takakura type or ground type, DLH should continue identifying the potential users and distributing the compost bins.

4.2.4 Issues of Waste from Business Entities

Large scale business entities have to treat and dispose of their waste by themselves or by their contractors. Other business entities should follow the waste rule of the SS-PP, but they, particularly those in RT40, 41 and 51, do not well follow it.

It is necessary to carry out careful socialization not only for general households but also the business entities.

4.2.5 Financial Issues of MRF Operation

The Balikpapan city approved 1,000 million Rp for 2017 budget to operate the SS-PP. DLH Accounting Department requested the JICA short-term to suggest how to use this amount on January 27, 2017. He and the JICA local staff together collected the financial data from BAPPEDA and examined two options. On February 1, they explained the result of examination to the director of DLH and other two staff.

The JICA short-term expert acknowledged the complaint of the SS-PP workers, who alleges that the lowest salary is 1,825,000 Rp/month even including incentives and this is lower than the minimum wage set by the national government. Therefore, in the examination of expenditure in 2017, the following two options were considered with recognition of the necessity to raise the salary not less than the minimum wage.

- Option 1: Salary as of December 2016 does not change.
- Option 2: Introduction of salary level above the national minimum wage (2,400,000 Rp/month).

The income of the SS-PP is the sales of salable items at MRF. Assuming that the waste separation rate at 21.4% as of December 2016 will increase to 80% in December 2017, the amount of salable items and the income of their trade are estimated as below.

Table 17 Estimated Sales of Salable Items at MRF

	Unit	Jan.	Feb.	Mar.	Apr	May	Jun	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Separation rate	%	26.3	31.2	36.1	40.9	45.8	50.7	55.6	60.5	65.4	70.2	75.1	80.0	-
Amount of salable items	ton/month	9.1	9.8	12.5	21.7	25.2	26.9	30.5	33.2	34.7	38.6	39.9	43.9	326.0
Sales of salable items	Mil. Rp	11.0	11.8	15.1	26.4	30.5	32.7	37.0	40.2	42.1	46.7	48.4	53.2	395.2

The result shows that the sales of salable amount in 2017 are 395.2 million Rp.

On the other hand, the expenditure to keep operating the SS-PP was estimated as below. It is to be noted that the cost for waste collection and transportation does not include the cost for fuel but only manpower cost, as the fuel cost was not presented from C/P.

Table 18 Cost for the SS-PP (Option 1) (unit: mil. Rp)

	Jan.	Feb.	Mar.	Apr	May	Jun	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Collection	28.0	28.0	95.2	28.0	28.0	28.0	48.5	28.0	28.0	28.0	28.0	28.0	423.4
Transportation	4.7	4.7	4.7	4.7	4.7	4.7	9.5	4.7	4.7	4.7	4.7	4.7	61.4
MRF operation	34.6	34.6	34.6	171.4	34.6	34.5	59.7	34.5	34.5	34.5	34.5	34.5	576.6
Total cost	67.3	67.3	134.5	204.1	67.3	67.2	117.6	67.2	67.2	67.2	67.2	67.2	1,061.4

The expenditure required for SS-PP in fiscal 2017 will be 1,061.4 million Rp, of which MRF's total operating costs will be 576.6 million Rp.

Table 19 Cost for the SS-PP (Option 2) (unit: mil. Rp)

	Jan.	Feb.	Mar.	Apr	May	Jun	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Collection	30.0	30.0	97.2	30.0	30.0	30.0	60.0	30.0	30.0	30.0	30.0	30.0	457.2
Transportation	4.7	4.7	4.7	4.7	4.7	4.7	9.5	4.7	4.7	4.7	4.7	4.7	61.4
MRF operation	44.8	44.8	44.8	181.6	44.8	44.8	88.2	44.8	44.8	44.8	44.8	44.8	717.8
Total cost	79.6	79.6	146.7	216.4	79.6	79.5	157.6	79.5	79.5	79.5	79.5	79.5	1,236.5

The expenditure required for SS-PP in fiscal 2017 will be 1,236.5 million Rp, of which MRF's total operating costs for 2017 will be Rp 717.8 million.

Waste collection and transportation is the fundamental public service to be provided by the city regardless of the SS-PP. Therefore, only the cost for MRF operation and income from sales are compared. In Option 1, sales exceeds operation cost in August onwards, while in Option 2, in September.

Table 20 Estimated Balance of Payment of MRF Operation (unit: mil. Rp)

	Jan.	Feb.	Mar.	Apr	May	Jun	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Option 1	-23.5	-22.8	-19.4	-145.0	-4.1	-1.9	-22.7	5.7	7.6	12.2	13.8	18.7	-181.5
Option 2	-33.8	-33.0	-29.7	-155.3	-14.4	-12.1	-51.2	-4.5	-2.7	2.0	3.6	8.5	-322.7

4.2.6 Issues of SS-PP Expansion to Other Areas

In the action plan, the SS-PP of the Kel. GB is planned to be replicated in other kelurahans. The system, however, needs improvement in the awareness raising about waste discharge rules and has not yet become the system which can be regarded as participatory waste management.

The C/P and the JICA experts acknowledged that the work should be concentrated on the improvement of waste separation and waste reduction in Kel. GB and that the expansion of the project would be the next step after then.

4.3 Conclusions and Recommendations

4.3.1 Conclusions

- The results of waste amount and composition survey in the SS-PP area showed that the composition of recyclable items was 10.97%. Considering the existence of waste from business entities which generally produce more recyclable waste, the composition of recyclable waste could be higher. The SS-PP aimed at the reduction rate close to the recyclable waste composition rate, but the waste reduction was substantially low.
- The MRF is the facility that extracts salable items from, and only from, the waste that is delivered to the MRF. The reduction effect given by the MRF is mostly controlled, therefore, by the condition of incoming waste, which is in turn influenced by the waste separation manner of the residents. In other words, source separation is the prerequisite for the MRF to be functional as a waste reduction facility.
- It is to be noted, however, drastic waste reduction exceeding 10% or more cannot be achieved only by material recovery.
- The operation cost for the MRF cannot be covered by material sales within 2017.

4.3.2 Recommendations

- The increase of sales from recyclable items necessitates community cooperation and understanding. It is highly recommended that the city secures substantial budget for public awareness raising.
- As for the expenditure for the MRF in 2017, it is recommended to maintain the current salary level and to examine the possible salary increase taking account of the sales trend.
- The sales of recyclable items should be large enough to cover the MRF operation cost. It then requires improved waste separation at source and area extension to other Kelurahans.
- The awareness raising activities attempted in the SS-PP was not implemented fully and showed limited effects. Utilizing the experiences in the SS-PP, DLH is expected to carry out awareness raising activities in a timely and constant manner.
- The MRF has 30 ton/day of the operation capacity and serve for three Kelurahans. Area extension without improvement of source separation, however, will result in increased mixed waste delivery, odor and pest problems and residents' complaints. Awareness raising is a top priority.
- The MRF should be financially supported by the city until it becomes self-sustainable.

Part 2 Organic Waste Composting System Pilot Project (Com-PP)

1. Outline of the Pilot Project

1.1 Basic Policy of Com-PP

The Balikpapan city has been composting pruning waste although its operation scale is small. Vegetable waste that generate at the traditional market in large quantity is another waste material for composting.

Under such consideration, Action 2 of the Action Plan aims to produce compost from all the pruning waste and market vegetable waste. To develop the receptive facilities for this, the existing composting facilities at TPA and two nursery centers in Kota Hijau and KM2 should be expanded and new facilities should be constructed.

Along with such facility development, a system must be developed to transport vegetable waste separated in the markets. This system consists of acquisition of cooperation at source (vegetable vendors in markets), proper instructions to primary waste collectors in the markets and separate waste transportation starting from TPS of the markets.

1.2 Objectives of Com-PP

This pilot project aims to examine the possibility of organic waste composting system using market waste in line with Action 2 of the Action Plan.

To produce compost from market waste needs facility development and it was originally planned to expand the current composting yard of Kota Hijau. In due course of the PP, however, PUPR decided to construct the TPST in Kota Hijau. Consequently, the TPST was planned to be the destination of market waste of the Com-PP instead of expanded composting yard. Since it was PUPR that has responsibility of TPST development, the main focus of the Com-PP was on the development of transportation system of vegetable waste from the market to the TPST.

2. Implementation

2.1 Plan Formulation of Com-PP

The plan of the Com-PP was formulated from September to December 2014 aiming to start the project in April 2015, when the budget of fiscal year 2015 became practically available.

From Sepinggan Market, approximately 4.8 ton of waste has been transported to the TPA. There used to be composting operation in the TPS, which is located next to the market and is the place for waste generated in the market is temporally stored, but it has stopped since the space was not enough for aerobic process and it caused odor.

Besides, Balikpapan city operates two nursery centers (Kota Hijau and KM12) where plants are grown for center dividers of roads and parks. Those centers make compost in their premises to be used by themselves but compost production is not large enough for their operation.

In such circumstances, it was planned that vegetable waste at Sepinggan Market would be separately collected, transported to the composting facility in Kota Hijau nursery center at a distance

of 4.0 km from the market and composted together with pruning waste.

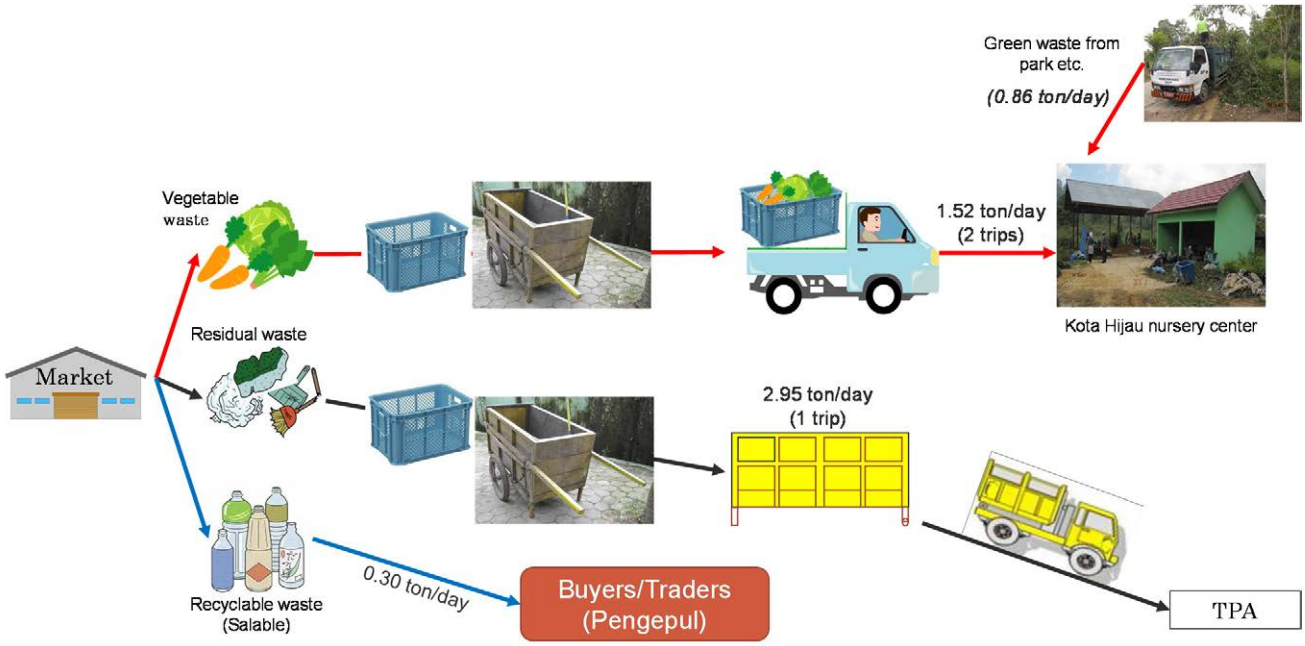


Figure 15 Waste Flow Image of Com-PP

Sepinnggan Market is a typical traditional market located near the Balikpapan Sepinggan Airport and it has 433 stalls.

The waste generated by the stalls is collected by 11 collection workers trice a day (8:00-15:00 and 17:00-23:00). The collection works are usually done by 4-5 trips a day. The waste is collected at the TPS and transported to the TPA by DKPP three times a day (four times a day on Saturdays and Sundays).

Compost production had once operated at the TPS, but it is no longer carried out due to the area limitation. The waste collection workers extracts salable items during waste collection and store them until traders come to buy.

2.2 Estimation of Waste Volume

The waste amount transported from Sepinggan Market to the TPA by DKPP is 4.8 ton/day. Using the waste composition data abtained by the waste amount and composition survey, the waste amount of each component can be calculated as below.

Table 21 Waste Composition from Sepinggan Market

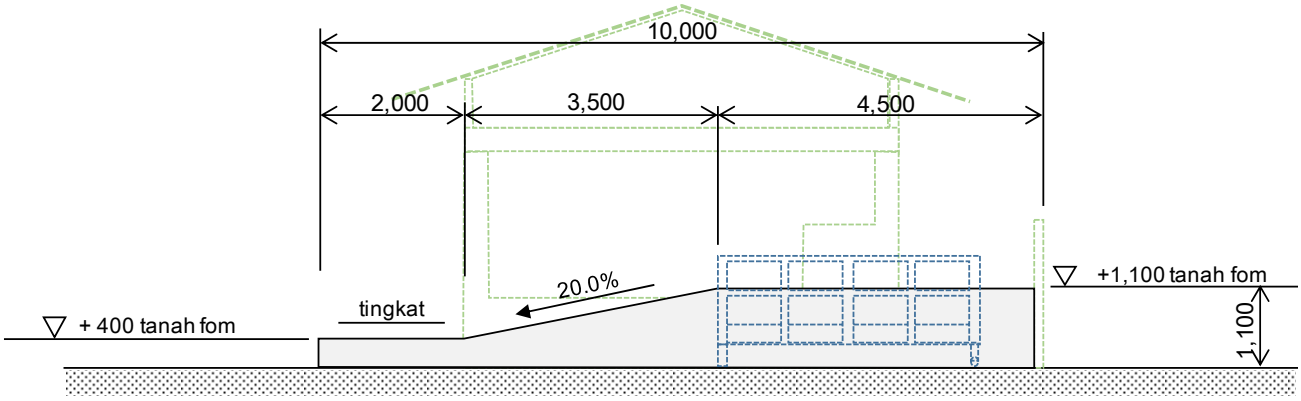
Items	Composition	Amount
1. Kitchen waste	57.61%	2.8 ton/day
2. Grass, wood	5.87%	0.3 ton/day
3. Paper	6.36%	0.3 ton/day
4. PET bottle	2.08%	0.1 ton/day

5. Other plastics	6.44%	0.3 ton/day
6. Textiles	6.49%	0.3 ton/day
7. Leather, rubber	2.81%	0.1 ton/day
8. Metals	1.95%	0.1 ton/day
9. Bottles, glass	3.73%	0.2 ton/day
10. Hazardous	0.73%	0.0 ton/day
11. Others	5.95%	0.3 ton/day
Total	100.0%	4.8 ton/day

From the figures above, the planning values were assumed as blow.

- Vegetable waste collection amount: 50% of organic was (Compositions 1 and 2) = 1.52 ton/day
  ==> Vegetable waste will be collected using plastic baskets with capacity of 50 liters. A cart will load four baskets.
  ==> The baskets with vegetable waste inside will be transferred onto small trucks with capacity of 1 ton, which makes two trips a day to the nursery center.
- Salable waste recovery amount: 30% of recyclable waste (Compositions 3, 4, 5, 8, 9) = 3.0 ton/day
  ==> It will be stored at TPS and sold to traders regularly (business as usual).
- Other waste amount: 4.80 – 1.52 – 0.30 = 2.98 ton/day
  ==> Other waste is collected using plastic baskets (50 liters) on carts and emptied to the 6m3 container at the TPS. To make it easier to waste transferring from the basket to the container, a platform should be constructed at the TPS.

FRONT VIEW



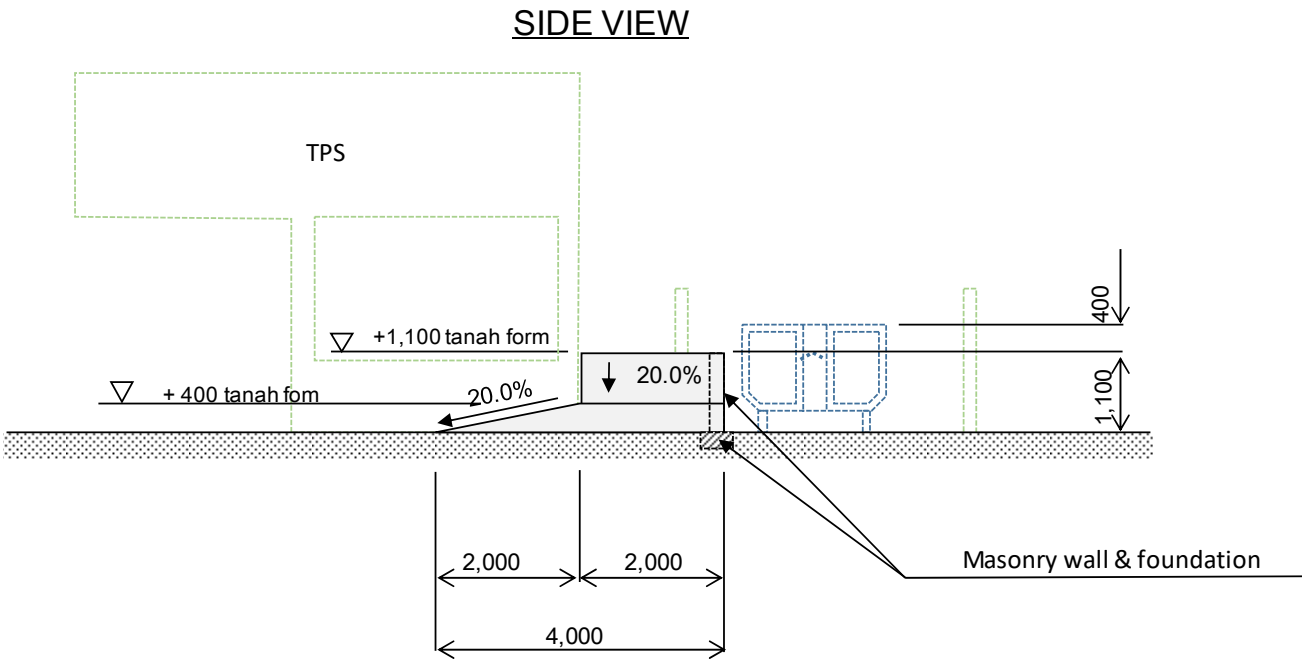


Figure 16 Font and Side View of the Platform of Sepinggan Market

2.3 Baseline Survey and Monitoring Plan

Items	Baseline survey	Monitoring
Timing	• By end of March, 2015	• After the PP commenced. (April 2015 – March 2016)
Final Disposal Amount	• Waste transport amount (weighbridge data) from the market to the TPA during one week prior to the PP	• Waste transport amount (weighbridge data) from the market to the TPA during one week prior to the PP
Material Recovery Amount	• Amount of waste sold by the waste collectors to the traders (interview)	• Amount of waste sold by the waste collectors to the traders (interview)
Waste composted	• 0 (January 2015)	• Amount of waste delivered to Kota Hijau nursery center and composted

2.4 Cost Estimation

Cost was estimated as below for DKPP to propose the budget for 2015.

The small truck with capacity of 1 ton and the arm roll truck for container transportation procured for the implementation of the SS-PP will be used also for the Com-PP. Therefore, no cost for them is necessary.

Miscellaneous cost includes 114 plastic baskets for the collection of vegetable waste and other

waste and eight sheets of water-proof sheets for composting operation.

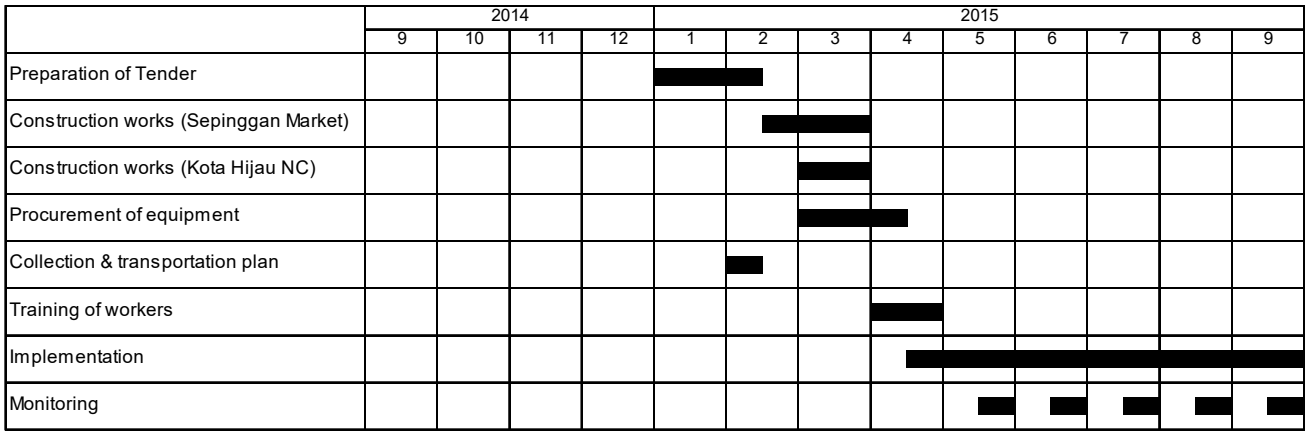
Operation and maintenance cost below is the cost needed from April to June 2015.

Table 22 Estimated Cost (Com-PP)

Items		Value (Rp)	Paid by
1	Initial cost for facility and equipment	197,340,000	
1.1	Facility development (platform)	63,440,000	BPN
1.2	Procurement of equipment (2 containers)	100,000,000	BPN
1.3	Miscellaneous (plastic baskets, sheets for composting operation, etc.)	22,200,000	BPN
1.4	Printing of awareness raising materials	11,700,000	JICA
2	Operation and maintenance	66,700,000	BPN
2.1	Manpower	46,200,000	
(1)	Workers for composting operation at Kota Hijau nursery center	46,200,000	
(2)	Workers for waste collection in the market (not shown as it is not additional.)	0	
2.2	Maintenance for equipment	2,500,000	
2.3	Utilities	18,000,000	

2.5 Implementation Schedule of Com-PP

Implementation schedule of Com-PP was planned as below.



3. Monitoring Results

Balikpapan city procured the plastic baskets by budget of fiscal year 2015, but the cost for the platform to be constructed at TPS and for the containers with capacity of 6m3 were not allocated.

Meanwhile, since PUPR decided to develop the TPST in Kota Hijau nursery center, the plan to expand the composting yard at Kota Hijau and compost the market vegetable was changed to one to

compost the market vegetable waste at the TPST. The construction work of the TPST was planned from august 2015 to November 2016, but financial shortage delayed it up to the time of this reporting (August 2017).

Although vegetable waste has been collected separately within the market, this Com-PP has not yet fully implemented. The facility to receive market vegetable waste, i.e. the TPST, must be completed and separate waste transportation system has to be established.

4. Lessons, Issues and Recommendations

4.1 Lessons Learnt

Waste separation at source needs a system to separately collect and transport the pre-sorted waste and a facility that receives it. In this Com-PP, the original plan to expand composting yard at Kota Hijau was changed to use the TPST, and further its construction schedule repeatedly delayed. Under such an unclear conditions about waste destination, the development of transportation system (platform construction and arrangement of transportation equipment) was inevitably postponed. This clearly proved the fundamental lesson that waste separation had to be designed in a holistic manner starting from the source to the treatment process.

As for the waste separation in the market, it was found that vegetable waste collection would be possible without troubles as vegetable waste was mostly produced at vegetable vendors and no other kinds of waste was mixed very much. It will be a right direction for the city to develop the vegetable waste composting system covering all the eight traditional markets under the city authority for waste reduction.

4.2 Issues for Improvement

PUPR plans to start test operation of the TPST in October 2017. To supply organic waste to this, the development of vegetable waste transport system is the present urgent issue for DLH. Without the platform, DLH considers not only the use of the small trucks as planned but also waste containers as a transportation means. If the small trucks are to be used, the idle time of them at the TD must be shortened by arranging enough number of containers. Accordingly, in any case either small trucks are used or containers are used for vegetable waste transportation, it is necessary to appropriately arrange all the containers owned by the city and to maximize their use.

4.3 Recommendations

- As stated above, DLH needs to immediately develop the vegetable waste transportation system for TPST.
- Since the TPST is not equipped with a weighbridge, the amount of incoming waste must be estimated by the number of vehicles. This then needs the understanding of unit volume of vegetable waste per one unit of vehicle.

- The city singed a minutes of understanding with PT. Pupuk Indonesia, a national fertilizer producer, and the company will buy compost produced in the city. In general, one of the obstacles to composting projects is how to secure a sales channel, but in case of Balikpapan, this issue is already cleared. Also, it is said that Ministry of Energy and Mineral Resources has a plan to develop an organic waste processing facility in the city. In order to make the best of such opportunities, DLH should first concentrate its resource to the development of vegetable waste transportation system for the Com-PP and acquire necessary expertise for next steps.

Appendix 1. Work Progress Table

	Activities	Responsible agencies & role: BPN	JICA	Plan & Progress	Year 2015 1 2 3 4 5 6 7 8 9 10 11 12	Year 2016 1 2 3 4 5 6 7 8 9 10 11 12	Year 2017 1 2 3 4 5 6 7 8 9 10 11 12
							Terminal evaluation; End of Project period
1. Pilot Project of source separation & separate collection in 13 RTs of Kelurahan Gunung Bahagia							
1.1	Preperation and Review of PP Implementation Plan	~~BAPPEDA,~~ DKPP, ~~BLH~~		Plan			
				Actual			
1.2	Socialization			Plan			
				Actual			
a)	Preparation of training materials for environmental cadre	BLH	○	Plan			
				Actual			
b)	Training of environmental cadres	BLH		Plan			
				Actual			
c)	Implementation of Socialization Activities	BLH		Plan			
				Actual			
1.3	Implementation of Pilot Project of source seperation&separate collection			Plan			
				Actual			
a)	Baseline survey of waste amount and composition of PP site	DKPP	○	Plan			
				Actual			
b)	Procurement of equipment and materials	DKPP		Plan			
				Actual			
c)	Establishment of operation system (Discharge, collection & sorting)	DKPP		Plan			
				Actual			
d)	Procurement of discharge bags	BAPPEDA, DKPP	○	Plan			
				Actual			
e)	Delivery of the discharge bags	BLH		Plan			
				Actual			
f)	Operation of the Pilot Project	DKPP	○	Plan			
				Actual			
1.4	Monitoring			Plan			
				Actual			
a)	Establishment of monitoring system	BLH, DKPP	○	Plan			
				Actual			
b)	Monitoring of the Project	BLH, DKPP	○	Plan			
				Actual			
1.5	Impact evaluation		○	Plan			
				Actual			
2. Expansion of the Pilot Project of source separation and separate collection to the whole Kelurahan Gunung Bahagia (57 RTs)							
2.1	Review of the implementation plan	BAPPEDA	○	Plan			
				Actual			
a)	Zoning of the Kelurahan area	BAPPEDA + DKPP	○	Plan			
				Actual			
b)	Collection planning	DKPP	○	Plan			
				Actual			
c)	Equipment planning	BAPPEDA + DKPP		Plan			
				Actual			
d)	MRF operation planning	BAPPEDA + DKPP		Plan			
				Actual			
e)	Socialization activities	BLH		Plan			
				Actual			
f)	Monitoring planning	BLH		Plan			
				Actual			
2.2	Socialization (before starting PP)	BLH		Plan			
				Actual			
a)	Training of environmental cadres	BLH		Plan			
				Actual			
b)	Socialiation to the residents	BLH +Kelurahan		Plan			
				Actual			
c)	Setting Halte Sampah	DKPP+ Kelurahan		Plan			
				Actual			
d)	Delivery of the discharge bags to residents	Kelurahan >> DKPP	○	Plan			
				Actual			
2.3	Construction of MRF	BAPPEDA + DKPP		Plan			
				Actual			
a)	Reform of the existing building	BAPPEDA + DKPP		Plan			
				Actual			
b)	Installation of belt conveyor	DKPP		Plan			
				Actual			
c)	Procurement of instruments (container, etc.)	DKPP		Plan			
				Actual			
d)	~~Preparation of storage (TPS 3R)~~	DKPP		Plan			
				Actual			

	Activities	Responsible agencies & role: BPN	JICA	Plan & Progress	Year 2015 1 2 3 4 5 6 7 8 9 10 11 12	Year 2016 1 2 3 4 5 6 7 8 9 10 11 12	Year 2017 1 2 3 4 5 6 7 8 9 10 11 12
							Terminal evaluation; End of Project period
2.4	Establishment of collection system	DKPP		Plan			
				Actual			
a)	Procurement of collection vehicles	DKPP		Plan			
				Actual			
b)	Appointment of collection crew	DKPP		Plan			
				Actual			
c)	Training of collection workers	DKPP		Plan			
				Actual			
d)	TPS closure	DKPP		Plan			
				Actual			
e)	Preparation of Transfer Station (T/S)	DKPP	○	Plan			
				Actual	PP in 13 RTs will continue to		
f)	Preparation of transportation system	DKPP		Plan			
				Actual			
2.5	Baseline survey (record of waste disposal amount)	DKPP		Plan			
				Actual			
2.6	Implementation of the PP (household waste)			Plan			
				Actual	PP in 13 RTs by JICA	PP in 57 RTs (Kel. GB) by BPN City	
a)	Socialization to improve waste separation and to promote home composting	BLH, DKPP, Kelurahan		Plan			
				Actual			
b)	Source separation and separate collection in whole Kel. GB (zone collection)	DKPP		Plan			
				Actual			
c)	Recyclable sorting at MRF	DKPP		Plan			
				Actual			
d)	Transfer of organic waste at T/S	DKPP		Plan			
				Actual			
e)	Landfilling organic waste collected in Kel. GB	DKPP		Plan			
				Actual			
f)	Transportation of organic waste collected to TPST	DKPP		Plan			
				Actual			
2.7	Implementation of the PP (commercial waste)	BLH		Plan			
				Actual			
a)	Socialization for the explanation of waste collection system	BLH		Plan			
				Actual			
b)	Source separation and separate collection (incl. recyclable sorting at MRF and organic waste transfer)	DKPP		Plan			
				Actual			
c)	Socialization to improve waste separation	BLH		Plan			
				Actual			
2.8	Monitoring of the PP	DKPP	○	Plan			
				Actual			
3. Pilot Project of composting of market waste from Sepinggan Market							
3.1	Review of the Implementation Plan	DKPP	○	Plan			
				Actual			
3.2	Construction of platform at the market building	DKPP, PU		Plan			
				Actual			
3.3	~~Preparation of compost yard at Kota Hijau Nursary Center~~	DKPP, PU		Plan			
				Actual			
3.4	Procurement of equipment (container, arm roll truck, etc.)	DKPP		Plan			
				Actual			
3.5	Explanation of separate collection to the collection workers and vegetable sellers	Market Dept.		Plan			
				Actual			
~~3.6~~	~~Training and producing compost in Kota Hijau~~	DKPP	○	Plan			
				Actual			
3.6	Transportation of vegetable waste to the compost facility at TP~~ATPST~~	DKPP		Plan			
				Actual			
4. Integration with TPST							
4.1	Construction of TPST at Kota Hijau Nursary Center by PUPR	PUPR		Plan			
				Actual			
4.2	Establishment of opeation system of TPST	DKPP		Plan			
				Actual			
4.3	Training of workers of TPST and trial operation	PUPR		Plan			
				Actual			
4.4	Operation of TPST (Composting of market waste & HH organic waste)	DKPP		Plan			
				Actual			
4.5	Monitoring of the PP	DKPP	○	Plan			
				Actual			
5. Expansion of the Pilot Project of source separation and separate collection to other Kelurahan							
6. Reporting of PP Monitoring Result							
6.1	Reporting of monitoring results every three months to KLHK and PUPR	DLH		Plan			
				Actual			c c c c c c c c c c c c

Plan | Activities conducted | Plan of PUPR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