

**MoLG-JICA Project for Capacity Development in Solid Waste  
Management in Palestine Phase-III (CDSWMP-III)  
- A Technical Cooperation between Palestine (MoLG) and Japan (JICA) -**

**CDSWMP-III Output 5 Activities / Project Webinar Series  
4<sup>th</sup> Webinar – Waste Composition in Palestine, 13<sup>th</sup> June 2021**

# **Proceeding of the 4<sup>th</sup> Webinar**

**\*\*\***

**Series Editor:**

**Suleiman Abu Mufarreh, Project Manager / Director General, Ministry of Local Government (MoLG)**

**Editor:**

**Rawan Tayeh, Specialist on Waste Reduction, MoLG-JICA Project**

**Technical Advisor:**

**Yosrea Ramadan, Project Member, Ministry of Local Government (MoLG)**

**Editorial Advisor:**

**Mitsuo Yoshida, Chief Advisor, MoLG-JICA Project / Senior Advisor, JICA**

**June 2021**

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**Disclaimer:**

The 4<sup>th</sup> Webinar was held as a part of the ODA (Official Development Assistance) technical cooperation project between Palestine (MoLG; Ministry of Local Government, Palestine) and Japan (JICA; Japan International Cooperation Agency) with the aim of promoting information exchange in the field of solid waste management in Palestine.

The Proceeding of the 4<sup>th</sup> Webinar contains the lectures presented at the 4<sup>th</sup> Webinar and discussions. The contents of the lectures and discussion were made at the responsibility of each author/speaker and do not express the official position of the MoLG-JICA Project, MoLG, or JICA. Each lecture material was simply posted as it was created under the responsibility of each author. Abstracts and discussion were summarized by the Editor of the Proceedings based on the presentations. The copyright of each lecture material belongs to each author. The content of each lecture is tentative in nature and may change with future developments, so if a reader wants to cite a part or all of presentation, it is recommended to obtain the consent of relevant author.

- Series Editor

**Corresponding Address of the MoLG-JICA Project:**

Directorate of Joint Service Council, Ministry of Local Government, P.O. Box 731, Ramallah

Attn: Suleiman Abu Mufarreh (Project Manager)

E-mail: [suleimana@molg.pna.ps](mailto:suleimana@molg.pna.ps)

Facebook: JSC Today, URL: <https://www.facebook.com/Jscoday/>

## Introduction

The Project for Capacity Development in Solid Waste management in Palestine Phase-III (CDSWMP-III) is targeting developing the technical capacity of the SWM institutions, namely MoLG and JSCs for SWM (13 JSCs in West Bank and 2 JSCs in Gaza). This Project overall goal is aiming at realization of waste reduction and minimization of waste amount over Palestine through implementing the Waste Reduction Program, (reduction of waste generation and various waste diversions from the waste stream flowing into landfills), and sustainable solid waste management systems are established in consideration of the environment and society. This goal is planned to be achieved through several Activities for minimizing waste generation and waste diversion throughout Palestine, where each JSC will prepare and start implementing a plan for minimizing waste generation, verification of effectiveness of methodologies of reduction in waste generation, waste diversion, reduction of waste disposed and appropriate disposal measures, drafting Law on 3Rs (Reduce, Reuse, Recycle) promotion is drafted for MoLG, and bylaws, regulations, standards, institutional design and/or guidelines necessary for promoting 3R practices, proposing for the next National Waste Management Strategy (2023-2027).

The Project will also formulate a National Waste Reduction Program including awareness raising program and appropriate SWM system designs for the entire Palestine, enhancing the Capacity for 3R promotion activities in MoLG-DJSC and JSCs, and support the JSCs in West Bank and Gaza through providing equipment and technical supports.

The Webinar Series will be organized for summarizing previous experiences and on-going activities in waste reduction, minimization, diversion and 3Rs promotion, and for sharing the knowledge and lessons among practitioners on the issues.

In the 4th webinar, the theme was the composition of waste in Palestine. The total amount of waste collected and transported in Palestine is reported to be more than 3,000 tons per day. In the SWM Data Book published in 2019 by the Project for Technical Assistance in Solid Waste Management in Palestine (Phase-II), about 50% is organic waste based on reporting from each JSC, while about 33% is paper, plastic, glass, and metal. Others unclassified materials account for 17%. However, it is just a rough description and detailed waste composition, its geographic, societal, seasonal, and temporal fluctuations are completely unknown. Without such information, a viable 3Rs and waste recycling policy cannot be developed. In this webinar, we will summarize the knowledge on waste composition in Palestine so far and examine the direction of future study required and policy formulation.

We hope the webinar can contribute for improving solid waste management system in Palestine.

Suleiman Abu Mufarreh, Webinar Series Editor & Project Manager, MoLG

Mitsuo Yoshida, Webinar Series Advisor & Chief Advisor of the Project, JICA

June 2021

## 1. Date, Time and Venue

- 09:00am to 11:00am, Sunday, 13th June, 2021 (Time in Palestine)
- Web Meeting System (Microsoft Teams)
- Webinar Moderator: Eng. Rawan Tayeh

## 2. Attendees

List of attendees including organizations and individuals is presented in Annex-A1.

## 3. Proceeding of Webinar Agenda

### 3.1 Welcoming and Objective of Webinar

Mr. Suleiman, the Project Manager of the MoLG-JICA Project started the 4th webinar by welcoming attendees. Then he mentioned the importance of this webinar and its relevance to the capacity development project implemented by MoLG and JICA which targets waste reduction over Palestine. Later, he asserted on the importance of achieving waste reduction and the impacts on environment as we do not have enough lands or capacity for landfilling. Also, he stated that the direction of the Palestinian Authority in general and MoLG in specific is to utilize renewable energy resources, reduce waste and promoting 3R's activities.

Eng. Rawan Tayeh, the waste reduction specialist of the project introduced the attendees and speakers. She also mentioned that the goal of this webinar is to compile all previous experiences in the field by experts in the West Bank and Gaza. She mentions that determining waste categories and composition plays a major role in promoting 3R's activities to achieve sustainable waste management.

### 3.2 Presentations

Set of PPTs were presented during this webinar. The title, speaker and summary of each presentation as following

**1st Presentation: Necessity of waste composition study for promoting recycling – General concept and Cases in other countries**

**Speaker:** Dr. Mitsuo Yoshida / Chief Advisor of the Project

**Organization:** JICA

**Abstract:** Waste reduction and minimization is a top priority for solid waste management in Palestine at this stage as the lack of lands for landfills, which pushes the efforts towards minimizing waste at different levels; that is waste reduction at source and waste diversion before final disposal (landfilling). Even if the WtE project currently planned by Palestinian Authority is commenced now, it can be operated for more than 10 years later due to investment process, design, construction and others. During these years, we should work on waste reduction and minimization, otherwise the environmental and social impacts will be disastrous. He pointed that recycling percentage of (30) % mentioned in the NSWM strategy is very general and we should think more on how we can achieve this target. The data required for conducting waste composition study is different including waste categories for identifying recyclables, which in some references are distributed to 37 different categories. However, we have a rough waste composition data with only 7 categories in West Bank and 17 categories in Gaza Strip. Also, we need the understanding of the geographical location impact on waste composition. Hence, it is very important to know where do we stand and what data do, we have, and if it is not available how can we get it.

**PPTs slides:**

1

**Waste Composition Study for Recycling Policy and Integrated Solid Waste Management Plan**

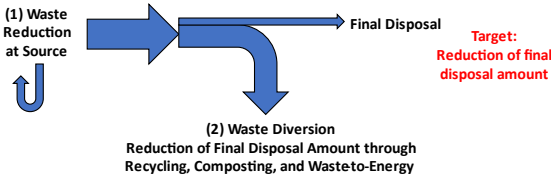
Mitsuo Yoshida, Ph.D.  
 Senior Advisor  
 Japan International Cooperation Agency (JICA)  
 June 13, 2021  
 CDSWMP-III Project 4<sup>th</sup> Webinar

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**Two Ways for reducing Waste Amount**



**We have only two ways:**  
**(1) Waste Prevention at source** (Saving behavior, Decrease of generation rate, Reuse, Source separation for recycling Home composting)  
**(2) Waste Diversion** (Composting, Material recycling, Waste -to-Energy by incineration or anaerobic digestion)

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## Waste Generation

- In **West Bank**, municipal solid waste generation is estimated at **2,622 tons/day (957,030 tons/year)**, and the per capita generation rate is **0.91 kg/day**. Around 65% of the generated municipal waste (1,711 tons/day) is collected by the JSCs, and the collection of the remaining quantities is under the responsibility of (LGUs) and UNRWA.
- The production of municipal solid waste in the Gaza Strip is estimated at **1,330 tons / day (485,450 tons / year)** and the average production per capita is **0.7 kg / day**. Approximately 12% of the municipal waste generated (157 tons / day) is collected by the JSC of southern Gaza Strip, the only council currently operating in the Gaza Strip.

Summary of Mohammed Barghouti based on Data Books (2017 & 2019)

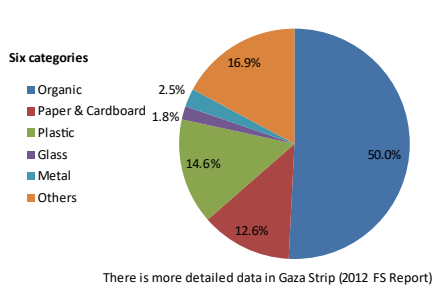
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## Currently referred waste composition data

SW Fractions in the West Bank



It was published in the Figure 1.1 of Data Book (2019)

However, it was an averaged data, and just showing general composition in six categories.

It is inadequate data for considering 3Rs and recycling policies.

**What kind of waste composition is required for our Project aiming Waste Minimization?**

Source: MoLG - JICA Project (2019) Data Book of Solid Waste Management of Joint Services Councils, West Bank and Gaza

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## Required Data of Waste Composition

- Appropriate categorization for material reuse and recycle
  - ASTM (approx. 22 categories), international (approx. 37 categories), or more depending local conditions and capacities of recycling sector
- Geographical variation
  - Urban area, Peri-urban area, Rural area
  - Residential area, Commercial area, Industrial area, Agricultural area
  - High-income zone, Middleincome zone, Lowincome zone, Slum
- Temporal variation
  - Weekly
  - Seasonal
- Waste Composition Study should be planned based on the purpose and given conditions

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## The current status and the future status after implementation of the National Strategy (2012/2022)

Achievement	Status in 2017	Status in 2019	Status in 2022
Percentage of recycled materials	Less than 1%	1%	30%
Percentage of transferring organic wastes into low quality compost for the purposes of coverage	2.5%	Less than 1%	2.5%
Coverage of residential areas	95%	95%	100%
Service coverage JSCs	76%	83%	100%
House separation of SW	0%	0%	20%
Coverage of sanitary landfills	53%	89%	100%

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## Our Questions

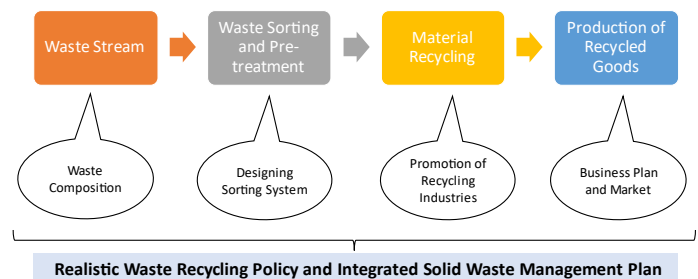
- We need accurate waste compositional data for promoting waste diversion.
- How to promote the waste diversion
  - Promotion of recyclables sorting
  - Promotion of recycling industries
  - Promotion of the market of recyclables
- Institutional development
- Key Question: **Which kind of recyclables is available in stable and sufficient quantities from the waste streams in Palestine?**

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Well-coordination among for components is required.



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**Examples of categorization for waste composition study**

**Table 7. List of ASTM D5231 Waste Component Categories (Designation D5231-92 from ASTM International, p. 2)**

Category	Material
1	High-grade paper
2	Computer printout
3	Other office paper
4	Newspaper
5	Corrugated
6	PET bottles
7	HDPE bottles
8	Film
9	Other plastic
10	Food waste
11	Wood
12	Other organics
13	Aluminum
14	Other ferrous
15	Other aluminum
16	Other ferrous
17	Other aluminum
18	Other ferrous
19	Other aluminum
20	Other ferrous
21	Other aluminum
22	Other ferrous

**Left:**  
ASTM D5231-92  
(22 categories)

**Right:**  
Pennsylvania DEP  
(37 categories)

Material Categories	Weights (Circle if net weight)
Paper	1 Newspaper
	2 Corrugated Cardboard
	3 Office
	4 Magazine/Glossy
	5 Polycoated/ Aseptic Containers
	6 Mixed Other Polycoated
	7 Other (Non-recyclable)
Plastic	8 #1 PET Bottles
	9 #2 HDPE Bottles
	10 #3-#7 Bottles
	11 Expanded Polystyrene
	12 Film Plastic
	13 Other Rigid Plastic
Glass	14 Clear
	15 Green
	16 Amber
	17 Other
Metal	18 Steel Cans
	19 Aluminum Cans
	20 Other Ferrous
	21 Other Aluminum
	22 Other Non-Ferrous
Organic	23 Yard Waste- Grass
	24 Yard Waste- Other
	25 Wood- Unpainted
	26 Wood- Painted
	27 Food Waste
	28 Textiles
	29 Diapers
	30 Other Organics
Inorganics	31 Brown Goods
	32 Carpet
	33 Other
	34 Other C&D
	35 Other
	36 Other
	37 Other Inorganics

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**Material Definition by the Pennsylvania Categorization 1/3**  
 Pennsylvania Waste Characterization Study  
 Final Material Definitions 7/18/91

Material Group	Material Category	Material Definition	Particulate	Non-Particulate
Paper	1 Newspaper	Printed and unprinted ground wood newspaper. This category includes glossy paper inserts included with the newspaper.		✓
	2 Corrugated Cardboard	Kraft Corrugated Cardboard (KCC) and Kraft Paper - Kraft linerboard and containerboard cartons and shipping boxes with corrugated paper medium (excludes wax or plastic coated boxes).	✓	
	3 Office	High-grade paper, bond, tag board, manila, or stationery grade paper with or without color (includes ledger, photocopy paper, computer printouts, manila folders, index cards, and envelopes (with and without windows or gummed labels)).		✓
	4 Magazine/Glossy	Magazines and catalogs printed on glossy, coated paper stock.		✓
	5 Polycoated/Aseptic Containers	Polycostated galb tin beverage cartons (such as milk and orange juice cartons) and aseptic drink boxes. Excludes non-beverage polycostated paperboard boxes.	✓	
	6 Mixed Paper (Recyclable)	Low grade recyclable paper. Includes paperboard, phone books, text books, other books and catalogs with groundwood paper, construction paper, junk mail, polycostated cartons and aseptic packages, blue prints, and glossy, coated paper (except magazines and catalogs).	✓	✓
	7 Other Paper (Non-recyclable)	Low grade non-recyclable paper. Includes tissue paper, napkins, paper towels, paper plates, paper food cartons, cigarette packages, waxed paper, wax or plastic coated corrugated boxes, coated FAX paper, and carbon paper, whether or not they are contaminated with fluids or food. Includes all other grades of paper if substantially contaminated with fluids or food waste, including toilet tissue.	✓	✓
Plastic	8 #1 PET Bottles	Clear molded plastic bottles and jars labeled #1 PET.		✓
	9 #2 HDPE Bottles	Clear molded plastic bottles and jars (both natural and pigmented) labeled #2 HDPE.		✓
	10 #3-#7 Bottles	Clear molded plastic bottles and jars labeled #3, #4, #5, #6, or #7.		✓
	11 Expanded Polystyrene	Food service polystyrene, polystyrene packaging, and "beanitos". - Any expanded foam product labeled #1.		✓
	12 Film Plastic	Any film plastic including garbage bags, retail bags, cereal bags, sheet plastic, shrink wrap, bagging, and other non-rigid plastic.		✓
	13 Other Rigid Plastic	Includes other thermofomed or injection-molded rigid plastic not captured in the above categories (includes tubs, trays and containers labeled #1, #2, #3, #4, #5, #6, and #7). Includes all non-container rigid plastics such as plastic pipe, electrical components, automotive components, toys, and framed plastic/moG-JICA Capacity Development Project	✓	✓

Pennsylvania State DEP (2000) Final Report of Statewide waste composition study

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**Why conduct a waste sort?**

A community might conduct a residential waste sort to address one of these six questions:

1. How can I set up a recycling program without knowing how many types of recyclables are in the waste stream?
2. How can I understand how effective my recycling program is without knowing how many recyclables are still in the trash?
3. How much non-recyclable materials are being put out in the recycling carts and becoming part of the residue stream at my material recycling facility (MRF)?
4. What areas of the community are doing a good job regarding quantity and quality with their recycling activities, and should we be spending more educational/awareness raising funds on certain lessparticipatory sections of the city to improve their recycling rates?
5. We are thinking about an organic waste recovery program: how much food waste and other organics are put into the waste stream?
6. If we think we want to seriously consider a wasteto-energy facility, what is the average moisture content heating value, and amount of non-combustibles in the waste stream?

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Bob Brinkner (2005) Are You Considering a Waste Composition Study? - Why and for What? MSW Management, Apr. 10, 2016

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**A waste sort can be expensive—what should you sort?**

There is no standard response to this question. Since more sorting equals more costs, the available budget for any sorting effort should also be evaluated on a marginal "cost versus benefit" basis. Examples of some of the issues associated with "what should you actually sort" are as follows:

1. If you do not have an extensive or vibrant recycling program, and most of your residential setout waste is still trash, sorting for recyclables is most likely the initial starting point.
2. If you have a reasonably good recycling program and are hoping to gain knowledge to increase the diversion of materials from the trash to recycling cart, for example, sorting the trash stream should be considered.
3. If you are getting feedback from your MRF operator that the recyclables includes a high amount of non-recyclables, sorting the recyclables can lead to confirmation of a problem and even support a potential targeted public relations programs.
4. If you have only a moderately successful recycling rate and the MRF operator is concerned about high contamination and residue levels, you may want to sort both the waste and the recyclables.

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Bob Brinkner (2005) Are You Considering a Waste Composition Study? - Why and for What? MSW Management, Apr. 10, 2016

14

**Planning of Waste Composition Study**

1. Defining the categorization based on the study purpose and local conditions
2. Determination of the targeted Area(s) and Timing
3. Measurement method ( 100-200 kg/batch)
4. Place and Equipment (Blue sheets, Containers for sorted items, tongs, weighing instrument (max 10kg), Plastic bags, Personal Protective Equipment (PPE), PC, etc.)
5. Organization of study team

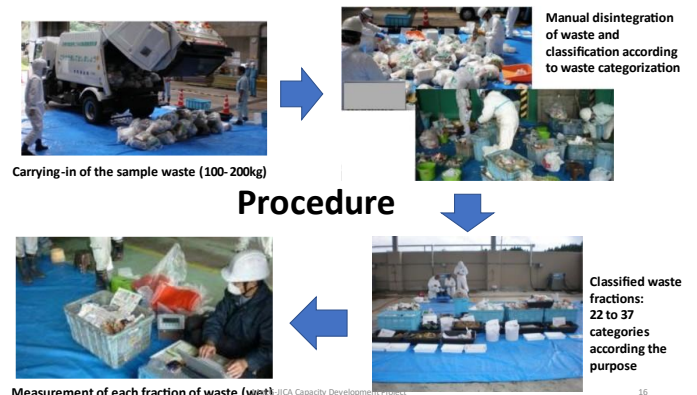


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Source of picture: Japan Environment and Sanitation Center

15



**Procedure**

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### **Guideline for Periodical Study and Information Disclosure**

1. It is recommended to update the waste composition data periodically, normally conducted **every two or three years** .
2. A Guideline is recommended to publish for planning and conducting a waste composition study in the same quality.
3. The results of waste composition study are recommended to be disclosed in the Web site and/or Data Book.



The screenshot shows a web browser displaying a data table. The table has columns for 'Waste Type', 'Unit', 'Percentage (%)', and 'Total (%)'. The data is organized into rows, with some rows highlighted in yellow. The table appears to be a summary of waste composition data.

Source of picture: Japan Environment and Sanitation Center

Thank you for your attentions



## 2nd Presentation: Feasibility and action plan for home and community composting systems: Anabta case study

**Speaker:** Dr. Tahseen Saya'ra

**Organization:** Palestinian Technical University Khadoori

**Abstract:** In the light of working towards waste reduction, PTUK is working in cooperation with Anabta municipality in Tulkarm on community and home composting to reduce organic waste. In this manner, the percentages of waste fraction are very important to determine the capacity of such projects, and what waste type to focus on. The project is currently planned and operated in Tulkarm and the work on designing the composters have started.

**PPTs slides:**

1

The Project for Capacity Development in Solid Waste Management in Palestine Phase-III  
 4th Webinar on waste composition in Palestine

**Feasibility and action plan for home and community composting systems: Anabta case study**


Dr. Tahseen Sayara  
 Palestine Technical University –Kadoorie

13/6/2021

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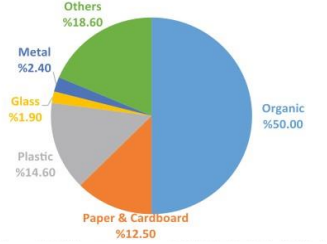
### Solid waste status in Anabta

- Anabta is a town Near Tulkarm, in Northern Palestine
- Number of inhabitants in Anabta is 9,000 capita
- Amount of solid wastes produced per year: 2,640 ton
- All unseparated solid wastes are collected by the municipality and discharged to Zahrat Al-Finjan landfill
- Organic waste percentage: 50 - 55%
- Organic wastes per capita per day: 0.55kg (approximate)



3

### Composition of solid waste in Palestine



Waste Type	Percentage
Organic	50.00%
Others	18.60%
Paper & Cardboard	12.50%
Plastic	14.60%
Metal	2.40%
Glass	1.90%

4

### DECOST Project in Anabta

The EU-funded DECOST (Decentralized Composting in Small Towns) project in Anabta aims to:

- Divert food wastes into compost, instead of being disposed in landfills
- Support urban agriculture in the town
- Adopt sustainable behavior for the participants and their families

**Through Decost project:**

- 90 home composters will be provided to residents in Kufr Rumman (suburb following to Anabta)
- 5 community composters will be installed in the municipality, volume of 5-7 m<sup>3</sup> for each composter.

5

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**Current status of cost details of solid waste management in Anabta**

Anabta municipality loses each month **€5,700**, due to:

- Residents pay fixed rates for waste disposal, and not related to quantity of wastes, while municipality pays according to wastes quantities
- No recycling activities are done in the municipality

Activity description	Rates paid by the municipality per month	Rates paid by municipality subscribers per month
ZAF collection and transportation from Anabta to JSC	€11,600	----
discharge from JSC transfer station to ZAF LF	€2,100	----
subscribers payments for waste management services	----	€8,000
<b>Total cost</b>	<b>€13,700</b>	<b>€8,000</b>
<b>Total payback to municipality (per month)</b>	<b>€5,700 (losing)</b>	

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**Home composter design**

Specifications of the Home composters that are provided to **Kufr Rumman**

- 92 "Dual chamber" 320 ltr composters
- Will be supplied to almost half of the residents in Kufr Rumman
- Expected to produce 25 -40 tons of compost yearly

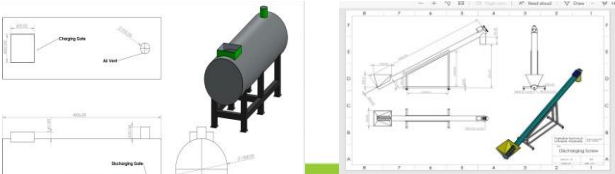


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**Community composters design**

Specifications of the Community composters that are provided to Anabta

- 5 closed system 5-7 m3 composters will be located in different areas in the town
- The system will be supplied with shredders, trummel, and required fixtures and testing equipments
- It is expected to cover the organic wastes from 50% of residents
- Expected to produce more than 300 tons of compost yearly



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**Initial and running costs for home and community composters**

Initial (fixed) costs for home and community composters

Item description	Cost per item
Home composters (92 composter)	€ 34,500
Municipal composters (10 municipal composters) and the related infrastructure	€ 150,000 (Approximate)
Shredder and vehicle	€ 15,000 (Approximate)
<b>Total</b>	<b>€ 199,500</b>

Expected running costs for home and community composters

Item description	Cost per item / month
Salary for technician operating the EC process	€ 400
Salary of field coordinator	€ 500
Cost of fuel oil for vehicle collecting organic wastes	€ 800
Cost of electricity for operational composters	€ 400
Cost of maintenance for machines	€ 200 approximate
Cost of collecting organic wastes and transfer to ZAF/ LF (Fajjan landfill)	€ 6,000
<b>Total monthly cost</b>	<b>€ 8,300</b>
Income from subscribers payments for waste management services	€ 8,000
<b>Net profit</b>	<b>€ 200</b>

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**Cost before installation of composters**

Cost before installation of composters, based on number of collections of waste per receptacle (rates in Euro)

Waste properties	Waste collection	Volume (Liters)	Nb. of WCB	Weekly collection frequency	Total no. of monthly collections per receptacle (average)	The cost of routine total monthly cost collection from one (source) receptacle
Domestic & Commercial mixed	Container	3.65m3	121	395.65	30	3989.5
Domestic & Commercial mixed	Container	3.65m3	50	82.5	3	12
Domestic & Commercial mixed	Can	400	11	4.74	7	30
			182			7121.4
						<b>5661.513</b>

11

**Cost after installation of home and community composters**

Cost after installation of composters, based on number of collections of waste per receptacle, and assuming participation of **30%** of the appointed residents

Waste properties	Waste collection	Volume (Liters)	Nb. of WCB	Weekly collection frequency	Total no. of monthly collections per receptacle (average)	The cost of routine total monthly cost collection from one (source) receptacle	Waste holder (private / municipal / business meeting)
Domestic & Commercial mixed	Container	3.65m3	121	395.65	30	3989.5	2854.4303
Domestic & Commercial mixed	Container	3.65m3	50	82.5	3	12	523.215
Domestic & Commercial mixed	Can	400	11	4.74	7	30	2,341.85
Domestic & Commercial mixed	Can	400	75	182	7	28	0.4
							<b>total collection cost</b>
							<b>3,547.63</b>
							<b>compensation</b>
							<b>2,000.00</b>
							<b>total</b>
							<b>5,547.63</b>

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Thank you...



### 3rd Presentation: Components of solid waste and the related challenges.

**Speaker:** Dr. Ali Barhoum

**Organization:** Gaza KRM JSC

**Abstract:** In 2012, a waste composition study was conducted in Gaza, it analyzed the waste component and percentage by weight. Results show that 56.6% is organic waste, 25.6% is recyclables and 17.8% is composed of other materials. Also, the increase in waste generation due to changes in lifestyle and other factors. At the end, it included ways to waste recovery through different technologies.

**PPTs slides:**

1



#### Components of solid waste & related challenges in Gaza Strip

13 June 2021

2



#### Waste Composition in Gaza Strip

Waste composition (by weight)<sup>1</sup>

	Waste Component	% by weight
1	Yard waste (non wood)	7.6
2	Organic food waste	31.84
3	Wood	0.77
4	Textiles	3.72
5	Diapers	9.9
6	Other Organics	2.73
7	Paper	7.31
8	Plastic	13.95
9	Ferrous	2.27
10	Aluminium	0.13
11	Glass	1.96
12	Sand / Fine materials	13.44
13	Other inorganics	4.37
	<b>Total</b>	<b>100</b>
1 to 6	Total Organics	56.56
7 to 11	Total Recyclables	25.62
12&13	Others	17.81

Percentage of Organic waste is  
**56,56 %**

Percentage of Recyclables is  
**25,62 %**

Percentage of Others is  
**17,81 %**

1: Feasibility Study of Gaza Solid Waste Management Project, 2012

3



#### Waste Generation (per capita) in Gaza Strip

Waste generation in Gaza Strip<sup>2</sup>

	2017	2018
Total Population of GS	1,899,291	1,961,406
Solid Waste Generation (Ton/Day)	1,709	1,726
Average generation (kg/day/capita)	0.9	0.88

The total waste generated constantly increases each year, following the increase of the population and the evolution of life style and livelihood conditions. However, although the increase of population, the waste generation rate in Gaza Strip was decreased in the last five years.

2: Thoni V., Matar S. (2019), Solid Waste Management in Palestinian Territories, Overview report. [http://www.cesvi.eu/wp-content/uploads/2019/12/SWM-in-Palestine-report-ThoniandMatar2019\\_compressed4.pdf](http://www.cesvi.eu/wp-content/uploads/2019/12/SWM-in-Palestine-report-ThoniandMatar2019_compressed4.pdf)

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4



#### Involvement in Waste Recovery Activities

##### 1. Plastics

Gaza Strip produces about **300 tons per day** of plastic wastes with a percentage of 16.1% from the total waste generation in Gaza strip. There are around **79 plastic recycling workshops** in Gaza Strip (**18 of them are large**, and others are small workshops work as sub-contractors who collect and grind the plastic wastes only before selling to the main large factories). These factories produce many types of products such as **electricity tools, pipes, kidsgames, water cannons, plastic containers, etc.**

It is estimated that **10 tons** are being recycled daily and **250 tons monthly**. This means that, currently, **not exceed 3%** of the daily generated plastic wastes are being recycled in Gaza Strip. Plastic wastes are collected mainly by **informal street wastepickers** who sell plastic to sub-contractors/plastic workshops.

Estimated Daily generation (Ton)	300
Plastic Recycling Workshops	79
Daily Avg. Recycling (Ton)	10
Monthly Avg. Recycling (Ton)	250

Size	Total	Workers
Large Factories	18	232
Small workshops	61	-



Ramlawi Factory for plastic Recycling

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### Involvement in Waste Recovery Activities

#### 2. Paper and Cardboard

Gaza Strip produces around **145 tons per day** of paper wastes with a percent of 8.4% from total the waste generation in Gaza. There are only **3 paper recycling factories** in Gaza Strip. It is estimated that **4-5 tons** of paper wastes are being recycled daily with **100 tons monthly**. This represents about **2 - 2.5%** of the daily paper waste generation is recycled in Gaza Strip.

Paper waste is collected mainly from some institutions such as schools.

Estimated Daily generation (Ton)	145
Paper Recycling Workshops	3*
Daily Avg. Recycling (Ton)	4-5
Monthly Avg. Recycling (Ton)	100

\* One of the workshops is non-operational since 2018.



Aziz Factory for Paper Recycling

**Source:**

- Feasibility Study of GSWMP (UNDP, 2012)

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### Involvement in Waste Recovery Activities

#### 3. Metals

In the Gaza Strip, there is no recycling factories for the scraps and waste metals, but factories exported the waste metals into Israel and Egypt once it is allowed to be exported.



Metal Waste bales

#### 4. Glass

In the Gaza Strip, there is no real glass recycling. Most of the waste glass is disposed to landfills. A very small portion is recycled as cullet for simple decoration and floor tiles purposes.



Recycling of Glass

#### 5. E-Waste

In the Gaza Strip, recycling of E-Waste is not common. There is no recycling workshop for E-Waste.

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### Involvement in Waste Recovery Activities

#### 6. Biodegradables

In Gaza, several attempts for composting have been performed in the last few years. Two of them were conducted by Gaza and Beit Lahia Municipality in the north of the Gaza Strip, and another two by NGOs in Rafah city, one was in cooperation with Rafah Municipality.

Further, there were some NGOs that tried to produce compost but their attempts were terminated at early stages. The Ministry of Agriculture conducted a composting plant which worked for a short period of time. It is estimated that less than 1% of the total solid waste flow is actually being composted in Gaza.

Gaza attempts and experiences of composting are not successful due to low quality of the product and the high competition of imported compost.



PEF and Municipality of Rafah Project (2012 - 2014)



Gaza Spring Unit, Jhr Aldeek Landfill



Thank you

#### 4<sup>th</sup> Presentation

**Speaker:** Eng. Majed Alsaree

**Organization:** Hebron and Bethlehem Higher JSC

**Abstract:** The presentation showed the results of a previous study made in Almenya landfill to split waste into 7 main categories and determine the percentage of each category. Results show that most of waste in the Southern area of West Bank is organic waste (46%) while 18.3% is plastic. This highlights the opportunity to reduce organic waste through composting as 32% of organic waste is compostable.

**PPTs slides:**

Waste Fraction	Percentage (%)
Organics	46.0
Plastics	18.3
Paper	10.9
Textile	6.1
Glass	2.3
Metal	1.8
Others	14.6

Total generation = 1200TPD, organic fraction = 552TPD  
70% or organic fraction is compostable = 386TPD which  
is equal to 32% of the total waste stream

### 3.3 Discussion and Q&A

Summary by: Eng. Rawan Tayeh (MoLG-JICA Project)

- ◆ Prof. Hafez Shaheen mentioned the importance of supporting municipalities and encouraging them to reduce waste, there was different project proposals for municipalities that were refused because they were not encouraged. There were different studies about waste in Palestine but at the same time we face different challenges; the administrative level, the private sector should be encouraged to participate. The technical level; no enough local experiences and the local market, that must be ready to receive the local recycled/ produced products.
- ◆ Dr. Ali Barhoum added that any study performed in the field of waste must be authorized from EQA, MoH, JSC's and municipalities. Also, the study level is critical as the data included is enough or not to put a strategy to encourage private sector to engage in the field. He also mentioned that we lack data on calorific value of waste.

- ◆ Dr. Tahseen Sayara raised the importance of recycling planning to know what waste should be considered and analyzed. It must be a national vision; a study to determine waste quantities and composition at the national level and to expect the future generation as well.
- ◆ Mr. Zahran Khleif added that PCBS have made an environmental survey in 2020, the survey targeted houses to know their waste generation and categories but the problem is that community do not pay enough attention and did not answer seriously so they might have told unrealistic data, the survey results are available on the PCBS website. In 2019, CESVI have made a study on waste and it was cumulative and gave a professional opinion. However, we still lack more studies on this field especially considering the geographical location.
- ◆ Eng. Mohammed Barghouthi mentioned that the main focus must be on coordination between LGU's and related associations. The MSW management should be on a national level; higher advisory committee at the national level including related ministries and parties, this is in order to be decision makers regarding the laws and regulations. He suggested to have advisory committee formulated by private sector representatives, ministry of general works, EQA, MoA and MoH and other parties.
- ◆ Eng. Abdelrahim Abulkombuz explained that there were previous projects implemented in the field of SW management, we need to evaluate these projects and their results to know their weakness and strength points and build on them. Gaza has many success stories in recycling the C&D waste especially after wars, in 2014, 100 % of C&D waste was successfully recycled. there were many industries in infrastructure and construction and companies were competing over C&D waste that is estimated by 300,000 tons from 2021 war on Gaza. However, the problem with the previous experiences is the difficulty in marketing, there must be a governmental party/ entity to follow up waste separation and recycling activities, and to support to market recycled items.
- ◆ Mrs. Taghreed Najjar explained that in Palestine we lack baseline data of waste composition based on geographical location. Each area has different commercial activities and this should be considered in the study. She recommends conducting a waste composition study including 15-20 category and based on the types we actually need; this study is to be updated every 5-10 years. Also, she mentioned that the study should include the calorific value of waste to determine suitable treatment technology. At the same time, the government should work on community's incentives to reduce waste especially plastic bottles. Same applies to private sector, where there should be incentives to reduce waste. She also mentioned that there is a protentional to partially finance such studies through UNDP. Thus, Eng. Yosrea added that further discussions is needed between MoLG and UNDP on this possibility.
- ◆ Dr. Mitsuo Yoshida added that the data from Gaza, 2012 is very helpful and important but it is old somehow and there is no later study or update to it. In West Bank, there is no similar studies. The aim of JICA is to support MoLG to develop better recycling strategies and basically it is a Palestinian internal issue, but if there is serious need to study waste composition, then JICA can work on financing a baseline study under the CDSWMP-III Project.
- ◆ Dr. Ali Barhoum asserted on Dr. Yoshida's opinion and that we need to start from waste categories not technologies.
- ◆ Dr. Issam Al Khatib added that there are 6-7 studies that were made, maybe the suggested study can be made based on them. He also asserted on the scientific research by educational institutions and that it should receive more attention. He suggested to study the chemical and physical properties of waste, but the cost of such aspects is very expensive, if there are any allocated funds then it can be performed locally.
- ◆ Eng. Yosrea mentioned the importance of this topic for MoLG and the efforts they are making in this regard through many activities. She also mentions that all of the recommendations will be presented to the SWM national team according to their request (not only this webinar but the previous webinars as well).

## 4. Participants' Comments in the Discussion Session

List of participants' recommendations compiled by the Editor:

- ◆ Reviewing all the studies that have been done related to the waste composition in Palestine and using them in preparing the terms of reference (TOR) required to be prepared and conduct a comprehensive and complete study of the waste composition in Palestine, taking into consideration the components required to be studied in a way that is compatible with the Middle East region and neighboring countries (*Dr. Ali Barhoum*).
- ◆ Creating a decision-making governmental body that is responsible for implementing the policy of reducing the volume of solid waste and has full powers related to this issue (*Dr. Ali Barhoum*).
- ◆ Preparing the legislation, laws and regulations that promote the application of the policy of reducing the volume of solid waste and regulating the relationship between the responsible authorities and the private sector, including incentives and privileges that can be granted to the private sector in order to encourage it to invest in this field (*Dr. Ali Barhoum*).
- ◆ A comprehensive study at the level of all governorates of the West Bank and Gaza Strip to determine the percentages of the main components of solid waste, after adopting the components that must be studied (*Dr. Issam Al Khatib*).
- ◆ Gradually conduct researches about the physical and chemical properties of municipal waste. (*Dr. Issam Al Khatib*).
- ◆ Detailed study about market identification and sustainability of recyclable materials (*Dr. Issam Al Khatib*).
- ◆ Structure Sustainable Waste Diversion/ Recycling Strategies, this includes: Policy considerations, regulations, economic incentives and disincentives, education and technical assistance and subsidization for sustainability (*Dr. Issam Al Khatib*).
- ◆ The need to study the most important administrative and institutional constraints that slow down the recycling process and to develop radical solutions to them (*Dr. Issam Al Khatib*).
- ◆ Prepare baseline data regarding waste composition for all the districts including the caloric value in order to decide what management approach to follow in each geographical area. The baseline data should be updated regularly (every five years) and it is recommended to be led by MoLG or the PCBS (*Mrs. Taghreed Najjar*).

## 5. Conclusions and Recommendations

The waste composition data currently published in the Data Book (2019) are very common in just 7 categories. In Gaza Strip, there are some data of detailed waste composition analysis available in 13 categories (Feasibility Study in 2012), but such survey data could not be found in the West Bank.

In order to promote material recycling and waste minimization in Palestine, a systematic waste composition survey of international standards is required, e.g., compositional analysis in 22 to 37 categories with geographic and temporal variations. Therefore, it is recommended for MoLG-JICA Project to make a plan of waste composition survey in accordance with international standards, in particular in the West Bank, and implement it as soon as possible.



## Annex-1: Participant List of the 4th Webinar

Name	Organization	Name	Organization
<b>Dr. Mitsuo Yoshida</b>	JICA	<b>Mr. Suleiman Abu Mufarreh</b>	MoLG
<b>Dr. Issam Al Khatib</b>	Birzeit University (BZU)	<b>Eng. Yosrea Ramadan</b>	MoLG
<b>Prof. Amer Hamouz</b>	Najah National University (NNU)	<b>Abeer Batma</b>	Palestinian Environmental NGOs Network (PENGON)
<b>Dr. Tahseen Saya'ra</b>	Palestinian Technical University Khadoori (PTUK)	<b>Dr. Ali Barhoum</b>	Gaza KRM JSC
<b>Prof. Hafez Shaheen</b>	An-Najah National University	<b>Eng. Hatem Abu Hamad</b>	MoLG-JICA project
<b>Ms. Yukako Akasaka</b>	JICA	<b>Ms. Reiko Shindo</b>	JICA
<b>Eng. Ula Aboudi</b>	MoLG-JICA project	<b>Zahrn Khleif</b>	Palestinian Central Bureau of Statistics (PCBS)
<b>Eng. Mohammed Al Barghouthi</b>	MoLG-JICA project	<b>Eng. Rawan Tayeh</b>	MoLG-JICA project
<b>Eng. Abdelrahim Abu Kumboz</b>	Gaza and North Gaza JSC	<b>Raed Aghbar</b>	Ministry of Agriculture (MoA)
<b>Mohammed Is'ayed</b>	Jericho JSC	<b>Haitham Zughayer</b>	The Agricultural Development Association (PARC)
<b>Majed Saree</b>	Hebron & Bethlehem Higher JSC	<b>Taghreed Najjar</b>	UNDP
<b>Mahmoud Othman</b>	Ministry of Health (MoH)	<b>Ibrahim Absah</b>	Environmental Quality Authority (EQA)

## Annex-A2: Agenda:



مشروع تطوير القدرات في إدارة النفايات الصلبة في فلسطين -الفرصة الثالثة  
The Project for Capacity Development in Solid Waste Management in Palestine Phase-III

أجندة اللقاء الرابع عبر الاتصال المرئي حول مكونات النفايات الصلبة في فلسطين

Agenda of the 4<sup>th</sup> Webinar on waste composition in Palestine

Speaker المتحدث	Subject الموضوع	Time التوقيت
--	تأكيد الحضور والاتصال Connection confirmation	09:05-09:00 ص
السيد سليمان أبو مقرح/ مدير عام دائرة مجالس الخدمات المشتركة/ مدير المشروع Mr. Suleiman Abu Mufarreh/ Project Manager/ Director General of General Directorate of Joint Service Councils	مقدمة عن المشروع وهدف الندوة Preface about the Project and the purpose of webinar	09:15-09:05 ص
د. ميتسو يوشيدا/ كبير المستشارين لوكالة التعاون اليابانية الدولية Dr. Mitsuo Yoshida/ Chief Advisor/JICA	أهمية دراسة مكونات النفايات لتعزيز إعادة التدوير - المفهوم العام والحالات في البلدان الأخرى Necessity of waste composition study for promoting recycling – General concept and Cases in other countries	09:25-09:15 ص
د. تصفين سيارا / أستاذة مساعد جامعة فلسطين التقنية حضوري Dr. Tahseen Sayara/ Assistant Professor/ PTUK	الجدوى وخطة العمل لأنظمة التسميد المنزلي والمجتمعي: دراسة حالة عينابا Feasibility and action plan for home and community composting systems: Anabta case study "	09:30-09:25 ص
د. علي برهوم/ المدير التنفيذي لمجلس إدارة النفايات الصلبة للهيئات المحلية في محافظات خان يونس ورفح والوسط Dr. Ali Barhoum/ Executive Director of the Gaza KRM JSC	مكونات النفايات الصلبة والتحديات المتعلقة بها Components of solid waste and the related challenges.	09:35-09:30 ص
د. ماجد الصريع/ مهندس فني في المجلس الأعلى للخدمات المحلي وبيت لحم Eng. Majed Alsaree/ Technical Engineer of H&B Higher JSC	مكونات النفايات في جنوب الضفة الغربية Waste composition in southern West Bank	09:40-09:35 ص
--	نقاش مفتوح Open discussion	10:40-09:40 ص
--	الختام والتوصيات Closure and recommendations	11:00-10:40 ص

## Annex-A3: News and Picture of Webinar

Newsletter on Project Facebook page (JSC Today):

<https://www.facebook.com/JscToday/photos/a.1489466044691424/2583747418596609/>

**Our Questions**

- We need accurate waste compositional data for promoting waste diversion.
- How to promote the waste diversion
  - Promotion of recyclables sorting
  - Promotion of recycling industries
  - Promotion of the market of recyclables
- Institutional development
- Key Question:
  - Which kind of recyclables is available from the waste stream in stable and sufficient quantities?

Participant thumbnails include: Taghreed Najjar (TN), +12, and others.

Participant thumbnails include: Rowan Tayeh, Tahseen Sayara, Ali JSC: KFM (Guest) (ゲスト), (Guest) محمد عبد الرحيم (مضيف), Ibrahim Absah (مضيف), Hafez, Yoshida, Mitsuo..., Taghreed Najjar, ulaa, mahmoud..., barghuathim, +11, and RS.