

Waste Management Technologies in Regions

Phase II (WMTR II)

Seasonal Study of the Morphological Composition of Solid Municipal Waste in Shida Kartli Region

Report

Tbilisi, Georgia
May 2018

This report was prepared by CENN for review by the United States Agency for International Development.



USAID Cooperative Agreement AID-114-A-17-00002

Prepared for:

Environmental Office of the Mission

Economic Development Office

USAID | Caucasus

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Report on Seasonal Study of the Morphological Composition of Solid Municipal Waste in Shida Kartli Region

Time period of the study: August 2017 – May 2018

Determination of the volumes of recyclables in municipal waste streams through identification of waste components is important for the assessment of technical and economic feasibility of waste recovery and recycling programs.

Since waste types and volumes vary depending on the season of a year, carrying out a seasonal morphological study of waste composition is recommended. The average level of reliability is sufficient for assessing waste recycling and recovery potential in different regions of the country.

To ensure efficient planning of waste recycling and recovery measures and programs, a seasonal (for four (4) seasons of a year) study of the composition of waste deposited in the Khashuri landfill was undertaken to determine the volumes and characteristics of waste. It shall be noted that the Khashuri landfill receives municipal wastes that are being collected in Khashuri, Borjomi and Kareli municipalities. Mixed samples of municipal wastes received from different settlements were analyzed.

The seasonal study, as indicated above, covered 4 seasons (sampling activities were carried out in August and November of 2017 and in January and May of 2018). Morphological composition of waste was studied during 7 days of each season. 100 kg of waste samples were collected and analyzed each day. In Total, 700 kg of mixed municipal waste samples were taken during the first, second, third and fourth seasons (each). In total 28 samples were collected. Waste samples were manually sorted. Each waste component was placed into a container designed for this specific type of waste and weighed. The process was photographed. Information obtained during the study was entered into Waste Composition Study Summary Forms. In total, 28 Waste Composition Study Summary Forms were completed for the Khashuri landfill during the reporting period. By the end of each season, reports reflecting the results of the study were prepared based on the relevant data.

The following main components from 46 components included in the Waste Composition Study Summary Form have not been recorded in analyzed municipal waste samples: major household appliances (14), non-ferrous containers (13), abattoir wastes (27), plastic films (19), furniture waste (43) and other (45) components.

During the study, waste collection trucks were transporting different number of waste tires. The landfill was stockpiling up to 10-12 tires per day for recyclers.

The results of the study were coded according to the 20th group “Municipal waste and similar commercial, industrial and institutional wastes including separately collected fractions” of the Annex 1 “List of Waste Groups” approved by the Resolution #426 of the Government of Georgia made on August 17, 2015 on Approval of the Regulation on Determination and classification of the list of waste by waste types and properties.

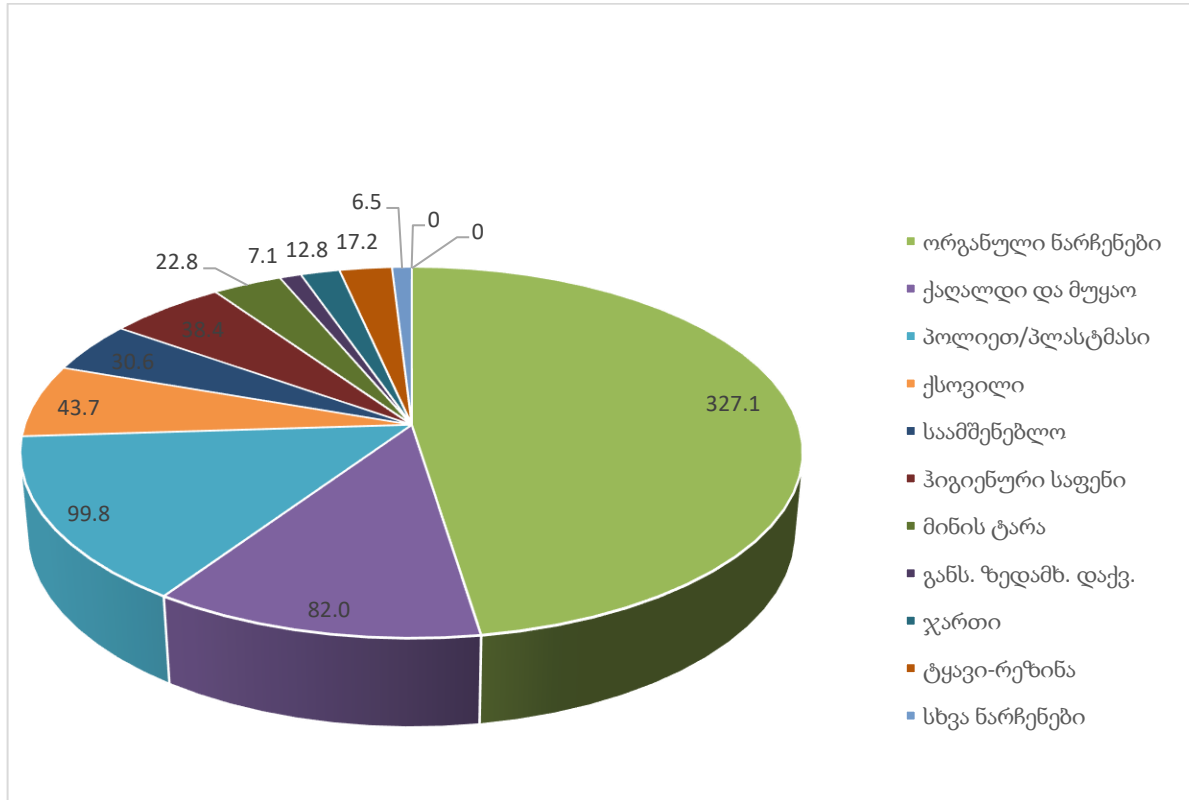
Ten (10) main waste categories from 46 waste components included in the Waste Composition Study Summary Form were identified during the process of determination of volumes and composition of waste:

Waste category	Code
Paper and paperboard	20 01 01
Glass	20 01 02
Metal/scrap	20 01 05
Polyethylene/plastic	20 01 39 20 01 03
Diapers	20 01 39
Textile	20 01 10
Organics	20 01 08
Construction and demolition waste	19 12 09
Special care waste	18 01 01 20 01 32
Leather and rubber	20 01 11
other waste	20 03 99

The Table below contains quantities (kg) of waste categories based on the seasonal study of the morphological composition of municipal wastes:

Waste category	I August 2017	II November 2017	III January 2018	IV May 2018	mean
Organics	311.35	380.85	294.15	322.0	327.1
Paper and paperboard	64.95	72.3	105.55	85.35	82.04
Polyethylene/plastic	106.7	75.1	127.35	90.1	99.81
Textile	53.2	39.55	38.1	43.75	43.65
Construction waste	23.9	37.7	19.35	41.4	30.59
Diapers	42.65	32.75	42.0	36.0	38.35
Glass	39.4	11.4	17.0	23.2	22.75
Special care waste	13.8	6.0	3.65	4.9	7.1
Scrap	11.85	5.6	17.65	16.05	12.79
Leather/rubber	18.35	22.75	7.4	20.18	17.17
other waste	7.04	10.5	3.15	5.2	6.47
loss	6.0	5.4	3.0	2.55	4.24

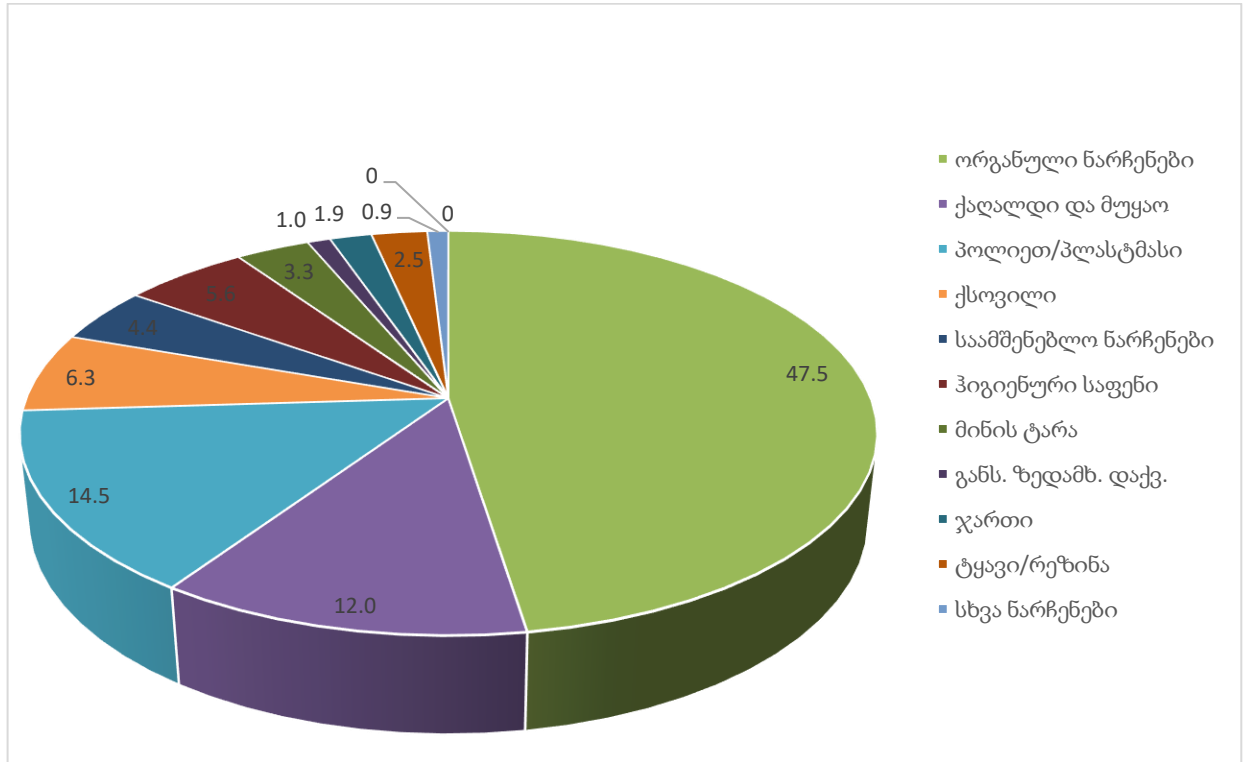
Mean quantities (kg) of waste categories based on the seasonal study of the morphological composition of municipal wastes:



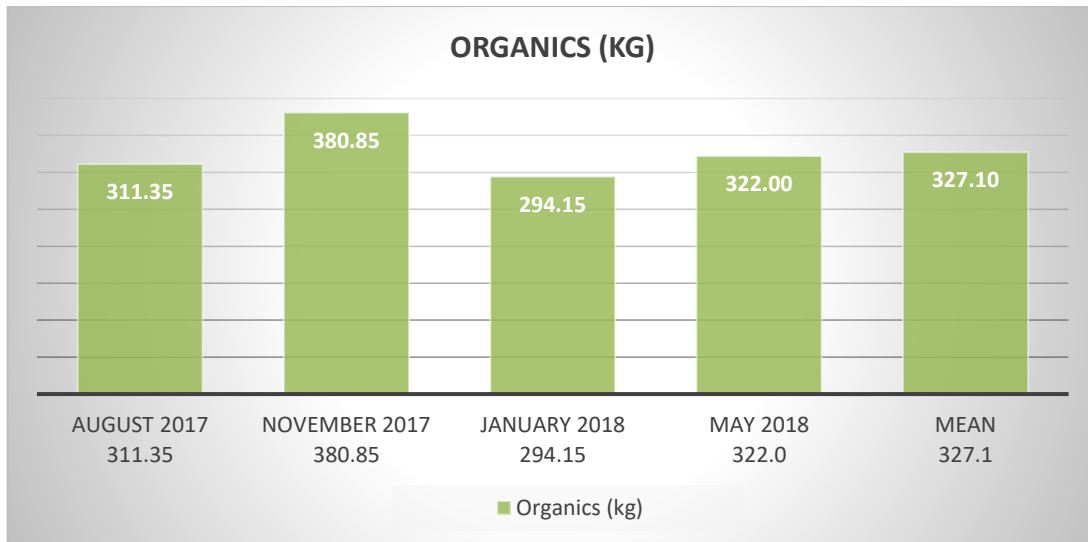
Percentage of waste categories based on the seasonal study of the morphological composition of municipal wastes:

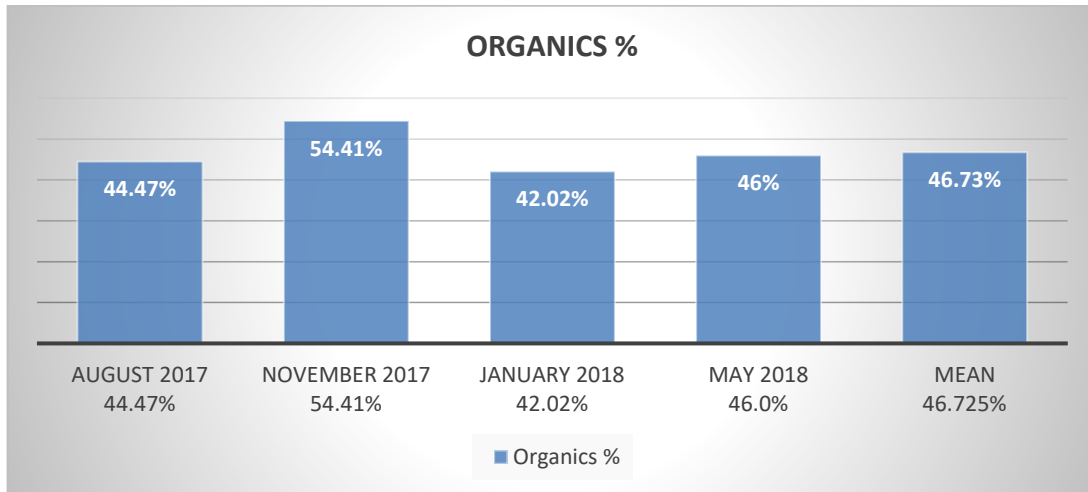
Waste category	I August 2017	II November 2017	III January 2018	IV May 2018	mean
Organics	44.47	54.41	42.02	46.0	46.725
Paper and paperboard	9.28	10.33	15.08	12.19	11.72
Polyethylene/plastic	15.24	10.73	18.19	12.87	14.2575
Textile	7.6	5.65	5.44	6.25	6.235
Construction waste	3.41	5.38	2.76	5.91	4.365
Diapers	6.09	4.68	6.0	5.14	5.4775
Glass	5.63	1.63	2.43	3.31	3.25
Special care waste	1.97	0.86	0.52	0.7	1.0125
Scrap	1.69	0.8	2.52	2.29	1.825
Leather/rubber	2.62	3.25	1.06	2.88	2.4525
other waste	1.06	1.15	0.45	0.74	0.85
loss	0.86	0.77	0.43	0.36	0.605

Mean percentage of waste categories based on the seasonal study of the morphological composition of municipal wastes:

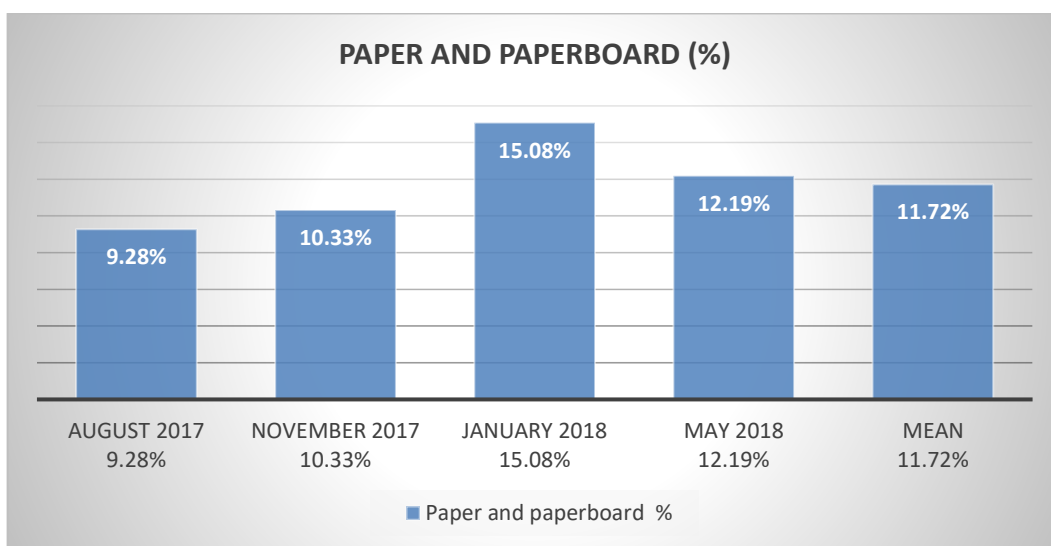
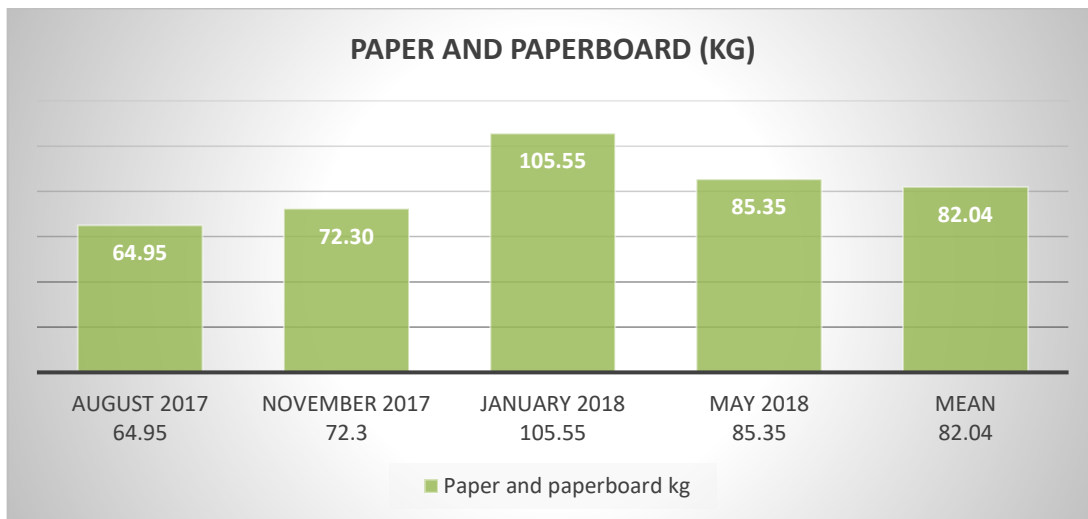


Organics – code 20 01 08 – food waste, garden waste, agricultural waste, abattoir waste, poultry fluff and remainder/composite waste.

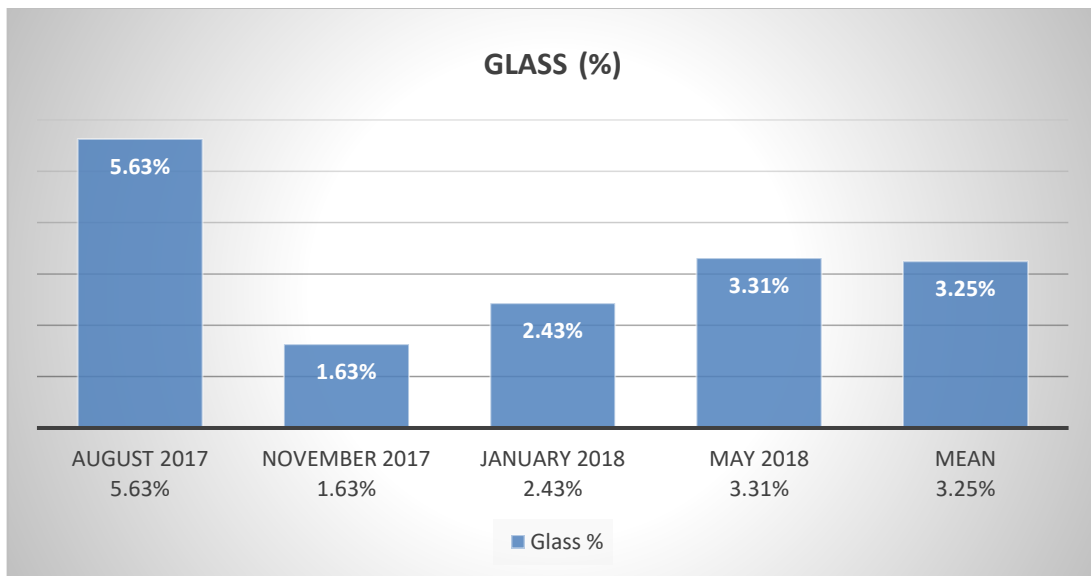
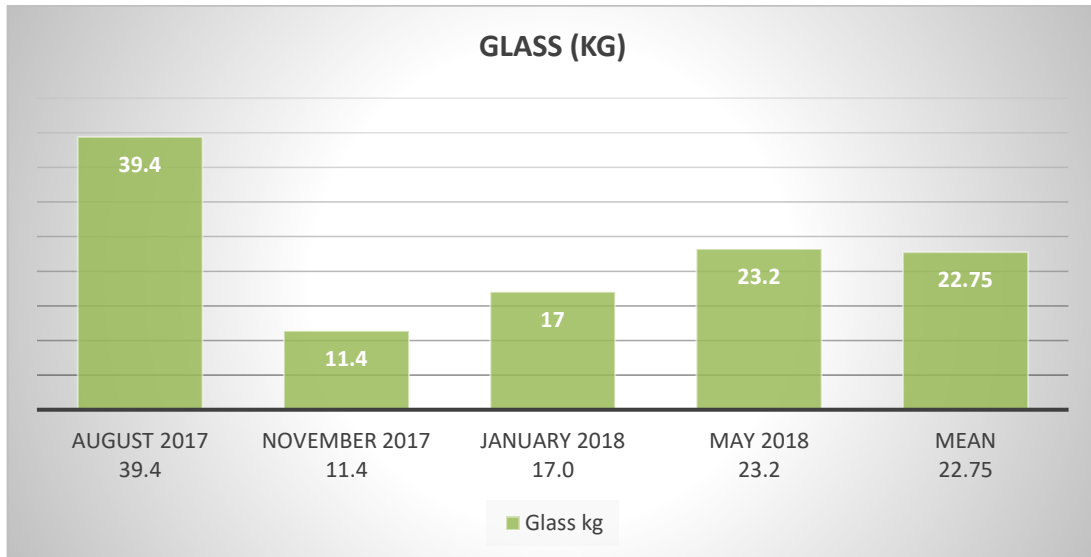




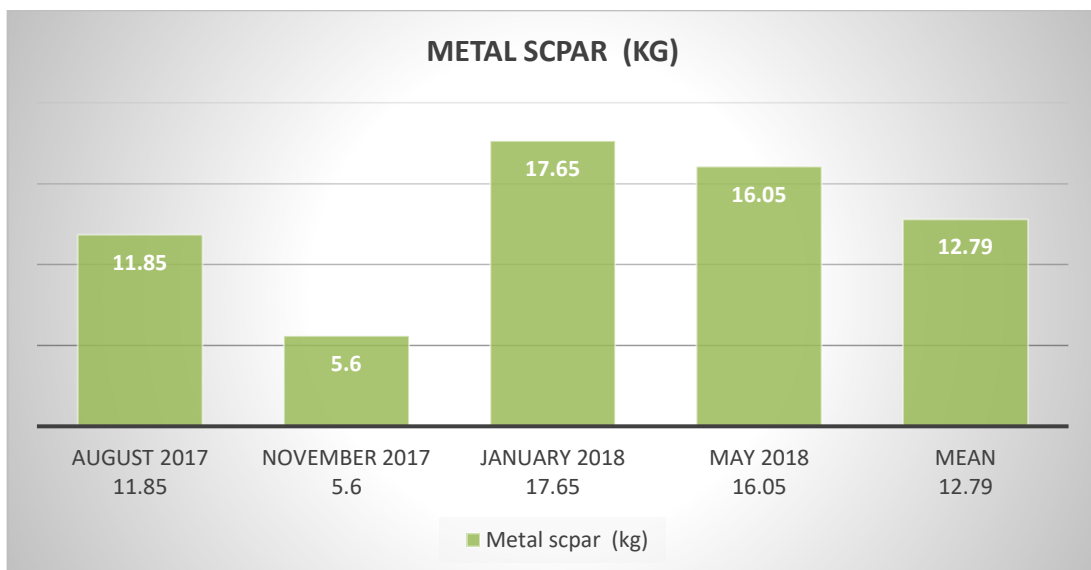
Paper and paperboard - code 20 01 01, includes newspapers, cardboard/boxboard, magazines/catalogues, office paper and other/miscellaneous paper.

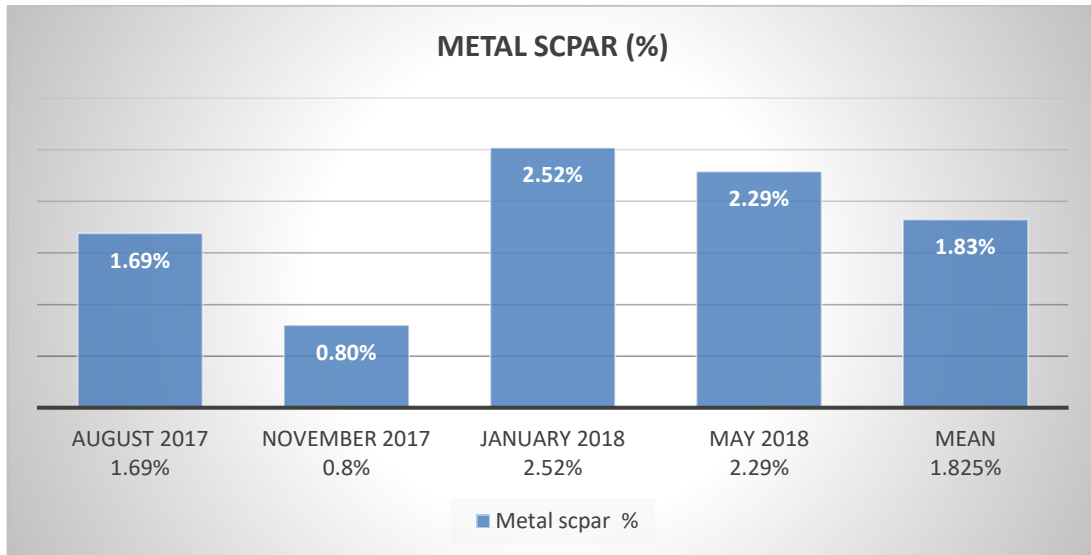


Glass – code 20 01 02, includes clear containers, green containers, amber containers and remainder/composite glass.

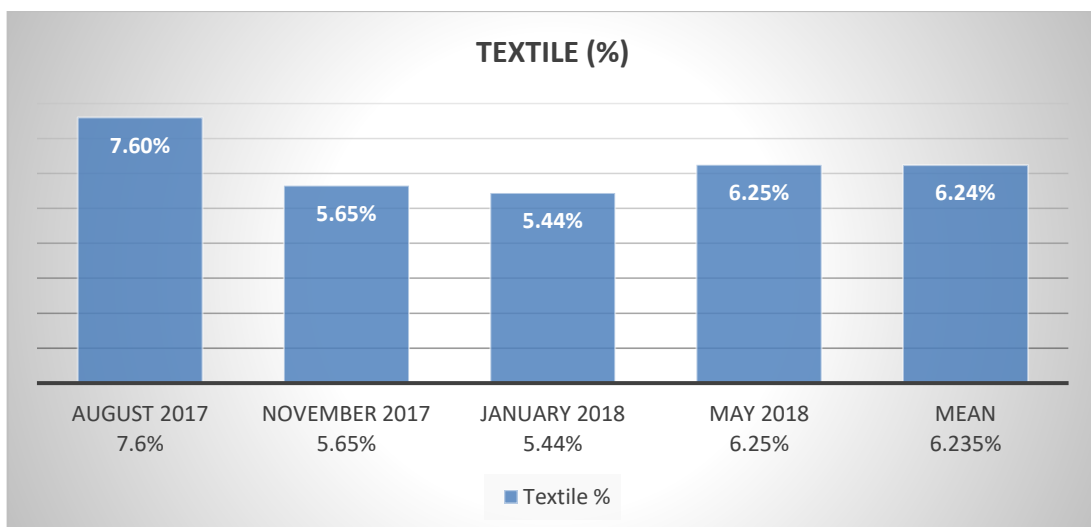


Metals – code 20 01 05, includes tin/steel containers, aluminum containers, ferrous metal, non-ferrous containers and major appliances.

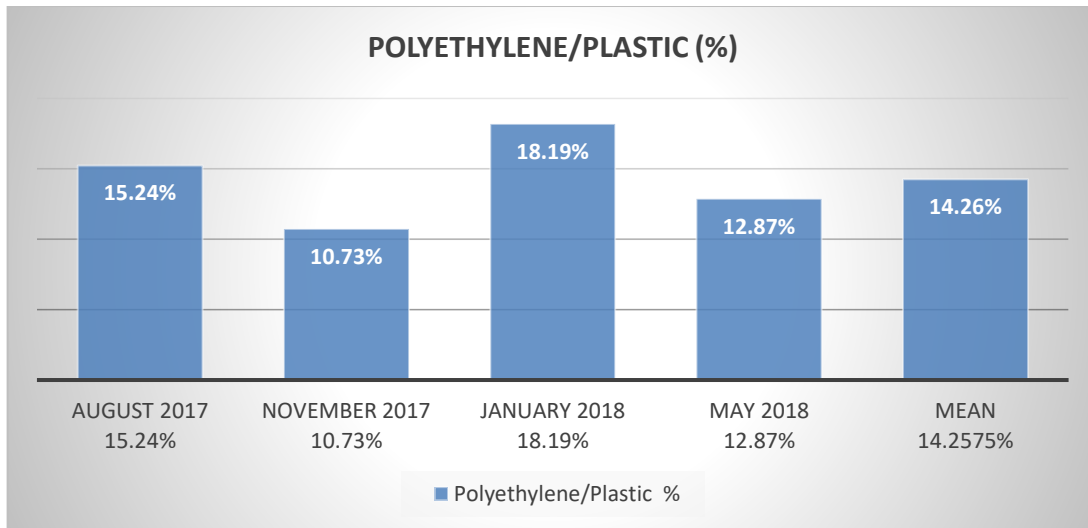
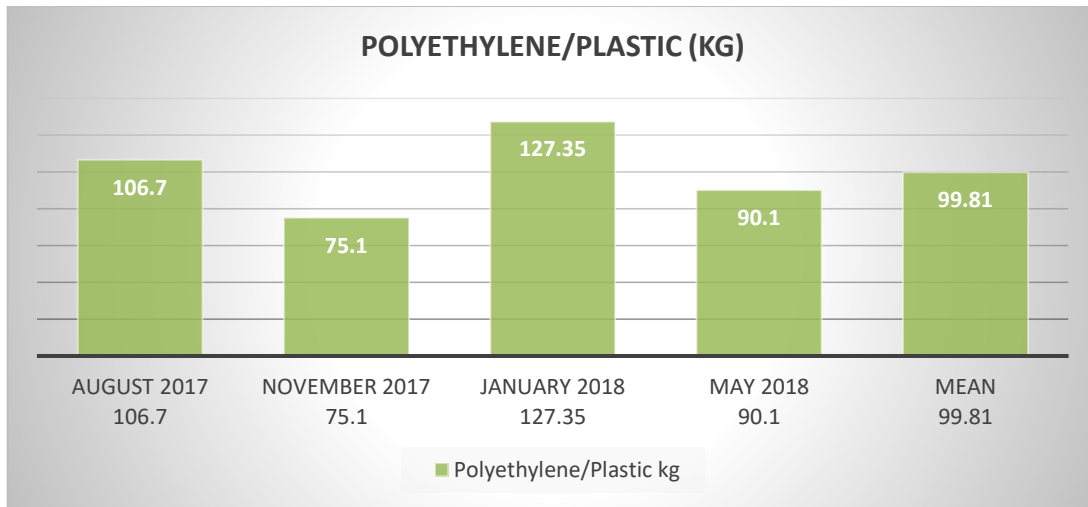




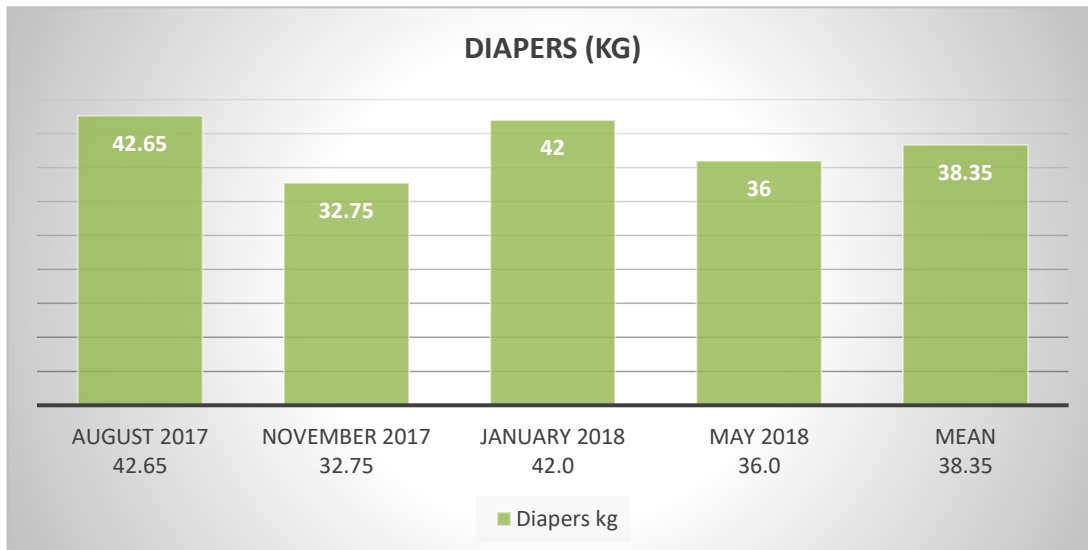
Textile – code 20 01 10, textile.

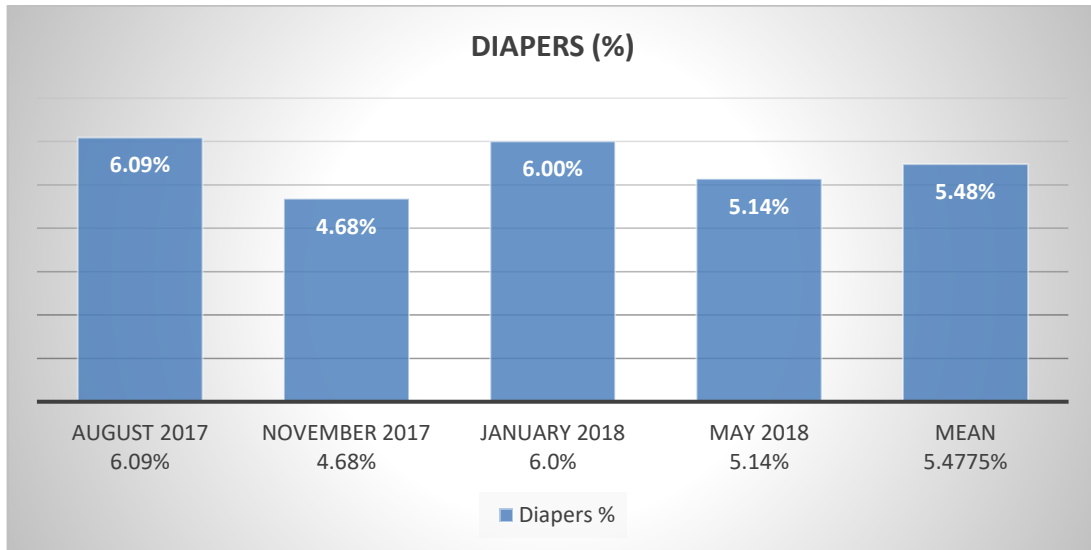


Polyethylene/plastic – code 20 01 39; 20 01 03 includes PET containers, including clear, green and amber containers, clear PET containers, green PET containers, amber PET containers, black PET containers, film plastics, HDPE containers and other plastics.

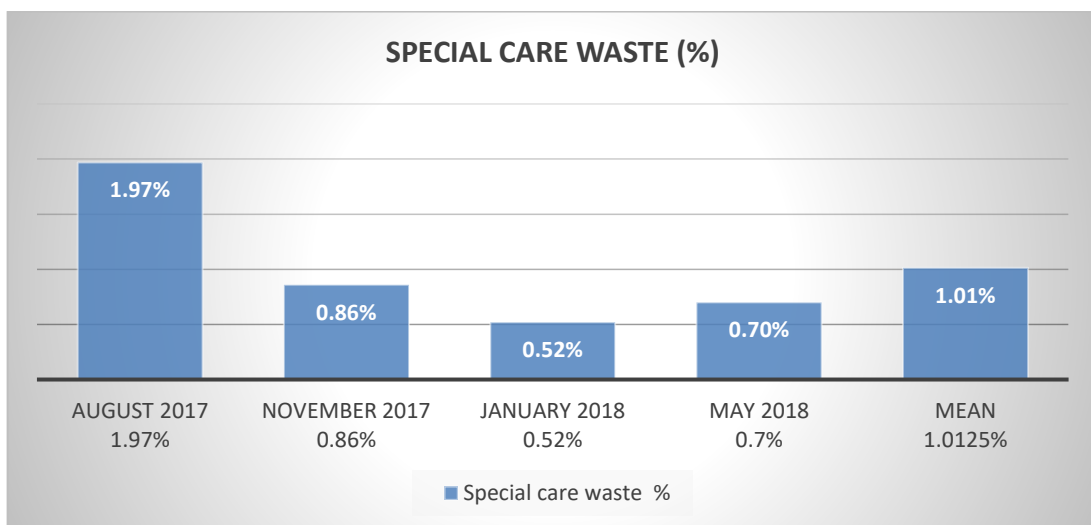


Diapers - code 20 01 04, diapers.

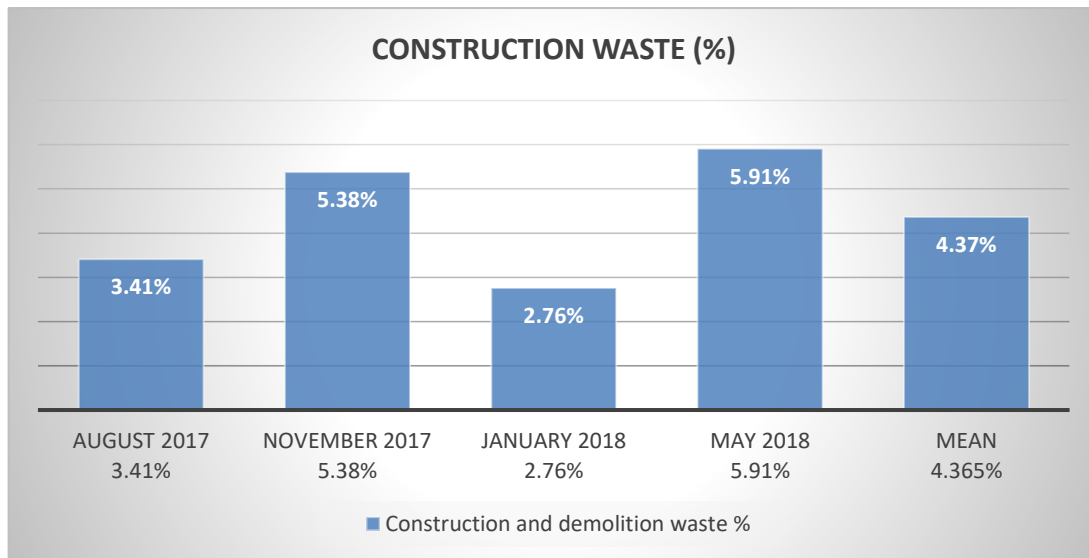
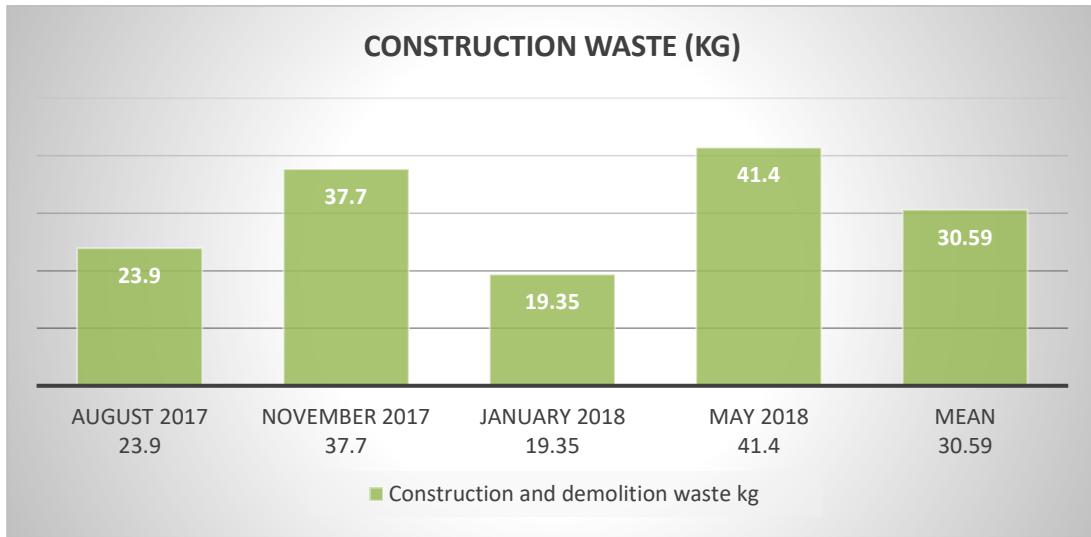




Special care waste – code 20 01 32 – includes paint, hazardous materials including agrochemicals and their packaging materials as well as those including oil products, biomedical, batteries, oil filters and remainder/composite waste.

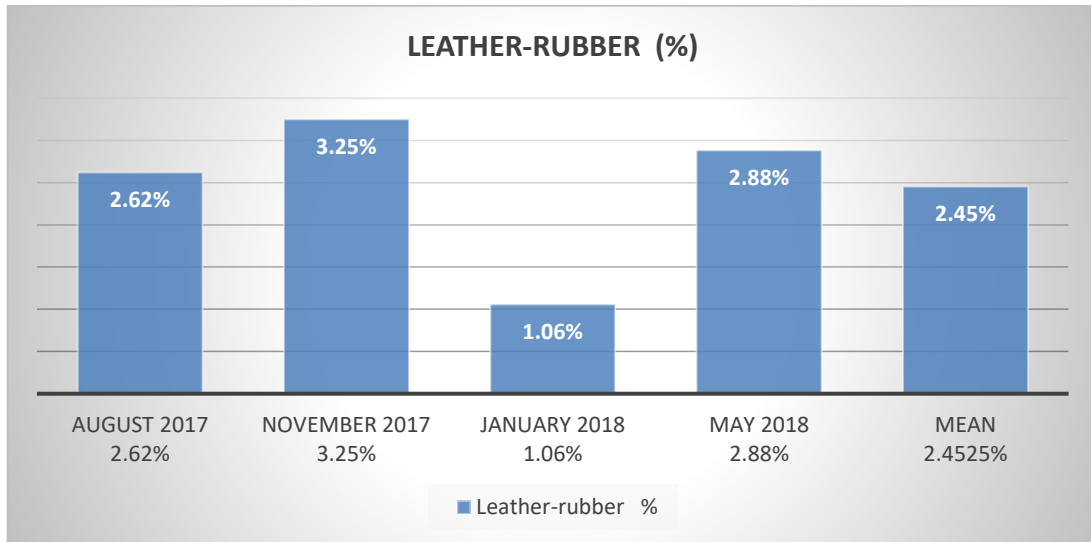


Construction and demolition waste – code 19 12 09 – includes concrete, lumber and remainder/composite construction and demolition waste.

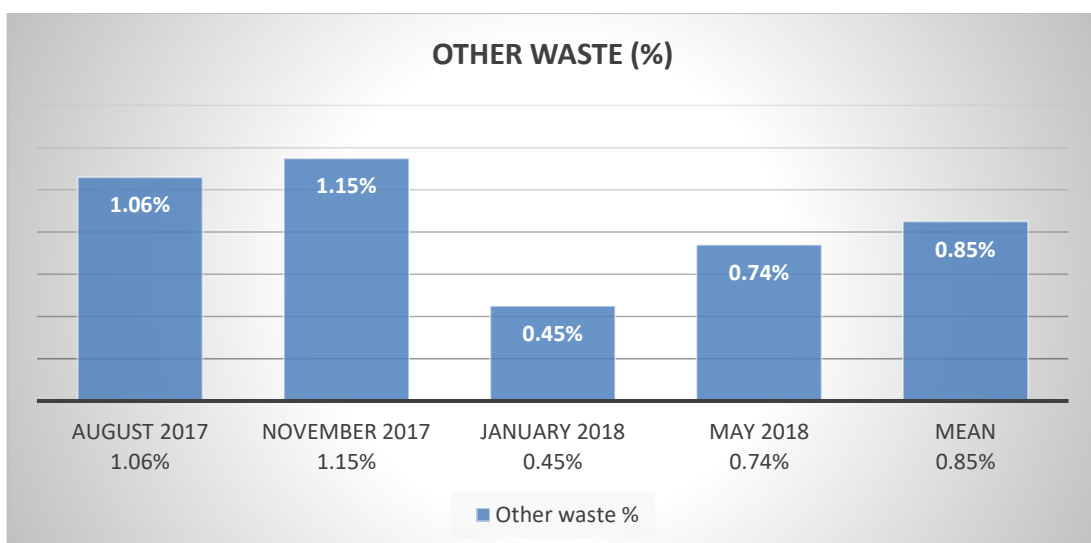
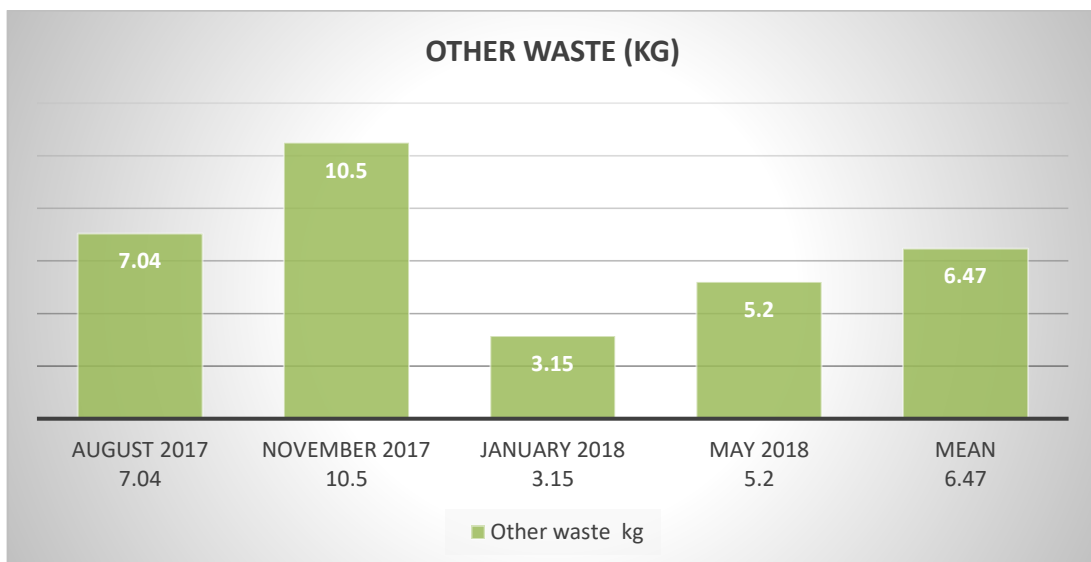


Leather-rubber – code 20 01 11 – Leather and rubber items.

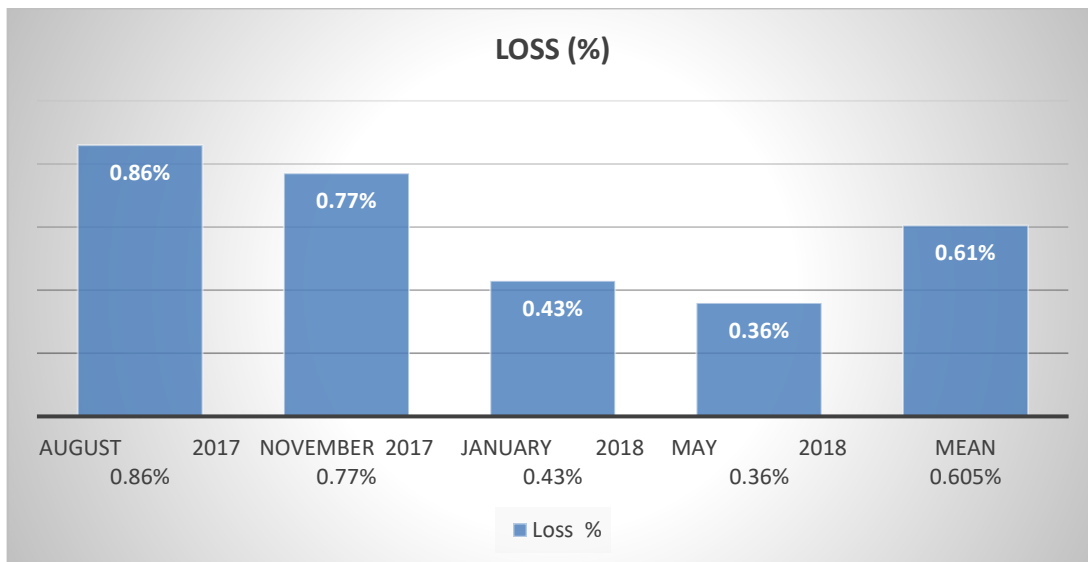
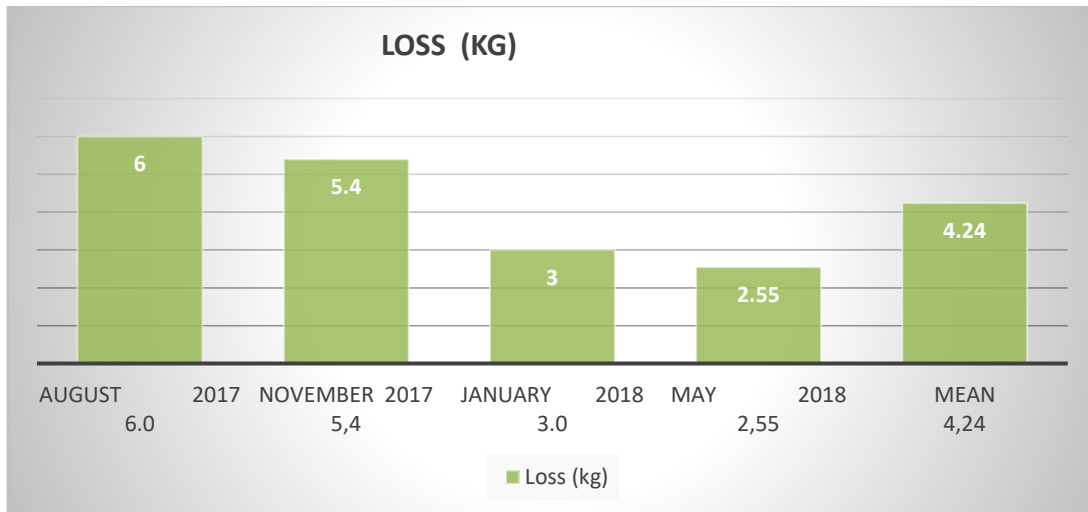




Other waste – code 20 03 99 – Waste electrical products, furniture, ceramics, other and <10 mm.



Loss – reduction in the quantity of a sample (100 kg) after determining its composition, due to impact of wind or sun radiation. Total loss during the seasonal study (700 kg):



The above described composition of waste reflects the actual morphological composition of waste disposed on the Khashuri landfill.

Correlations between the results of the studies undertaken during the different seasons have been determined. Namely, the correlation between: the results of the first season and the results of the second, third and fourth seasons and mean indices; the results of the second season and the results of the third and fourth seasons and mean indices; the results of the third season and the results of the fourth season and mean indices; the results of the fourth season and mean indices have been established.

	Correlations	%	Correlations
1-2	0.984333		1-2
1-3	0.978019		1-3
1-4	0.990534		1-4

1-5	0.99521	1-5	0.995228
2-3	0.957849	2-3	0.957849
2-4	0.994241	2-4	0.994241
2-5	0.992128	2-5	0.992251
3-4	0.979697	3-4	0.979697
3-5	0.985062	3-5	0.984873
4-5	0.998575	4-5	0.998596

The Khashuri landfill receives up to 35-40 tons of municipal wastes a year. Percentage and quantity of each waste component in municipal waste accepted by the Khashuri landfill is shown in the table below:

Waste category	Code	%	Tons/year
Paper and paperboard	20 01 01	11.72	4688
Glass	20 01 02	3.25	1300
Metals	20 01 05	1.82	728
Polyethylene/plastic	20 01 39 20 01 03	14.2575	5703
Diapers	20 01 04	5.48	2192
Textile	20 01 10	6.24	2496
Organics	20 01 08	46.73	18692
Construction waste	19 12 09	4.37	1748
Special care waste	20 01 32	1.0	400
Leather/rubber	20 01 11	2.45	980
other waste	20 03 99	0.85	340
loss (moisture - 0,43 %)0.6		240	

The results of the calculations reflect the potential of wastes of different types and characteristics that are generated in the region and therefore can serve as a basis for planning waste separation and treatment processes. Some individuals collect waste plastic, polymer materials, PET bottles and paperboard in the region and transport collected waste to recyclers (based in Tbilisi and other regions). These individuals are not officially registered and therefore the number of collectors is not known. Glassware is being collected and reused in an unorganized manner with violation of respective rules and standards.

Organic fractions make 46.73% of the total amount of municipal wastes accepted by the landfill. Therefore, a site for the construction of composting plant for producing a valuable soil amendment can be allocated in the region.

Recycling of plastic will result in 10-15% reduction of total amount of wastes deposited on the landfill due to the high amounts of plastic in wastes. Plastic recycling facilities do not operate in the Khashuri municipality, however such wastes can be collected and transported to recyclers located in Tbilisi or to the nearest recycling facilities.

Based on the results of the study, 14.25 % of wastes fall under plastic/polyethylene code, out of which 7.22% are plastic, PET and HDPE. The practice of recycling of these types of wastes already exists in the country, however none of the recyclers operate in Shida Kartli region, therefore, in case of organized collection these wastes should be transported to the nearest recycling facilities.

Paper and paperboard wastes make 11.72% of the total amount of accumulated waste. They are not separately collected and recycled. Effective measures have to be introduced to ensure recycling of paper and paperboard, otherwise these valuable resource will be lost.

The study of the waste components showed that due to the current practice of waste collection, transportation and disposal, up to 90% of recyclables are being buried, the decomposition of which require long periods of time. Organic and semi-organic matters decompose and emit greenhouse gases, mainly methane and carbon dioxide when buried.

To reduce GoG emissions, as required by the UNFCCC to which Georgia is a party, many countries collect methane or use it as energy source (electricity, gas). Where methane is not collected and burned, unpleasant odors are spread over neighboring areas and GoG are emitted into air. Generation of gases from organic fractions usually starts in a few months after their disposal and occurs during the whole lifecycle of the landfill. The total period of emission of landfills gases is about 70 years. It is recommended to undertake timely measures and establish waste recycling facilities for different waste types and properties. The following activities have to be implemented:

- Introduce a source separation system for municipal wastes to ensure separate collection of wastes according to their type and properties and their transportation to relevant recycling facilities;
- Introduce incentives (i.e., exempt from taxes) to encourage recycling facilities (including collectors) during 3-5 years from the start of operation;
- Facilitate marketing and sale of recycled materials using different methods, including financial mechanisms;
- Increase coverage and promotion of recycling facilities via media, organize business forums, exhibitions and other events to attract investments in waste management.