

## Waste Management Technologies in Regions

### Seasonal Study of the Morphological Composition of Solid Municipal Waste in Kakheti Region

**Report**

May 31, 2016



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USAID Cooperative Agreement AID-114-LA-14-00001

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## **Report on Seasonal Study of the Morphological Composition of Solid Municipal Waste in Kakheti Region**

Time period of the study: July 2015 – April 2016

Determination of the volumes of recyclables in municipal waste streams through identification of waste components is important for the assessment of technical and economic efficiency 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 disposed in the Telavi landfill was undertaken to determine the volumes and characteristics of waste. Mixed samples of municipal wastes received from different settlements were analyzed.

The seasonal study, as indicated above, covered 4 seasons (summer, fall, winter and spring) from July 2015 till April 2016. Morphological composition of waste was studied during 7 days of each season. 100 kg of waste samples were collected and analyzed each day. 100 kg of waste were collected per day. In Total, 700 kg of mixed waste samples were collected 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. Waste Composition Study Summary Forms were filled during each season. In total, 28 Waste Composition Study Summary Forms were completed for the Telavi 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), furniture waste (43) and other (45) components.

During the study, waste collection trucks were transporting different number of tires along with other wastes to be disposed on the landfill. The landfill was receiving and landfilling up to 10-12 tires per day.

The results of the study were coded according to the 20<sup>th</sup> 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.

Specifically 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:

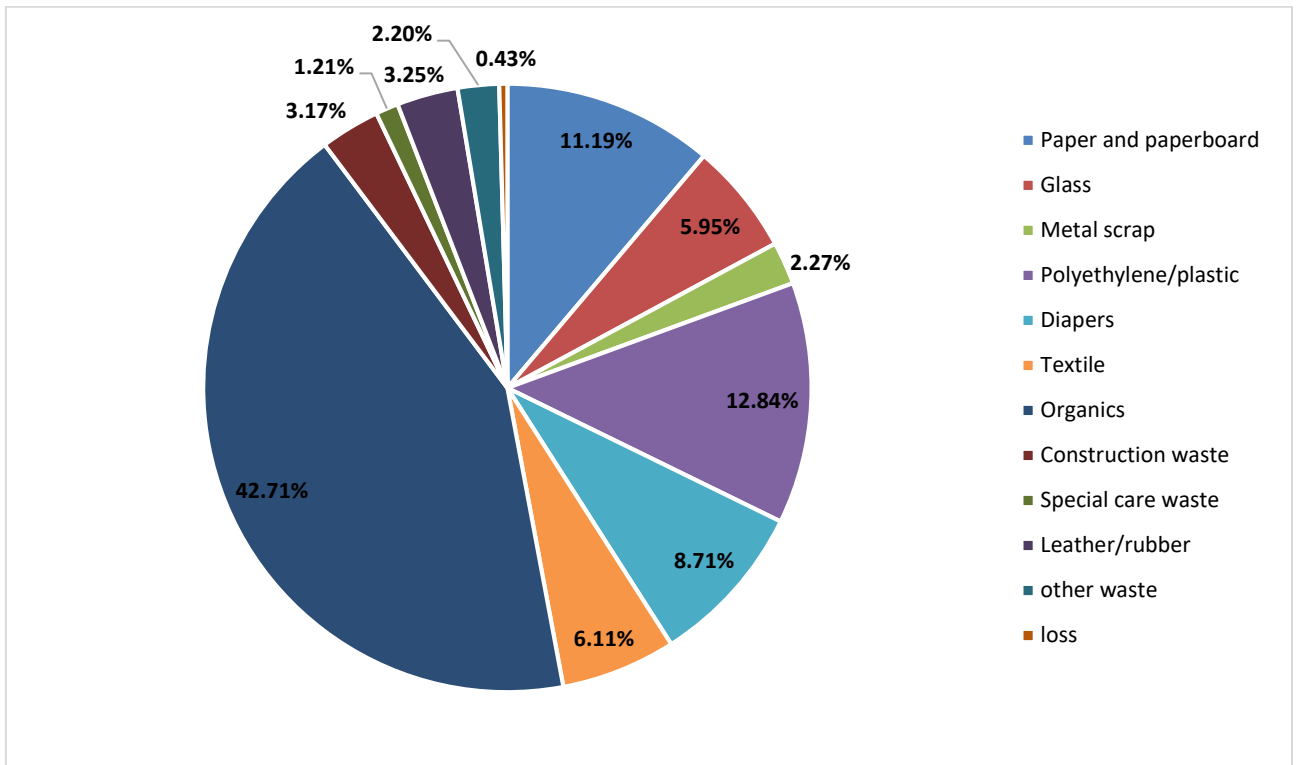
<b>Waste category</b>	<b>Code</b>
Paper and paperboard	20 01 01
Glass	20 01 02
Metal	20 01 05
Polyethylene/plastic	20 01 39 20 01 03
Diapers	20 01 04
Textile	20 01 10
Organics	20 01 08
Construction and demolition waste	19 12 09
Special care waste	20 01 32
Leather and rubber	20 01 11
other waste	20 03 99

### Share (%) of waste components in municipal waste

**Comparative analysis** – the table below shows the comparative analysis of the studies carried out in July 2015 (I study), October 2015 (II study), January 2016 (III study) and April 2016 (IV study).

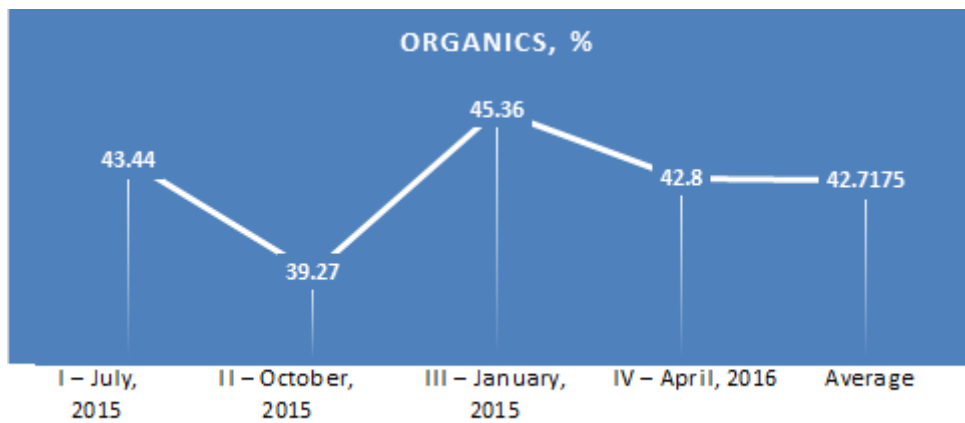
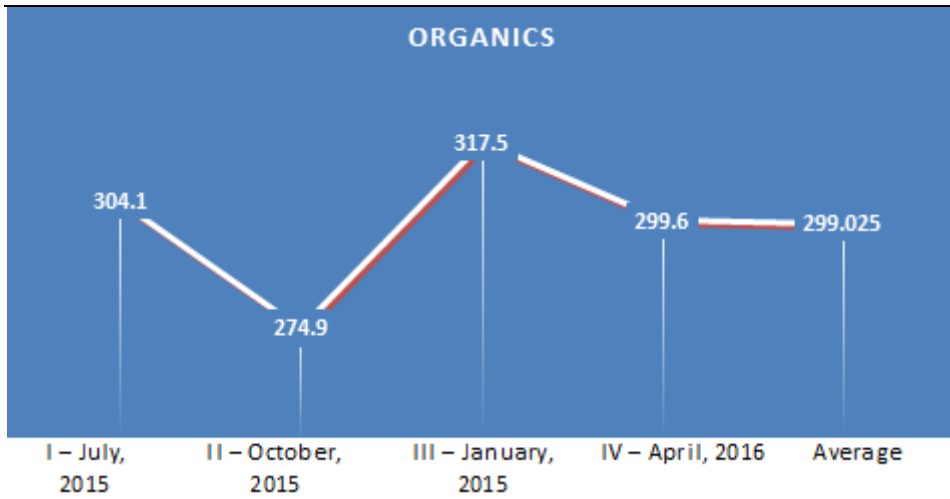
<b>Waste category</b>	<b>I Jul 2015</b>	<b>II Oct 2015</b>	<b>III Jan 2016</b>	<b>IV Apr 2016</b>	<b>mean</b>
Paper and paperboard %	10,41	13,96	10,94	9,46	11,19
Glass %	4,76	9,23	5,08	4,74	5,95
Metal scrap %	1,99	2,04	2,95	2,11	2,27
Polyethylene/plastic %	12,76	15,44	12,58	10,58	12,84
Diapers %	6,53	5,39	12,93	10	8,71
Textile %	5,03	7,37	3,67	8,4	6,11
Organics %	43,44	39,27	45,36	42,8	42,71
Construction waste %	6,39	1,11	1,9	3,28	3,17
Special care waste %	1,14	0,84	2,18	0,68	1,21
Leather/rubber %	4,13	3,39	0,5	5,01	3,25
other waste %	2,86	1,65	1,88	2,41	2,2
loss %	0,56	0,31	0,37	0,5	0,43

**Quantitative characteristics, average data for the reporting period**

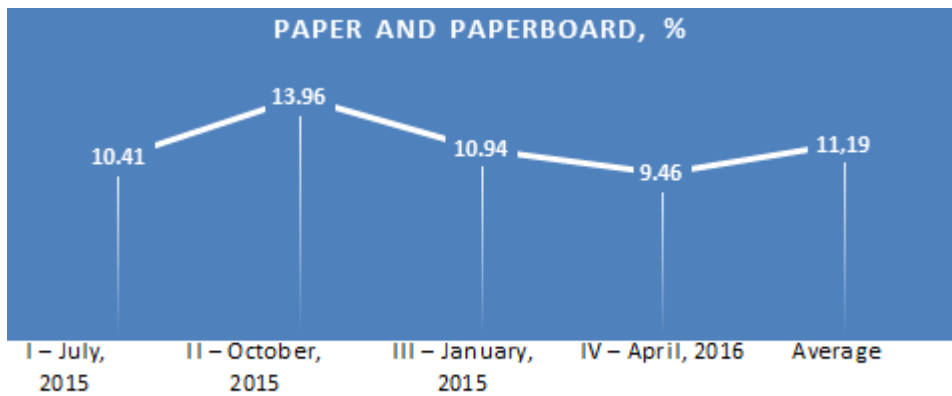
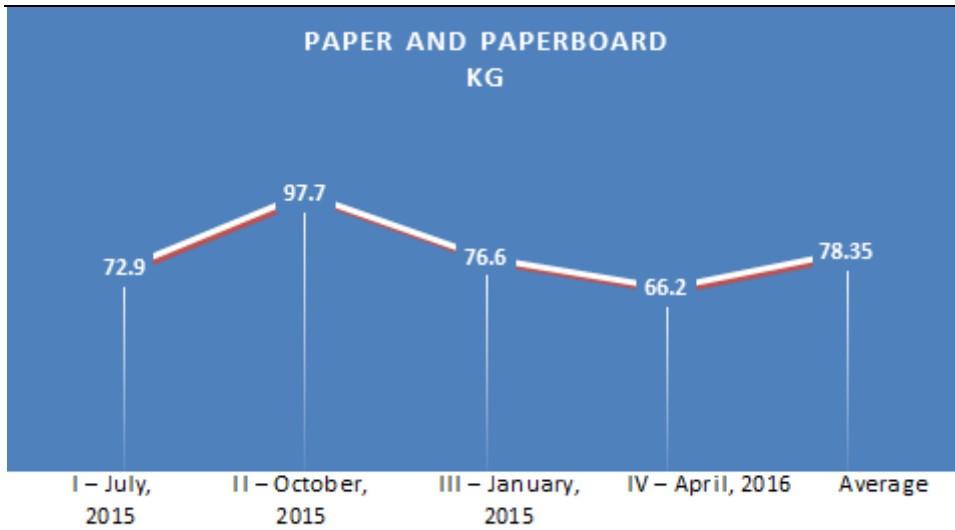


Waste type	Kg
Paper and paperboard	78.35
Glass	41.67
Metal scrap	15.33
Polyethylene/plastic	89.9
Diapers	60.97
Textile	42.82
Organics	299.03
Construction waste	22.21
Special care waste	8.48
Leather/rubber	22.8
other waste	15.41
loss	3.06

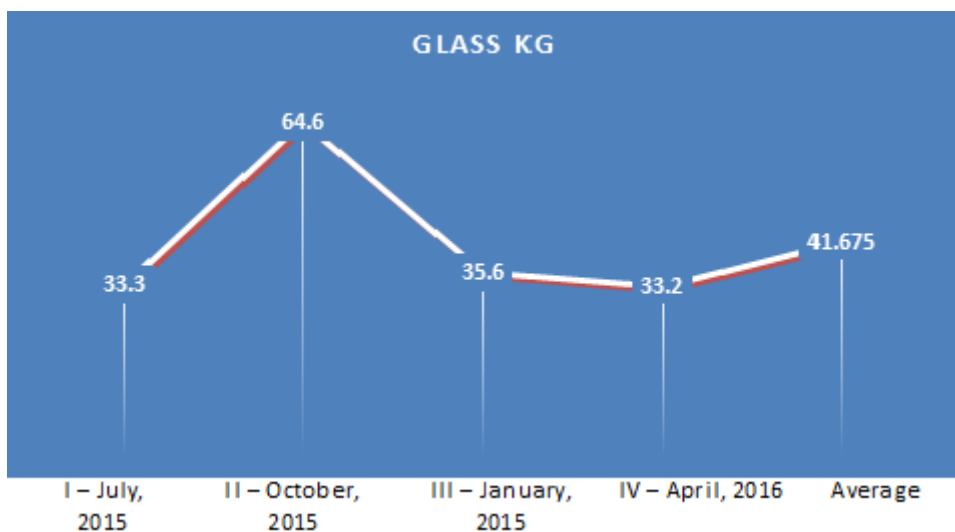
**Organics** (code 20 01 08): food waste, garden waste, agricultural waste, abattoir waste, and poultry fluff and remainder/composite waste.

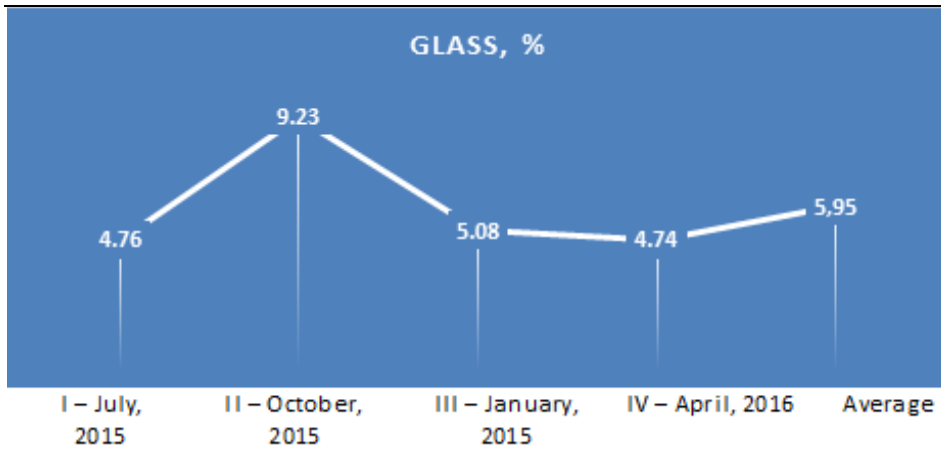


**Paper and paperboard** (code 20 01 01): includes newspapers, cardboard/boxboard, magazines/catalogues, office paper and other/miscellaneous paper.

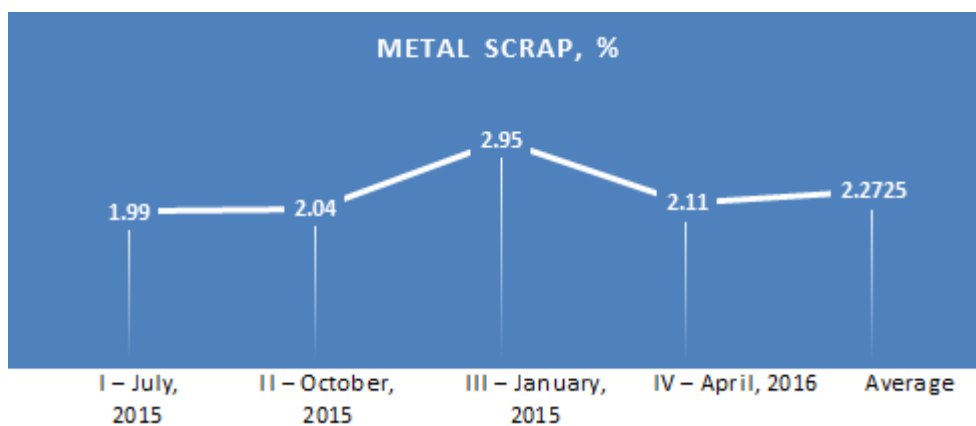
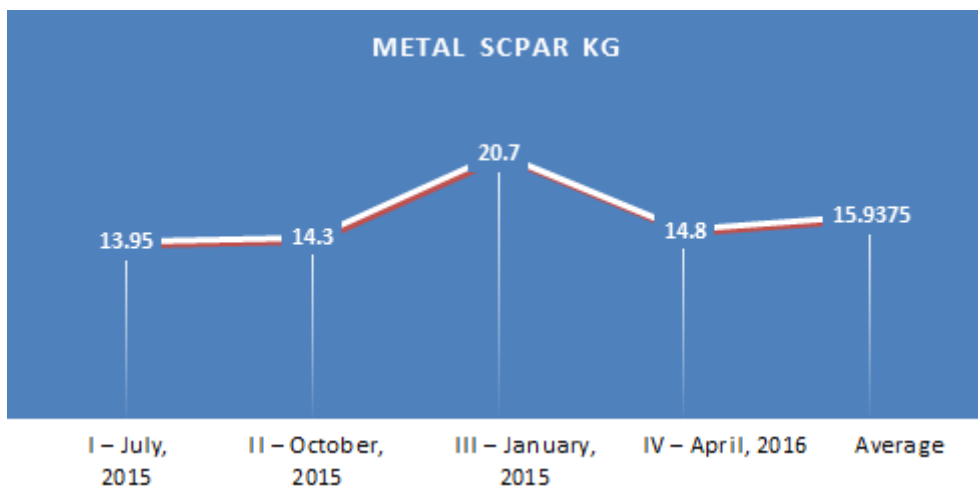


**Glass** (code 20 01 02): includes clear containers, green containers, amber containers and remainder/composite glass.



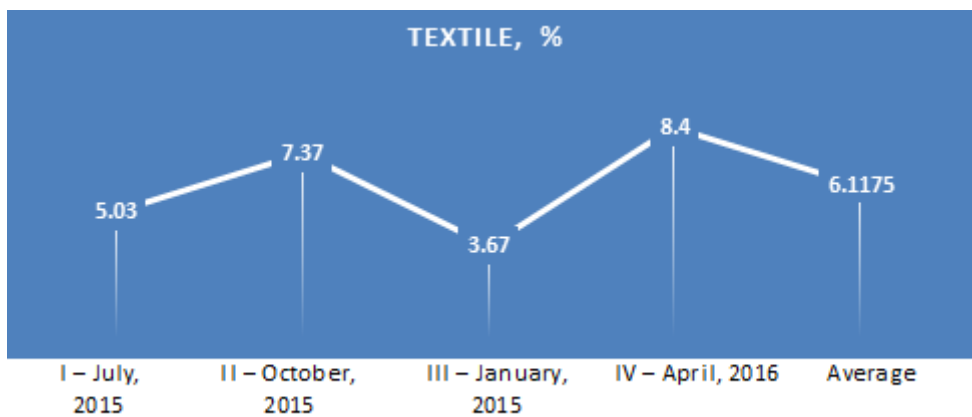
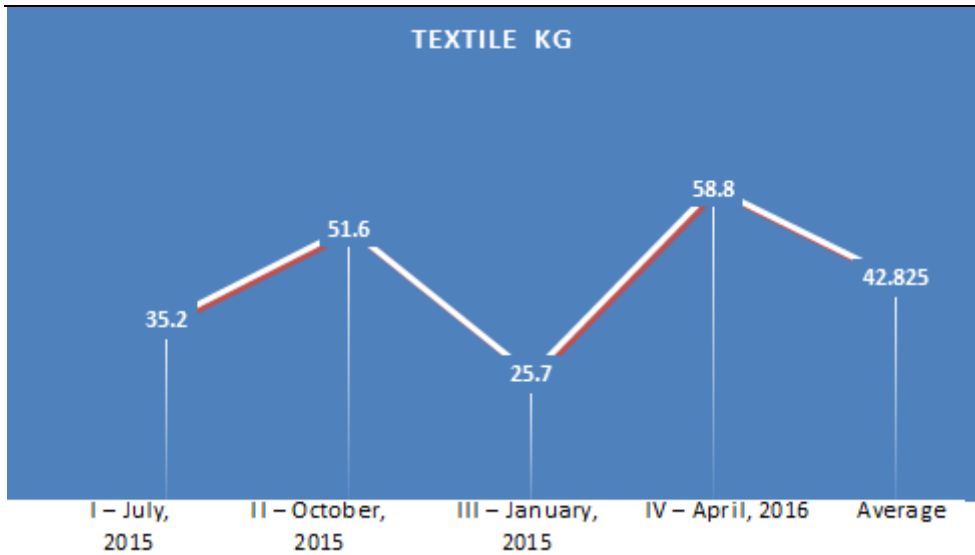


**Metals** (code 20 01 05): includes tin/steel containers, aluminum containers, ferrous metal, non-ferrous containers and major appliances.

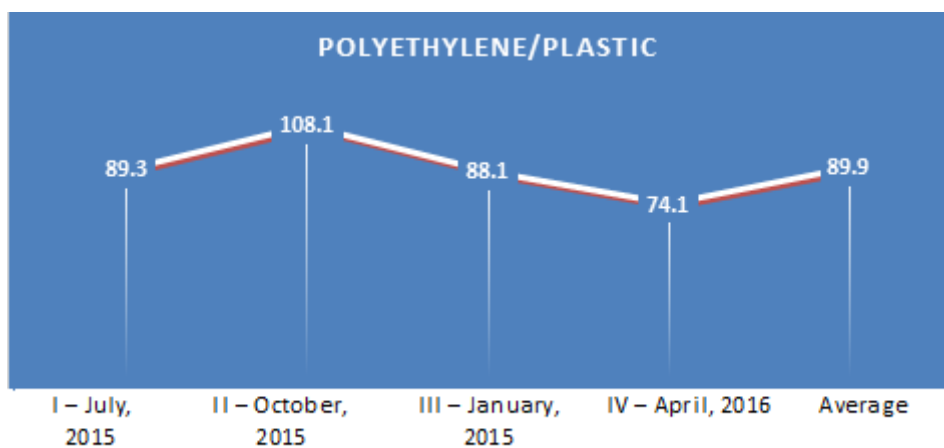


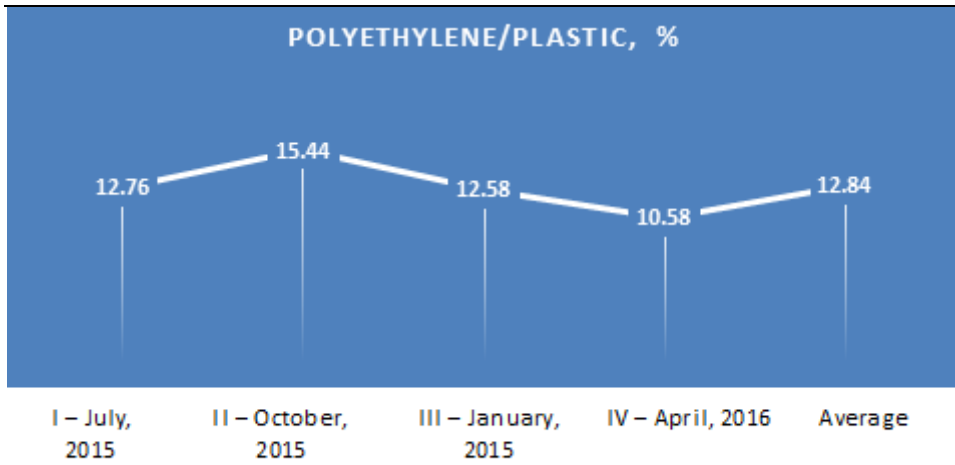
**Textile** (code 20 01 10): textile.



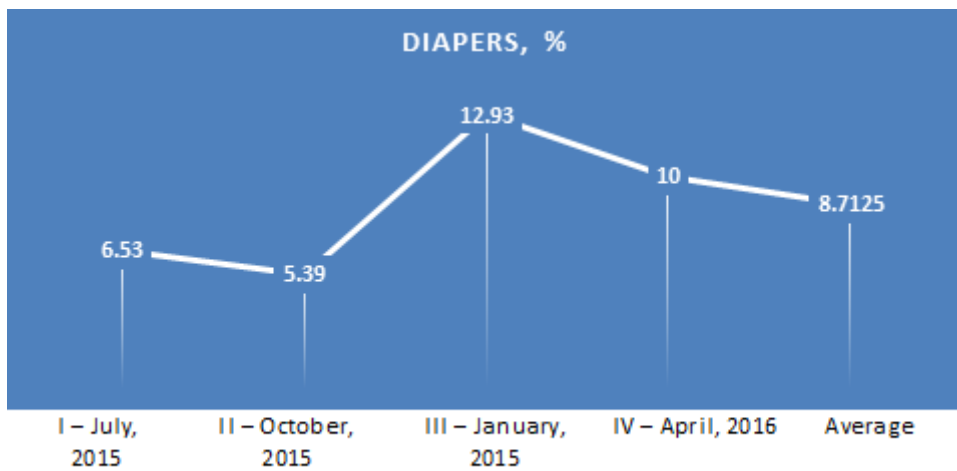
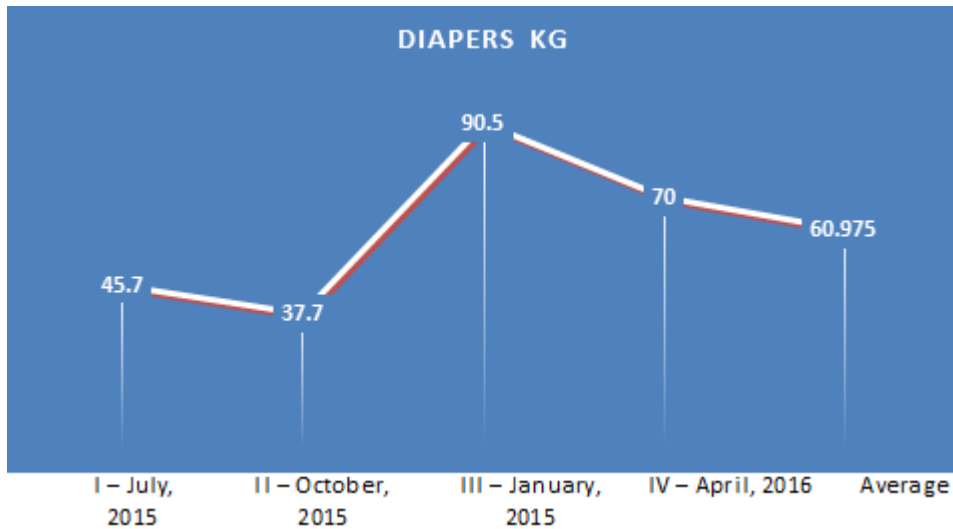


**Polyethylene/plastic** (code 20 01 39; 20 01 03): includes PET containers, including clear, green and amber containers, clear PET containers, green PET containers, amber PET containers, black PET containers, film plastics, HDPE containers and other plastics.

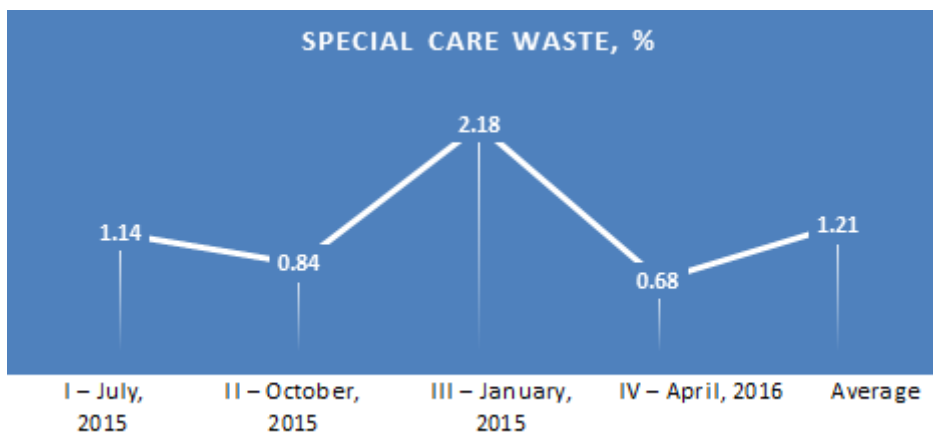




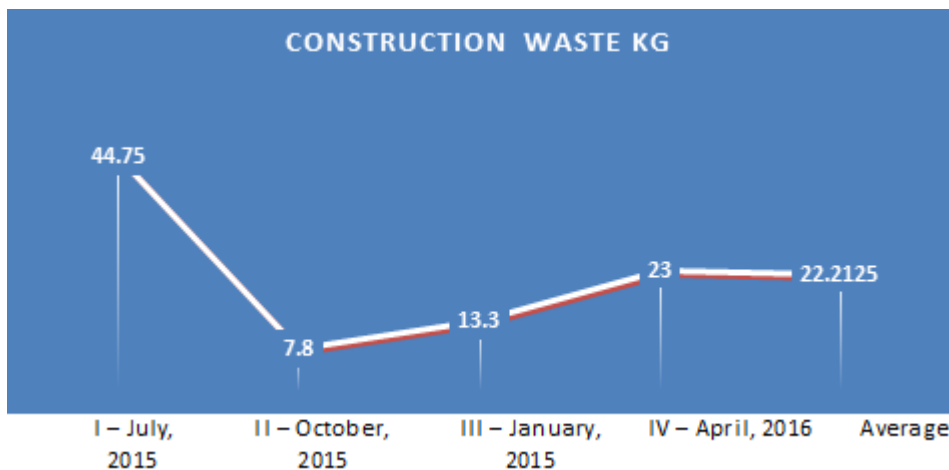
**Diapers** (code 20 01 04): diapers.

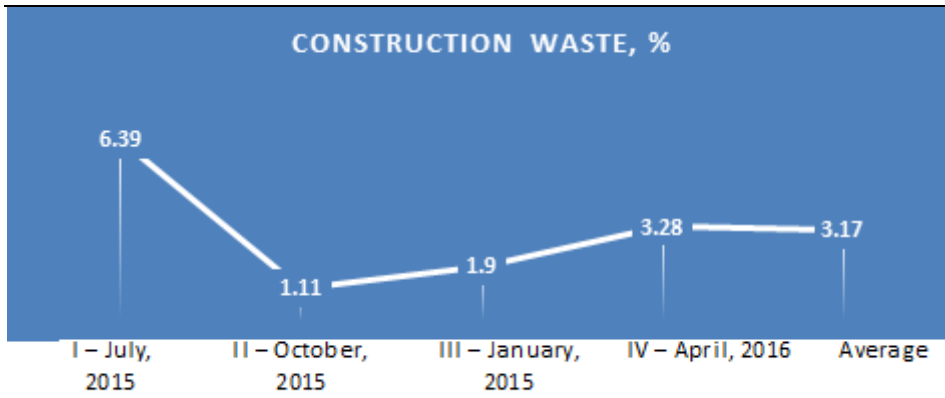


**Special care waste** (code 20 01 32) includes paint, hazardous materials including agrochemicals and their packaging materials as well as those including oil products, biological and medical, batteries, oil filters and remainder/composite waste.

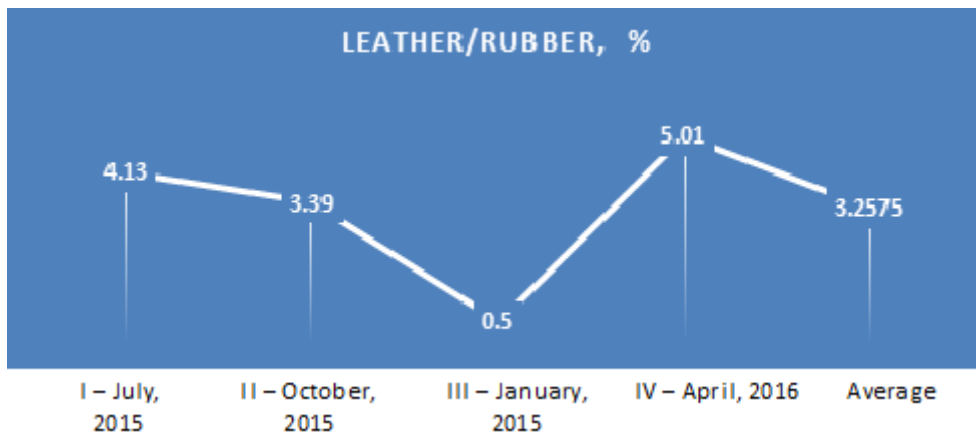
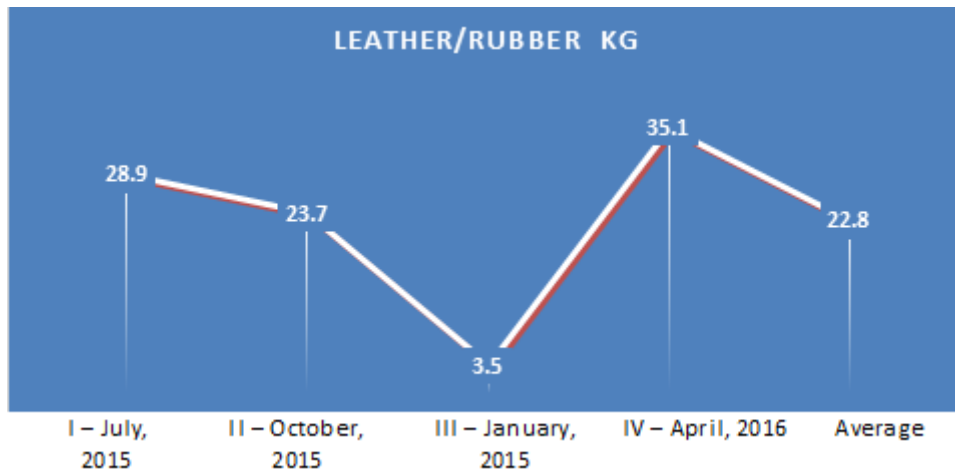


**Construction and demolition waste** (code 19 12 09) includes concrete, timber and remainder/composite construction and demolition waste.

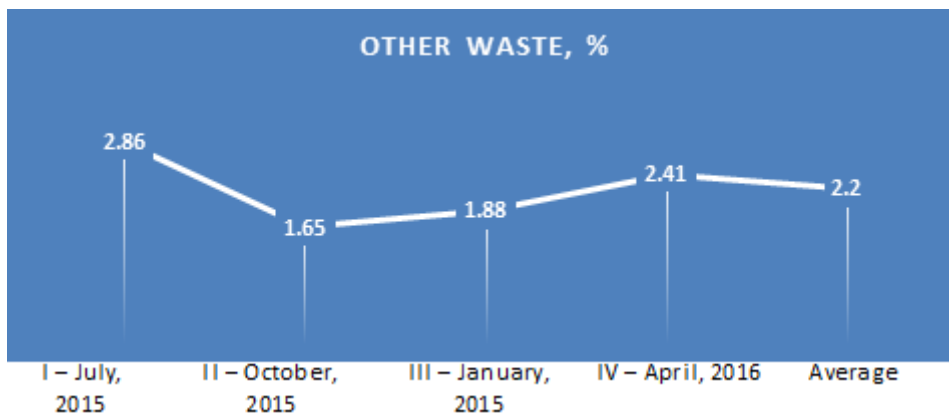
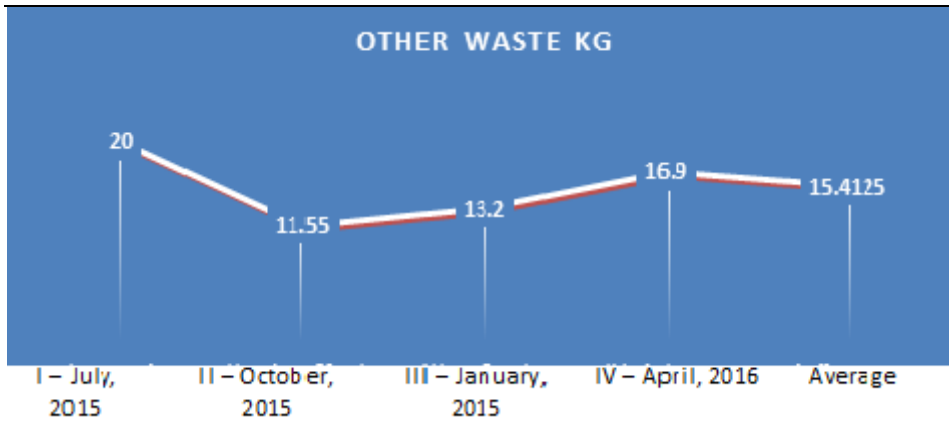




**Leather-rubber** (code 20 01 11): Leather and rubber items.



**Other waste** (code 20 03 99) Waste electrical products, furniture, ceramics, other and <10 mm size waste.



The above described composition of waste reflects the actual morphological composition of waste disposed on the Telavi landfill which receives 20,000 tons of municipal waste per year. Percentage of each waste competent in municipal waste accepted by the Telavi landfill is shown in the table below:

Waste category	Code	%	Tons per year
Paper and paperboard	20 01 01	11,19	2,238
Glass	20 01 02	5,95	1,190
Metals	20 01 05	2,27	454
Polyethylene/plastic	20 01 39 20 01 03	12,84	2,568
Diapers	20 01 04	8,71	1,742
Textile	20 01 10	6,11	1,222
Organics	20 01 08	42,72	8,544
Construction waste	19 12 09	3,17	634
Special care waste	20 01 32	1,21	242
Leather/rubber	20 01 11	3,25	650
other waste	20 03 99	2,2	440
loss (moisture - 0,43 %)			

The results of the study can serve as a basis for planning of appropriate processes to design appropriate waste separation and recycling processes. Organic fractions make 42.72% of the total amount of waste accepted by the landfill. Therefore, one of the main directions should be instruction of composting systems or use of organic waste in biogas digesters to get fuel.

Recycling of plastic and paper, cardboard, will result in 10-15% - 11% reduction of total amount of wastes disposed on the landfill due to the high amounts of plastic in wastes.