



Final report

“Support for the creation of infrastructure for the collection and utilization in an environmentally sound manner, of waste electrical and electronic equipment in Almaty”

Agreement Number: BRS-SBC-SSFA-1704

Center for Sustainable Production and Consumption

Almaty 2018

The project “Support for the creation of infrastructure for the collection and utilization in an environmentally sound manner, of waste electrical and electronic equipment in Almaty” was funded by the European Union. The project is a part of the technical assistance of the Secretariat of the Basel Convention and is implemented by the Centre for sustainable production and consumption” (CSPC) in Almaty, Kazakhstan.

Table of contents

1.	Introduction	4
1.1	Problem identification	5
1.2	Objective of the assessment.....	5
2.	Methods	5
2.1	Data acquisition	5
2.2	Webinar	6
2.3	Massflow assessment.....	8
2.4	Limitations.....	11
3.	Development indicators.....	13
4.	Policy and legislation	17
4.1	E-waste related policies & legislation	17
4.2	Institutional framework	20
5.	Stakeholders assessment.....	22
6.	Massflow assessment.....	29
7.	Impacts	32
8.	Campaign for separate collection of e-waste.....	37
9.	Conclusions	40
10.	Recommendations	41
11.	Referencies	42

Abbreviations

EEE – Electrical and Electronic Equipment

EC RK – Environmental Code of the Republic of Kazakhstan

EPR – Extended Producer Responsibility

ICT – Information and Communication Technologies

ME RK – Ministry of Energy of the Republic of Kazakhstan

RK – Republic of Kazakhstan

WEEE – Waste of Electrical and Electronic Equipment

1. Introduction

RK gained independence in 1992. In a relatively short period the country has developed environmental legislation and established state institutions in the field of environmental protection. RK is actively integrated into international processes and ratified a number of important environmental conventions, including Basel Convention, Stockholm Convention, Rotterdam Convention, etc. The way out of the deep economic crisis caused by the collapse of the Soviet Union has been observed during the last fifteen years. At the same time, the welfare and purchasing power of the population began to grow. With the development of Internet technology there was a sharp demand for computer equipment, peripheral equipment, cell phones and so on. The RK Government pays great attention to the development of digital technologies. The country has implemented the "Program to reduce information inequality in the Republic of Kazakhstan for 2007-2009", and now state program "Information Kazakhstan-2020" is being implemented.

Some target indicators of the program:

- accessibility of information and communication infrastructure in households of RK - 100 %;
- share of healthcare organizations connected to the unified healthcare network - 100 %;
- доля share of scientific and educational institutions connected to the unified national scientific and educational network - 100 %;
- the level of computer literacy - 80 %

According to the data of International Telecommunication Union the dynamics of growth of Internet users in RK is as follows:

Year	Number of users	Internet users (% of total population)	GDP per capita, \$ (www.stat.gov.kz)
2000	70,000	0.5 %	1 229,0
2005	400,000	2.7 %	3 771,3
2007	1,247,000	8.5 %	6 771,6
2008	2,300,000	14.9 %	8 513,5
2009	3,160,000	14.9 %	7 165,1
2010	5,300,000	34.3 %	9 071,0
2016	9,966,444	54.3 %	7 510,1

This project will contribute to strengthening cooperation between all stakeholders involved in e-waste management in RK and awareness raising among citizens about the necessity for e-waste separation.

The project team expresses its special gratitude to the authors of "The Manual for the e-Waste Assessment Methodology". This document contains a lot of useful information, provides links to international sources of information and helped to structure the work, identify key stakeholders, and assess e-waste generation in RK.

1.1 Problem identification

Until recently e-waste wasn't considered as a big problem in RK partly due to lack of knowledge of dangerous properties of some chemicals and components of e-waste, partly because the share of this kind of the waste was insignificant in the overall waste generation structure. Was spontaneously formed market of used EEE, mainly for spare parts or for extraction of precious metals. But the offered prices were too low, and as a rule, consumers had to transport used EEE by themselves. Many consumers prefer to bring WEEE to places of municipal waste collection. At the present time there is no e-waste management strategy in RK and absent infrastructure for separate WEEE collection.

1.2 Objective of the assessment

The project is aimed to assess the volumes of WEEE generation of popular electronic goods in RK and Almaty city. Almaty is the largest city in the RK, today the share of Almaty in the country's GDP is more than 20% and about a quarter of tax revenues. As well very important is to determine the role of stakeholders involved in e-waste management and promote their closer cooperation. Despite the absence of municipal WEEE collection infrastructure the project team in collaboration with EEE retailers will provide an awareness raising campaign for propaganda the necessity of separate collection of WEEE. This action will contribute for assessing the readiness of people to separate household waste including e-waste.

Work out recommendations based on the results of the project.

2. Methods

2.1 Data acquisition

Literature review and statistical data

Literature review – reports, surveys, articles.

Website of the Agency for statistics of RK

Website of the ME RK

Website of the World Bank

Website of the Basel Convention

Website of the International Telecommunication Union

Website of the International Trade Statistics

Databases of RK e-government

Questionnaires for stakeholders

An invitation to participate in the survey and questionnaires were sent to stakeholders by post and e-mails.

State institutions:

- Department of Health of Almaty city, supervisor of 83 health organization
- Department of Education of Almaty city, supervisor of 186 schools and 20 colleges
- Public Service Centers, 8 in each Almaty districts.

Repair workshops of household appliances and computer equipment:

- Ltd. "Eco-techservice»
- Ltd. TOPSERVICE
- Ltd. "BytTechService"

Producers:

LG Electronics in Kazakhstan

Ltd. "Samsung Electronics"

Retailers:

- Ltd. "Planet of Electronics"
- Ltd. TECHNODOM
- «ASTEK»

Universities:

- Kazakh-British Technical University
- Kazakh National University named after al-Farabi
- University "Narkhoz»

2.2 Webinar

CSPC in collaboration with the Secretariat of the Basel Convention held a webinar with the participation of representatives of the Department of Customs Control of Almaty, the Department of Statistics of Almaty, the Department of Ecology of Almaty Committee of

Environmental Regulation and Control of the ME RK, business representatives, students and journalists. Project Manager Zulfira Zikrina presented the aims of the project and the need to joint efforts of all stakeholders to solve the problems of WEEE safe management. The Secretariat of the Basel Convention introduced the document “Technical guidelines on transboundary movements of electrical and electronic waste and used electrical and electronic equipment, in particular regarding the distinction between waste and non-waste under the Basel Convention”.

Meetings and discussions with stakeholders:

1. Ltd. "Operator EPR"
2. Department of natural resources and regulation of natural resources use of Almaty city
3. Repair workshop Ltd. "Eco-techservice»
4. Ltd. “Promotkhod”
5. Ltd. «Schrott recycling»
6. Retailer net “Planet of Electronics”

2.3 Massflow assessment

The list of products was made taking into account the recommended categories and in accordance with the list of products (goods), which are subject to EPR in RK

	Product	Category	List of EPR (RK)	Code
1	Refrigerators, freezers and other refrigerating or freezing equipment	Category 1	Large-sized EEE	8418
2	Washing machines	Category 1	Large-sized EEE	8450
3	Monitors and projectors, not incorporating television reception apparatus; reception apparatus	Category 4	Mid-sized EEE	8528
4	Automatic data-processing machines and units thereof	Category 3	Mid-sized EEE	8471
5	Telephone sets, incl. telephones for cellular networks or for other wireless networks	Category 3	Small size EEO	8517120000

Quantitative assessment of e-waste flows

'Consumption and use method'

The 'consumption and use method' assumes a basket of EEE-commodities per household. For each product, an assumed weight is multiplied by the total number of households. By dividing this amount by the life-span, the expected annual WEEE potential is received.

The following categories are selected:

Refrigerators and freezers, televisions, washing machines, personal computers, cell phones

The calculations based on such statistical indicators as "availability of durable goods per 100 families", population, number of households. The Statistical Compilation "Standards of life of the population in Kazakhstan" (Committee on statistics of the Ministry of National economy of the RK, 2016) presents data on the basis of sample surveys of households on the provision of televisions (TV), washing machines (WM), refrigerators and freezers (R&F), personal computers (PC) and cell phones (CP) per 100 families.

Calculation was made be using the equation:

$$\text{WEEE generation per year} = \frac{m_n * hh * r_n}{ls_n}$$

m_n - medium weight per appliance n

hh - number of household

r_n - saturation rate with appliance n per household

ls_n - medium life span of appliance n

Provision of durable goods, per 100 families

Y	TV	R&F	WM	PC	CP	Number of household in RK	Number of household in Almaty
1997	134	113	101			4 423 039	373367
1998	137	114	102			4 339 478	376330
1999	137	115	102			4 398 561	364658
2000	140	118	103			4 382 836	364658
2001	142	120	105	1		4 129 336	364116
2002	142	121	106	3	3	4 125 294	404437
2003	147	125	108	3	5	4 247 668	410586
2004	154	126	105	17	7	4 271 771	419717
2005	163	126	106	27	12	4 307 076	447957
2006	173	133	109	39	29	4 476 262	462184
2007	181	139	114	56	50	4 528 494	476758
2008	185	144	115	73	74	4 718 638	490644
2009	187	147	116	79	97	4 700 697	469613
2010	173	131	103	73	115	4 765 669	463537
2011	192	141	112	79	156	4 697 278	471051
2012	218	155	120	84	178	4 763 981	499781
2013	239	164	129	102	198	4 973 602	526732
2014	247	171	134	119	205	5 047 310	538178
2015	247	177	139	110	240	5 122 269	586230
2016	247	184	144	113	248	5 197 028	608131

Calculation of e-wastes generation in RK and Almaty: TV and R&F

Year	TV (kg) - RK	TV (kg) – Almaty	R&F (kg) - RK	R&F (kg) - Almaty
1997	18728916	1580985	21658148	1828254
1998	18786468	1629208	21437021	1859070
1999	19042250	1578677	21919496	1817212
2000	19389666	1613247	22410901	1864618
2001	18529156	1633861	21472547	1893403
2002	18511019	1814790	21630292	2120598
2003	19731267	1907254	23008202	2224008
2004	20788146	2042511	23323870	2291655
2005	22184887	2307337	23516635	2445845
2006	24470829	2526667	25798190	2663720
2007	25901174	2726865	27276629	2871672
2008	27585158	2868305	29444301	3061619
2009	27777359	2775037	29943440	2991435
2010	26052959	2534064	27053114	2631345
2011	28499325	2857961	28700369	2878122

2012	32818112	3442891	31998072	3356862
2013	37562632	3978091	35345732	3743309
2014	39395264	4200587	37400567	3987899
2015	39980334	4575642	39287803	4496384
2016	40563843	4746584	41437637	4848831
Total	526298767	53340565	554062965	55875861

Calculation of e-wastes generation in RK and Almaty: WM, PC, CP

Year	WM (kg) RK	WM (kg) Almaty	PC (kg) RK	PC (kg) Almaty	CP (kg) RK	CP (kg) Almaty
1997	29037251	2451154				
1998	28770739	2495068				
1999	29162459	2417683				
2000	29343087	2441385				
2001	28182718	2485092	81761	7209		
2002	28423276	2786571	245042	24024	8251	809
2003	29818629	2882314	252311	24389	14159	1369
2004	29154837	2864569	1437878	141277	19935	1959
2005	29675754	3086424	2302563	239478	34457	3584
2006	31714316	3274574	3456570	356898	86541	8936
2007	33556141	3532777	5021194	528629	150950	15892
2008	35271819	3667564	6820319	709177	232786	24205
2009	35443255	3540882	7352830	734569	303978	30368
2010	31906154	3103380	6888298	669996	365368	35538
2011	34196184	3429251	7347482	736818	488517	48989
2012	37159052	3898292	7923453	831236	565326	59307
2013	41703653	4416648	10044687	1063788	656515	69529
2014	43962070	4687530	11892472	1268055	689799	73551
2015	46279700	5296588	11156302	1276809	819563	93797
2016	48644182	5692106	11627830	1360632	859242	100544
Total	681405277	68449851	93850993	9972984	5295387	568376

Total e-waste, tons by 'Consumption and use method'

E-waste category	Average weight (kg)	Average lifespan (year)	E-waste – RK (tons)	E-waste – Almaty (tons)
TV	31,6	10	526 299	53 341
R&F	65	15	554 063	55 876
WM	65	10	681 405	68 450
PC	9,9	5	93 851	9 973

CP	0,2	3	5 295	568
Total, tons			1 860 913	188 208

2.4 Limitations

Number of households

Accurate data on this indicator are given only in the results of the census of 1999 and 2009, for the rest of the years there are statistics on the "Average size of households", which is determined by the division of the number of members of the surveyed households by the number of households.

For each year, the population was divided by the average household size.

Year	Population size in RK, by the beginning of year	Average size of households in RK	Average size of households in Almaty	Population Almaty	Average number of households in RK	Average number of households in Almaty
1997	15 480 635	3,5	3	1 120 100	4 423 039	373367
1998	15 188 174	3,5	3	1 128 990	4 339 478	376330
1999	14 955 106	3,4	3,1	1 130 440	4 398 561	364658
2000	14 901 641	3,4	3,1	1 130 439	4 382 836	364658
2001	14 865 610	3,6	3,1	1 128 759	4 129 336	364116
2002	14 851 059	3,6	2,8	1 132 424	4 125 294	404437
2003	14 866 837	3,5	2,8	1 149 641	4 247 668	410586
2004	14 951 200	3,5	2,8	1 175 208	4 271 771	419717
2005	15 074 767	3,5	2,7	1 209 485	4 307 076	447957
2006	15 219 291	3,4	2,7	1 247 896	4 476 262	462184
2007	15 396 878	3,4	2,7	1 287 246	4 528 494	476758
2008	15 571 506	3,3	2,7	1 324 739	4 718 638	490644
2009	15 982 370	3,4	2,9	1 361 877	4 700 697	469613
2010	16 203 274	3,4	3	1 390 610	4 765 669	463537
2011	16 440 472	3,5	3	1 413 152	4 697 278	471051
2012	16 673 933	3,5	2,9	1 449 366	4 763 981	499781
2013	16 910 246	3,4	2,8	1 474 849	4 973 602	526732
2014	17 160 855	3,4	2,8	1 506 899	5 047 310	538178
2015	17 415 715	3,4	2,8	1 641 444	5 122 269	586230
2016	17 669 896	3,4	2,8	1 702 766	5 197 028	608131

Inaccuracy on this indicator:

	1999	2009
The number of households in the RK according to results of the population census	4 152 740	4 391 759
Calculation	4 398 561	4 700 697
Inaccuracy	5,9%	7%
The number of households in Almaty	385 758	438 227

according to results of the population census		
Calculation	364658	469613
Inaccuracy	5,5%	7,2%

Lifespan:

In the USSR, the lifespan of EEE was determined by the state Standards. For example, the lifespan of refrigerators was 15 years (GOST 16317-87, observed since 1988). The lifespan depends on many conditions: the manufacturer, quality of manufacture, components, operating conditions, maintenance, etc. For calculation were taken average lifespan for household devices; were taken into account data of questionnaires and surveys.

Weight

Calculation was based on data provided by the guideline «e-Waste Assessment Methodology, Training & Reference Manual», Annex G Weight and composition of selected tracers and categories.

Conclusion

This method based on the statistical data and is acceptable for RK, since all the necessary statistical information is publicly available in the country. The method is convenient as by changing the data in Excel tables, you can easily and quickly observe the dynamics of changes in waste volumes.

As this method based on households data, without taking into account public and private organizations, the results can be used for development of municipal waste management system and for planning the infrastructure for WEEE collection from households.

3. Development indicators

Population

Main development indicators for Almaty city

Year	Population Almaty	Population growth, % to the previous year	GINI index	Average size of household	Unemployment rate (%)	Unemployment rate, ages 15-24 %	Self-employed workers	Proportion of the population living below the subsistence level %
1997	1 120 100			3				
1998	1 128 990	0,8		3				
1999	1 130 440	0,1		3,1				
2000	1 130 439	0,0		3,1				
2001	1 128 759	-0,1	19,4	3,1	10,8	19,9	107 385	19,4
2002	1 132 424	0,3	13,1	2,8	9,6	21,4	103 022	13,1
2003	1 149 641	1,5	12,1	2,8	8,9	16,4	96 941	12,1
2004	1 175 208	2,2	12,6	2,8	8,8	25,1	94 845	12,6
2005	1 209 485	2,9	10,6	2,7	8,4	24	45 994	10,6
2006	1 247 896	3,2	12,1	2,7	8,2	75,5	43 741	12,1
2007	1 287 246	3,2	8,5	2,7	7,8	19,3	44 060	8,5
2008	1 324 739	2,9	13,7	2,7	7,4	10,2	46 369	13,7
2009	1 361 877	2,8	3,0	2,9	7,7	8,8	45 908	3,0
2010	1 390 610	2,1	2,6	3	6,3	9	56 706	2,6
2011	1 413 152	1,6	2,0	3	5,6	6,6	61 075	2,0
2012	1 449 366	2,6	0,4	2,9	5,6	6	59 514	0,4
2013	1 474 849	1,8	0,6	2,8	5,6	5,9	59 583	0,6
2014	1 506 899	2,2	0,6	2,8	5,5	5,6	60 203	0,6
2015	1 641 444	8,9	0,6	2,8	5,3	5,3	66 533	0,6
2016	1 702 766	3,7	0,8	2,8	5,3	5,3	64 397	0,8

World Bank data of RK development

Year	Electric power consumption (kWh per capita)	Access to electricity, percent of the population	CO2 emissions (kt)	Energy use (kg of oil equivalent) per \$1,000 GDP (constant 2011 PPP)
1997	3173,8	98,69	129 459,8	295,0
1998	2948,8	98,79	127 321,9	299,5
1999	2838,3	97	116 493,3	266,3
2000	3169,5	98,96	118 099,4	240,9
2001	3512,0	99,02	131 850,7	205,5

2002	3558,3	99,08	133 735,5	215,3
2003	3768,8	99,14	142 209,9	213,6
2004	3859,2	99,19	173 053,1	229,7
2005	4012,1	99,25	177 328,8	209,7
2006	4261,2	99,32	192 631,2	228,8
2007	4487,3	99,39	222 348,5	226,0
2008	4689,2	99,48	232 806,8	231,3
2009	4447,4	100	213 338,7	207,6
2010	4728,1	99,67	248 549,3	210,7
2011	4892,9	99,78	259 058,9	219,5
2012	5180,9	99,88	242 971,8	200,1
2013	5345,6	99,85	262 846,9	208,4
2014	5599,9	100	248 314,6	188,0

Economic indicators of RK development

Year	GDP (current US \$)	Kazakhstan PPP conversion factor, GDP (LCU per international \$)	GDP per capita (current US\$)	GDP per capita, PPP (current international \$)	Consumer price index (2010 = 100)
1997	22165932062,97	16,54	1445,57	6593,65	33,50
1998	22135245413,23	17,29	1468,70	6652,41	35,89
1999	16870817134,78	19,29	1130,11	7002,96	38,87
2000	18291990619,14	22,15	1229,00	7887,89	43,99
2001	22152689129,56	23,85	1490,93	9172,37	47,66
2002	24636598581,02	24,85	1658,03	10225,45	50,45
2003	30833692831,40	27,23	2068,12	11360,99	53,69
2004	43151647002,61	30,77	2874,29	12705,43	57,39
2005	57123671733,90	35,14	3771,28	14259,02	61,74
2006	81003884545,41	41,45	5291,58	16098,51	67,04
2007	104849886825,58	46,64	6771,41	17793,15	74,26
2008	133441612246,80	55,32	8513,56	18513,93	87,00
2009	115308661142,93	57,48	7165,28	18387,20	93,36
2010	148047348240,64	67,88	9070,65	19690,38	100,00
2011	192626507971,58	80,17	11634,42	21277,71	108,35
2012	207998568865,79	82,49	12387,19	22392,20	113,89
2013	236634552078,10	88,89	13890,86	23773,82	120,54
2014	221415572819,50	92,36	12806,57	24845,45	128,63
2015	184388432148,72	93,05	10509,98	25044,88	137,18
2016	133657084404,96	101,71	7510,08	25263,81	157,09

GDP structure of RK and Labour force by sector (agriculture, industry, services)

GDP structure, %				Labour force distribution by sector, % of total employed population					
				RK			Almaty		
Year	agriculture	industry	services	agriculture	industry	services	agriculture	industry	services
2001	9,4	38,8	51,8	35,0	16,6	48,4	1,1	21,0	77,8
2002	8,6	38,6	52,8	34,7	16,6	48,7	4,8	20,8	74,4
2003	8,4	37,6	53,9	34,5	17,3	48,3	2,9	22,9	74,2
2004	7,6	37,6	54,8	33,0	17,6	49,4	1,9	23,4	74,6
2005	6,8	40,1	53,1	31,9	17,9	50,2	1,5	23,5	75,0
2006	5,9	42,1	52,0	31,1	18,2	50,7	1,0	23,4	75,6
2007	6,1	40,6	53,3	30,8	18,7	50,5	0,7	24,0	75,3
2008	5,7	43,3	51,0	29,7	18,7	51,6	0,7	23,4	75,9
2009	6,4	40,3	53,3	29,0	18,6	52,3	0,7	22,7	76,6
2010	4,8	42,9	52,3	28,3	18,7	53,0	0,5	21,3	78,2
2011	5,5	40,9	53,6	26,5	19,0	54,6	0,4	19,2	80,3
2012	4,7	39,5	55,9	25,5	19,4	55,1	0,4	17,9	81,7
2013	4,9	36,9	58,2	24,2	19,8	56,0	0,5	19,4	80,1
2014	4,7	35,9	59,4	18,9	20,8	60,4	0,2	17,8	82,0
2015	5,0	32,5	62,5	16,2	21,0	62,8	0,2	18,2	81,7
2016	4,8	33,5	61,7	16,2	20,6	63,2	0,2	18,0	81,8

Dynamics of tax revenues and payments to the state budget:

Year	Total revenue, RK, thousand KZT	Δ Total revenue, Almaty, thousand KZT	% Almaty
2001	733 822 596	127 071 986	17,3
2002	808 040 305	148 845 591	18,4
2003	1 004 678 460	203 409 045	20,2
2004	1 286 914 000	244 066 646	19,0
2005	2 098 273 009	330 788 858	15,8
2006	2 337 001 544	493 442 276	21,1
2007	2 629 048 106	786 534 607	29,9
2008	2 961 781 559	722 026 698	24,4
2009	2 400 514 561	638 703 950	26,6
2010	3 098 792 602	757 055 810	24,4
2011	4 170 611 974	934 161 600	22,4
2012	4 432 718 445	1 074 718 189	24,2
2013	4 976 718 331	1 182 021 513	23,8
2014	5 365 835 046	1 249 415 617	23,3
2015	5 178 643 694	1 363 110 952	26,3

2016	6 451 722 086	1 617 097 833	25,1
------	---------------	---------------	------

ICT sector development in RK

Index	2012	2013	2014	2015	2016
The share of volume of production and realization of goods (services) of the ICT sector in total GDP	3,5	3,6	3,9	3,9	3,5
The share of the ICT sector in total employment	2,1	2,3	1,7	1,8	1,7
The number of cellular subscribers per 10,000 people, units	18 006	17 829	16 540	14 996	14 347
The number of Internet users per 100 people	62	63	64	73	77
The proportion of households with access to the Internet, %	65,7	86,7	86,9	82,2	84,4
The provision of computers for every 1000 people, units	240	291	339	316	283
The number of computers in organizations	631 670	884 909	882 677	935 312	951 777

ICT sector development in Almaty

Index	2012	2013	2014	2015	2016
The number of computers in organizations	142 510	237 335	188 222	222 318	254 411
The proportion of households with access to the Internet, %	64,7	99,9	100,0	70,3	88,0

Share of households that use ICT in 2016 (%)

	fixed telephone line	cellular telephone	cable television	satellite television	desktop computer	portable computer (laptop, netbook, ultrabook)	tablet PC
RK	76,5	96,8	48,1	35,8	58,0	44,7	32,1
Almaty	86,2	94,7	72,3	16,1	74,8	71,4	58,1

4. Policy and legislation

Environmental legislation of RK is based on the Constitution of RK and consists of the Environmental Code (EC RK) and other regulatory legal acts of RK. In case of conflict between the EC RK and other laws of RK related to environmental protection, the provisions of the EC RK shall be applied.

If an international Treaty ratified by RK establishes rules other than those in the EC RK, the rules of the international Treaty shall be applied. RK has ratified a number of important international conventions in the field of environmental protection – Basel, Stockholm, Rotterdam, Aarhus, etc.

4.1 E-waste related policies & legislation

Law or Regulation	Major content	Influence on e-waste management
<p>Environmental Code of the Republic of Kazakhstan</p> <p>dated January 9, 2007</p>	<p>Formalizes the foundations of state regulation in the field of environmental protection and use of natural resources</p>	<p>Specifies the environmental requirements for disposal of production and consumption waste.</p> <p>For the purposes of transport, treatment, storage and disposal, 3 waste hazard levels are established in accordance with the Basel Convention</p> <ul style="list-style-type: none"> 1) Green – index G; 2) Amber – index A; 3) Red – index R <p>Import to the RK territory from countries which are not members of Customs Union, and export from the RK territory to these countries of waste for the purpose of their use (utilization, treatment) are carried out on the basis of the license issued by the body authorized by the Government of RK.</p> <p>The import and export of waste by individuals for personal use (for non-commercial purposes) is prohibited. The import of wastes for dumping and disposal is prohibited.</p>

<p>The law of RK "Amendments and additions to some legislative acts of RK on issues of industrial and innovation policy».</p> <p>from November 17, 2015</p>	<p>Introduces the concept of "Extended producers (importers) responsibilities" - EPR</p> <p>Establishes the authorities of EPR Operator and the responsibility of EPR participants</p>	<p>EPR Operator – a legal entity appointed by the government of RK, responsible for organization of collection, transportation, treatment, neutralization, use and (or) disposal of waste, to which the EPR applies.</p> <p>In the List of products to which the EPR applies are included to large-sized, medium and small-sized EEE</p>
<p>The Law of RK “Amendments and additions to some legislative acts of RK on the transition of RK to the "Green Economy"</p> <p>April 28, 2016</p>	<p>Introduction the concept of "separate collection of municipal waste", "recyclable materials" and the establishment of requirements for recyclable materials separate collection and disposal of certain types of hazardous waste; transfer of waste into recyclable materials.</p> <p>The local authorities are responsible for organizing separate collection of municipal waste at the source of their formation, utilization and recycling of waste.</p>	<p>EC RK, Article 293:</p> <p>2-1. Hazardous components of municipal waste: EEE, mercury-containing waste, batteries, accumulators and other hazardous components must be collected separately and transferred for recycling to specialized enterprises.</p> <p>Article 292-1</p> <p>Local authorities are responsible for organizing a rational and environmentally safe system of municipal waste collection, which provides separate collection, storage, regular removal, recycling, disposal and disposal of hazardous components of municipal waste, as well as cleaning the territory of the settlement</p> <p>Environmental requirements for treatment of materials and products transferred to the category of WEEE shall be established by the Standards of RK. Requirements of Standards are obligatory for execution by individual entrepreneurs and legal entities regardless of the organizational and legal form.</p> <p>Article 297-1. Transition of waste into recyclable materials</p>

		<p>Article 300:</p> <p>It is prohibited to dispose of municipal solid waste without its preliminary processing.</p> <p>Article 301</p> <p>Waste not acceptable for landfills – WEEE</p>
Law of RK "On State Statistics" March 19, 2010		Article 16
Decision No. 30 of the Board of the Eurasian economic Commission dated April 21, 2015	Regulations on import to the territory of the Euroasian Economic Union and export from the its territory of hazardous wastes according to the Annex No. 7	<p>List of goods for which the permit procedure for import and (or) export from the territory of the Eurasian Economic Union is set.</p> <p>Section 2.3. Hazardous waste</p> <p>39. Scrap electrical equipment or electrical nodes, including galvanic cells, batteries, mercury switches, glass of cathode-ray tubes and other glass, having an active coating, or contaminated with cadmium, mercury, lead, polychlorinated biphenyls at a concentration level of 50 mg/kg and above</p>
Order #695 of the Acting Minister of ME RK dated December 5, 2015 "Approved List of goods subject to EPR"	List includes different kind of goods: cars, tires, engine oil, packaging, EEE	<p>The List includes:</p> <ul style="list-style-type: none"> - Large-sized EEE - Mid-sized EEE - Small-sized EEE
Resolution #28 of the Government of RK "Approval of the Rules of implementation EPR" dated January 27, 2016	Bodies of state revenues of RK quarterly at the request of the authorized body in the field of environmental protection shall send information on imported in	Information includes the name and the product code, net / gross weight of products

	<p>RK products (goods) to which the EPR applies.</p> <p>EPR Operator annually by May 1 of each year following the reporting year shall submit a report to the authorized body in the field of environmental protection on the implementation of EPR extended obligations of producers, importers</p>	<p>Information regarding the amount of WEEE for recycling (in the context of each component in the composition of WEEE) and the indicator of the actually recycled amount of WEEE</p>
<p>Order #762 of the Minister of Energy of RK, 25 December, 2015 With amendments from 7 February 2017</p>	<p>Manual for calculation of the payment for the organization of collecting, transportation, processing, neutralization, use and (or) disposal of waste</p>	<p>11. Payment regarding EEE is made as the follow:</p> $C_0 = m * C_{MPII} * 0$ <p>C_0 – payment that manufacturers (importers) pay for the organization of collection, transportation, processing, disposal, use and (or) disposal of EEE;</p> <p>m – the weight (in tons) of the made (imported) EEE;</p> <p>C_{MCI} – the amount of one monthly calculation index</p>
<p>Order #7 of the Minister of Environment Protection of RK, 12 December 2012</p>	<p>Stimulates to reduce volume of WEEE at landfills</p>	<p>The List of activities to stimulate the utilization of wastes and reduction of waste generation</p>

4.2 Institutional framework

Title	Functions
<p>Ministry of Energy of the Republic of Kazakhstan</p>	<p>Strategic, regulatory, implementation and control functions, as well as coordination of the activities of state and local Executive bodies for the implementation of state policy in the field of preservation, restoration and improvement of the quality of the environment, ensuring the transition of the Republic of Kazakhstan to low-carbon development and "green economy".</p> <p>State environmental control over:</p> <ul style="list-style-type: none"> - compliance with the rules of transboundary movement of hazardous wastes;

	<ul style="list-style-type: none"> - observance of norms and rules of industrial ecological control; - fulfillment by producers (importers) requirements of payment for the organization of collection, transportation, processing, neutralization, use and (or) disposal of wastes; - implementation by the Operator EPR requirements set by the EC RK; - EPR implementation; - compliance with the requirements for waste disposal on the landfills and maintenance of the landfills. <p>Approve the List of production (goods) of EPR.</p>
<p>Committee of Environmental Regulation and Control of the Ministry of Energy of the Republic of Kazakhstan</p> <p>Has 16 Departments of Ecology:</p> <ul style="list-style-type: none"> - 14 Regional Departments in each oblast; - Department of Ecology of Almaty city; - Department of Ecology of Astana city 	<p>State environmental control over compliance with the environmental legislation of RK, environmental quality standards and environmental requirements.</p> <p>The structure and staff number of the Committee are approved by the ME RK.</p> <p>Control over the activities of individuals and legal entities within the competence of the Committee.</p> <p>Control functions over activities of local Executive bodies on issues related to the Committee responsibilities.</p> <p>Employees of Departments, carrying out state environmental control, are granted the rights of state environmental inspectors.</p>
<p>The State Revenue Committee of the Ministry of Finance of the Republic of Kazakhstan</p>	<p>Customs statistics of foreign trade and special customs statistics of RK.</p> <p>The tax authorities provide to the authorized body in the field of environmental protection information related to manufacturers of products (goods) which is (are) subject to the EPR.</p>
<p>Ministry of Health of the Republic of Kazakhstan</p>	<p>Develops sanitary rules and hygienic standards for the objects and products subject to the state sanitary and epidemiological supervision, including collection, use, neutralization, transportation, storage and burial of production and consumption wastes.</p>
<p>Local Executive Authorities (akimats). Departments of natural resources and environmental management of regional akimats, Astana and Almaty cities.</p>	<p>The structure and staff of the Departments are made in accordance with applicable law.</p> <p>Departments are responsible for the organization of rational and environmentally safe system of municipal waste collection, providing separate collection, storage, processing, utilization and neutralization of dangerous components of municipal waste.</p> <p>Control over compliance with environmental requirements when handling municipal waste.</p> <p>Creation of necessary infrastructure for small and medium enterprises dealing with collection, transportation, sorting, secondary use, and landfilling of municipal waste.</p> <p>Coordinate environmental action plans and waste management programs within their competence.</p> <p>Ensuring control together with the state bodies of sanitary and epidemiological supervision and the authorized body in the field of environmental protection.</p>

Individual entrepreneurs, legal entities	Organization of activities for the implementation of production control, including waste management
Ltd. Operator EPR	Organization of collection, transportation, processing, disposal, use and (or) disposal of the waste generated after the loss of consumer properties of the product that is subject to the EPR.

5. Stakeholders assessment

To assess the market of household appliances, it'd useful to consider national statistics on main types of products:

Balance of resources and use of refrigerators and freezers (pieces)

Name of balance sheet items	2012	2013	2014	2015	2016
Resources – total	817 508	592 370	507 365	516 487	559 592
Production	5 055	34 945	9 840	-	-
Import	488 570	458 496	452 588	429 732	404 789
Import from CIS countries	322 951	277 578	273 122	284 152	254 737
Import from other countries	165 619	180 918	179 466	145 580	150 052
Other receipt	246 343	-	7 532	43 652	112 298
Stocks at the beginning of the year	77 540	98 929	37 405	43 103	42 505
Consume – Total	817 508	592 370	507 365	516 487	559 592
Consumed at the domestic market	718 145	554 457	463 682	471 760	500 761
Consumed by households	715 843	553 442	462 150	470 515	499 437
Export	434	509	580	2 222	3 695
Export to CIS countries	418	479	557	2 205	3 673
Export to other countries	16	30	23	17	22
Stocks at the end of the year	98 929	37 405	43 103	42 505	55 135

Balance of resources and use washing machines and clothes drying machines (pieces)

Name of balance sheet items	2012	2013	2014	2015	2016
Resources – total	579 731	575 915	382 330	513 931	466 042
Production	88 711	46 839	9 090	-	-
Import	416 964	410 315	369 737	510 289	328 239
Import from CIS countries	103 786	79 573	150 620	376 498	271 833
Import from other countries	313 178	330 742	219 117	133 791	56 406
Other receipt	-	113 450	-	-	114 574
Stocks at the beginning of the year	74 056	5 311	3 503	3 642	23 229
Consume – Total	579 731	575 915	382 330	513 931	466 042
Consumed at the domestic market	571 360	572 095	378 248	487 114	434 045
Consumed by households	425 202	513 620	348 311	372 840	376 758
Export	3 060	317	440	3 588	6 407
Export to CIS countries	3 051	304	425	3 463	6 394
Export to other countries	9	13	15	125	13
Stocks at the end of the year	5 311	3 503	3 642	23 229	25 590

Balance of resources and use of television receivers (pieces)

Name of balance sheet items	2012	2013	2014	2015	2016
Resources – total	2 543 917	2 199 524	2 405 253	2 116 563	1 727 017
Production	484 230	442 391	309 184	223 887	126 242

Import	1 800 390	1 727 124	2 049 874	1 723 020	1 419 745
Import from CIS countries	481 433	302 880	664 307	301 066	287 170
Import from other countries	1 318 957	1 424 244	1 385 567	1 421 954	1 132 575
Stocks at the beginning of the year	259 297	30 009	46 195	169 656	181 030
Consume – Total	2 543 917	2 199 524	2 405 253	2 116 563	1 727 017
Consumed at the domestic market	1 710 548	1 882 091	2 067 018	1 730 434	1 438 764
Consumed by households	722 136	721 254	811 519	635 109	546 613
Export	803 360	271 238	168 579	205 099	252 729
Export to CIS countries	802 194	270 363	166 831	204 156	251 400
Export to other countries	1 166	875	1 748	943	1 329
Stocks at the end of the year	30 009	46 195	169 656	181 030	35 524

Manufacturers

The LG Electronics plant in Kazakhstan

In 1998, LG Electronics plant was built in Almaty, which today is the first and only enterprise in Central Asia for the production of world-class electronics. Production of washing machines, TVs, refrigerators, printed circuit boards.

LG has an extensive network of service centers in Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. Repair services are provided after the expiration of the warranty period.

Considering that the market of Kazakhstan is not big enough, it looks unattractive for producers.

Distributors

Network Retailers (wholesale and retail trade)

The largest - TECHNODOM, "Planet of electronics", "White wind", "Sulpak", "Mechta", "Eureka", "Alser".

“Planet of Electronocs” - the first retail net of specialized stores of electrical appliances in RK, founded in 1993; is a partner of the project, actively participates in the action of WEEE collection from Almaty people. It has 14 shops in major cities of RK. Opened the first network online store of household appliances operating throughout RK.

The service center ASKON-7 was opened and began the activity since October, 2010. ASKON-7 carries out service maintenance of a network of shops "Planet of Electronics" in RK. The service center performs a wide range of works on installation, maintenance and repair of complex electronic equipment.

ASKON-7 is an authorized service center of manufacturers of such well-known brands as: Kaiser, Electrolux, AEG, Zanussi, Indesit, Ariston, Gorenje, Candy, Ardo, Bompany, Nardi, Fagor, Unit, Elica, sencor, Philips, Samsung, Panasonic, Lieher, Eurolux, GREE, Tefal, Mulenex, Krups, Polaris, Binatone, Remington, EIA, FAS, FAS, FAS, FAS, FAS, FAS, FAS, FAS, FAS, FAS, FAS, Rowenta (SEB), Takada, loc, Venta, Orior, Vestel, Liebherr, Smeg, Haier, Hitachi Monitors, Sharp, De Dietrich.

TECHNODOM – the leading national net stores of appliances and computer equipment in RK, has 69 stores, a common shopping area is about 80,000 square meters in 28 cities.

Developed product "Technoservice" - to save customers from finding repair shops, delivery of equipment for repair and back, registration of unnecessary documents, and extend the life of the equipment.

Technoservice is a program of additional service, diagnostics and consultations concerning installation, operation, cleaning and repair of the acquired equipment, for a period of 2 till 5 years (at the choice of the client). For this purpose the certificate of service "Technoservice" is offered for receiving service under this program by contacting the consultants.

Stocks are about 10% of the total amount of goods due to careful study of demand. Order the optimal quantity of the necessary goods at the factories of vendors.

Pays attention to promotion of a healthy lifestyle and protection of environment, establishes boxes for utilization of collecting of batteries, bulbs and other WEEE.

"Sulpak" is the largest net stores of household appliances and electronics in RK, has 95 stores in 30 largest cities; it is the official distributor of the world's leading electronics manufacturers. The range includes more than 25 thousand models of electronics and home appliances. In 2009, the company opened an online store.

Service centers occupy more than 3 thousand square meters and can provide more than 5 thousand repairs each month.

Main brands: Acer, AEG Altus Ariston, Artel, Asus, Samsung, Biryusa, Beko, Tefal, Black&Decker, Blomberg, Bosch, Bosch, Braun, Braun Oral-B, Brother, Candy, Canon, Casio, Coolfort, Daewoo, Darina, DeLonghi, DeWalt, DWT, Dyson, Electrolux, Epson, Ergo, Flama, Fly, Fujifilm, Gefest, Gorenje, Grundig, Haier, Hansa, Hotpoint, HP, HTC, Huawei, Hyundai, Indesit, Kenwood, Krups, Laura star, LG, Lenovo, Maxwell, Meizu, Micromax, Philips, MSI, Nikon, Nokia, Oppo, Panasonic, Philips, PocketBook, Polaris, Prestigio, Redmond, Ricoh, Philips, Samsung, Sanyo, Philips, Sharp, Sony, Stanley, Sven, Tefal, Textet, Thermex, Thomas, TP-Link, Vestel, Philips, Whirlpool, Worth, Xerox, Samsung, Philips, ZTE, Zyxel.

"White Wind" was founded in Karaganda, in December 2000. Company delivers on RK market modern digital technology and software products.

Thanks to close partnerships with HP, Apple, Microsoft, Intel, etc., offers more than 7,700 certified products. Search of new suppliers of innovative equipment is constantly conducted.

Company has more than 40 stores in RK, as well as an online store that serves both residents of cities and remote villages of RK. For 10 years of the online store delivered more than 400,000 orders; has a network of service centers.

"Mechta" is a specialized retail chain of consumer electronics stores; has 32 stores in 18 cities. The total area of all stores is over 37,000 square meters. The wide range of goods is presented - from 3000 to 10000 names in each shop, the certified equipment of world brands, with a factory guarantee and the subsequent service. There is an online store.

«**EVRIKA**» - the network of shops of electronics and household appliances, carries out the activity since 2000, is presented in 8 cities. Offers more than 15 thousand names of goods, carries out direct deliveries from the leading enterprises-producers of electronics and household appliances, provides guarantee maintenance in the authorized service centers.

Alser has been a member of the international group of major retail chains Euronics since 2015 - operating in the regions of Europe, the Middle East, Africa and CIS countries, offering innovative devices and electronics to consumers through a multi-channel approach. As of December 2017, the ALSER retail chain has 155 stores in RK.

Working with dealers in the wholesale of office equipment, components, spare parts, consumables and software, has about 400 dealers all over Kazakhstan. The company has a service (repair) network; there are 30 service centers in Almaty.

The market of second-hand EEE is not well developed; mostly people put advertisement in newspapers or Internet.

Consumers

Consumers can be divided into three groups:

- population
- public institution
- business: large corporations, SMEs

Demographic indicators are presented in section 3. Basically, the population purchase large-size electronics in specialized net stores. Small household appliances can also be purchased from small traders who bring them from abroad or buy in bulk from large suppliers. Budget organizations purchase products in accordance with the rules of public procurement.

Below are the national statistics on the activities of industrial enterprises, budget organizations and SMEs.

The number of registered legal entities in RK

	2014	2015	2016
Total	353 833	360 287	383 850
Agriculture, forestry and fish farming	12 621	12 858	14 548
Mining and quarrying	2 776	2 981	3 327
Processing industry	20 401	20 720	21 912
Electricity, gas, steam and air conditioning	1 102	1 160	1 266
Water supply; Sewerage system, control over waste collection and distribution	2 120	2 189	2 358
Building	50 037	51 121	53 481
Wholesale and retail trade; repair of motor vehicles and motorcycles	108 758	106 893	112 736
Transportation and warehousing	13 275	13 857	14 740
Accommodation and catering services	4 202	4 611	5 119
Information and communication	8 117	8 630	9 449
Financial and insurance activities	9 065	9 195	9 632
Operations with real estate	16 544	16 655	17 259
Professional, scientific and technical activities	26 401	26 528	27 796
Activities in the area of administrative and support services	13 993	14 633	15 768
Public administration and defence; compulsory social security	10 023	9 909	9 935

Education	18 664	19 369	20 683
Health protection and social services	5 789	5 896	6 259
Arts, entertainment and recreation	5 060	5 264	5 661
All other types of services	24 884	27 818	31 921

Key performance indicators of the industry in RK

	2014	2015	2016
The share of industry in GDP (%)	27,3	24,7	26,1
The volume of industrial production (goods, services), billion KZT	18 531,8	14 925,2	19 026,8
The number of enterprises	11 296	11 619	11 884
Number of personnel, thousand people	694,1	657,3	634,3

Performance indicators of SMEs (2016)

	The number of active SMEs, units	The number of employed, persons	Output of products (goods and services), million KZT	Share in GDP (%)
Republic of Kazakhstan	1 186 629	3 166 792	19 609 010	26,8
Almaty	160 845	598 186	5 157 870	

Refurbishers

As mentioned above, large distributors have service centers that provide services for warranty service and repair. At the same time, repair services are provided by individuals, placing ads on the Internet, newspapers, flyers. Often they engage in buying of used EEE for spare parts.

Recyclers

On the website of the Ministry of Energy of RK the list of waste (including WEEE) recyclers is available, as well for each region and the cities of Almaty and Astana are presented the roadmaps for the introduction of separate collection, recycling and disposal of municipal waste, including WEEE.

For almost all regions, a common task is to attract private investment and expand the capacity of existing enterprises specializing in sorting, processing and recycling of solid waste. The plans include the construction of waste sorting lines and waste treatment plants. In Almaty, it is planned to build a waste sorting complex, also a plant for burning waste that can not be recycled.

A list of the largest WEEE recyclers of Almaty and Almaty region

Name	Type of WEEE	Recycled volume and Recycling capacity, tons	outputs (name, volume)
Ltd. «TechnikDestroy»	Office equipment, home appliances	68 (2015)	Extruder – forming plastic material

		capacity of 600 tons per year	
Ltd. "Kyzyl Bel»	Radio electronics and computers	570 (2015)	
Ltd. "Soyuz Plast"	Polymeric materials such as ABS, PA, PP, PS, PC, PMMA, HD-PE, LD-PE, LLD-PE		Production of secondary granules and agglomerate PP, HD-PE, LD-PE, PS, as well as the implementation of crumbs PA, ABS, PP, PC, PS, PE
Ltd. "PromTechnoResurs"	Office equipment, home appliances, industrial equipment, mercury-containing lamps	600 (2017)	

At the same time, there is an informal sector of WEEA collection and recycling.

Collectors

Waste disposal in Almaty is carried out in accordance with the General Scheme approved by the Maslikhat (local representative body). Removal of solid waste from legal entities operating in the city, as well as from owners of individual houses is carried out on a contractual basis by waste removal companies that won the tender for municipal waste disposal. These companies must have special vehicles and contracts for waste landfill, as well as contracts with specialized companies that dealing with sorting, disposal and recycling of solid waste with subsequent disposal. Removal of large-size waste including WEEE is made by the enterprises, institutions and individuals by themselves or by waste disposal enterprises on the contract basis.

The location of container sites shall be agreed with the institutions of sanitary-epidemiological surveillance, architecture and urban planning, and with cooperatives of apartment owners. Owners of individual residential houses can use small containers for the waste collection. Not permitted storage and placement of solid waste on the roadway of the streets, as well as in adjacent areas of individual houses, and the burning of household waste in containers.

Currently in Almaty more than 30 companies engaged in waste removal. The largest one is the JSC "Tartyp". The company employs 910 people, including 821 people – production personnel directly engaged in the collection and disposal of waste, 236 units of specialized equipment, deployed at seven production bases in six districts of the city.

Landfills

Waste from the city of Almaty is transported to the city landfill, located in Karasai district, Almaty region, 30 km from Almaty. The landfill was transferred to Ltd. "Kaz Waste Conversion" according to the Decision of Akim of Karasai district in 2010. The company has permission to emissions to environment for objects of 1, 2 and 3 categories. The main activity of the company is

rendering services in acceptance, processing, utilization of municipal solid waste and construction waste.

The total area of the land plot is 206 hectares.

The daily volume of waste received is 7500-10000 cubic meters.

Ltd. "KAZ Waste Conversion" concludes contracts for 2018, for the disposal of waste at the municipal landfill with enterprises and organizations, regardless of ownership, at the following prices:

- reception of solid waste from enterprises and organizations - 271.43 KZT (about 0,85\$), excluding VAT, per 1m³;

- reception of construction waste from enterprises and organizations - 1471,79 KZT (about 4,6\$), excluding VAT, per 1 ton;

- reception for disposal of waste from enterprises and organizations - 1268.28 KZT (about 4\$), excluding VAT, per 1m³.

The company utilizes the following waste types:

- Paintwork material
- Medical waste
- Construction waste
- Biological waste
- Lead batteries and accumulators
- Food waste
- Mercury-containing waste
- Tires
- Other waste

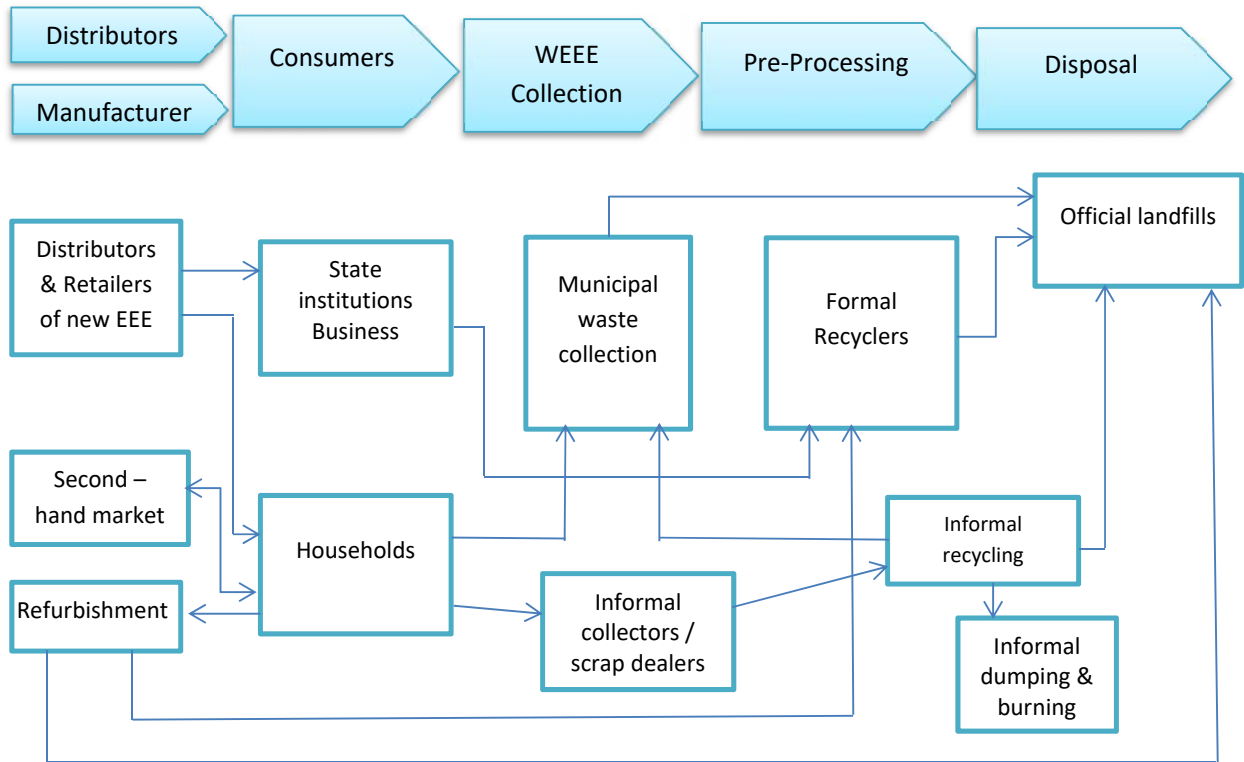
Operates on the territory of Almaty and Almaty region. Clients are universities, the largest shopping centers, factories, management and construction companies. It has its own sorting area in the city, part of the waste is handed over for recycling.

The most affected communities

The most affected communities are the inhabitants of suburbs and rural areas where are uncontrolled dumps at which burning of waste takes place. Residents of apartment buildings in cities must to pay for waste removal, because they have no option for disposal and in cities as we can see on example of Almaty is well organized system for waste collection (without separation). Due to lack of infrastructure rural population use domestic waste, including packaging, tyres, plastic and other as fuel in households that causes serious harm to their own health and environment.

6. Massflow assessment

Massflow system chart of WEEE in RK



As an example, using this chart it is possible to consider the formation of waste stream of Personal Computers for 2016.

The following national and international statistic data and information from questionnaires were used for calculation:

Imported in RK in 2016 – 2 185 tons

PC consumers divided in two major groups – households and others (state institutions, business companies). According to statistics (Statistical compendium “ICT Development in RK 2012-2016”) in 2016 households has 7005594 units of PCs, including:

Desk computer – 3 014 276 units = 29 841,3 tons

Tablet computer – 1 668 246 units = 951 tons

Portable computers (laptop, netbook, ultrabook) – 2 323 072 units = 3 717 tons

Households, total – 34 509,1 tons

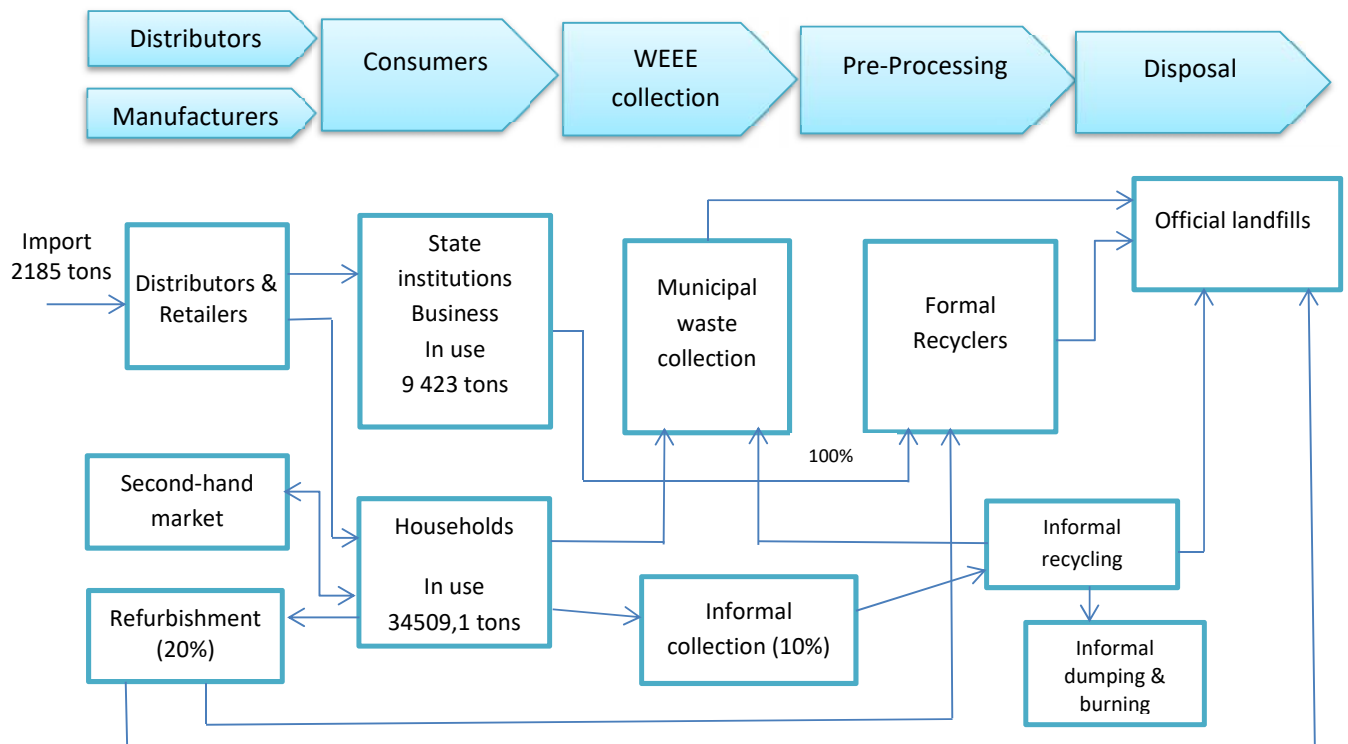
State institutions, business companies – 951 777 units = 9 423 tons

TOTAL in RK in 2016 – 7 957 371 units or 43 931,7 tons

legal entities deliver WEEE for recycling, that means that the 951 777 units will be sent to the official recycling in the next 5 years. With households situation is different. Now people can take domestic WEEE to recycling or throw it to containers with other household garbage without separation. As a rule people get EEE for repair and if refurbishment is impossible leave it as WEEE at service workshops. Some part of households WEEE (roughly 10%) get to informal recycling.

Since 2019 it will be responsibility of local authorities to stop WEEE landfilling without separation. Big problem now is lack (almost absence) of appropriate infrastructure for WEEE collection from households.

Massflow system chart (personal computers, based on data 2016) in RK

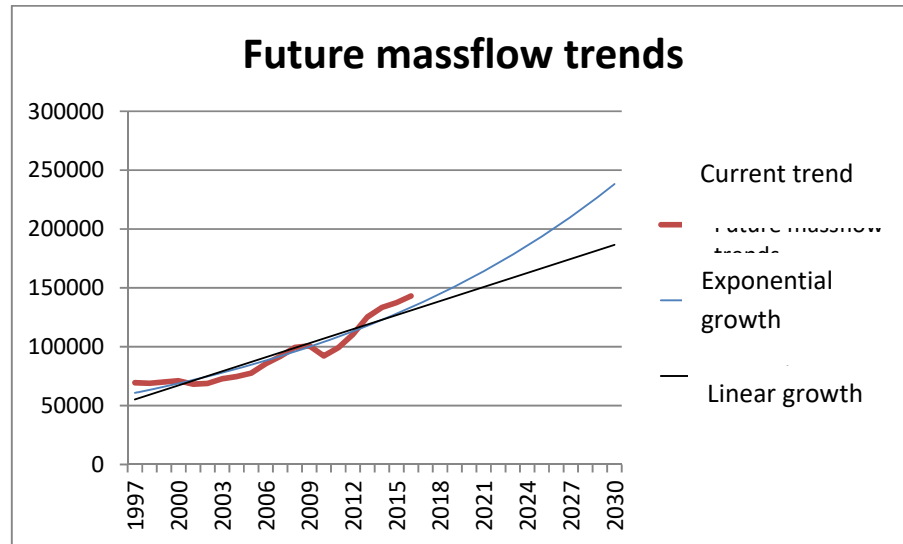


Future massflow trends for WEEE generation in RK

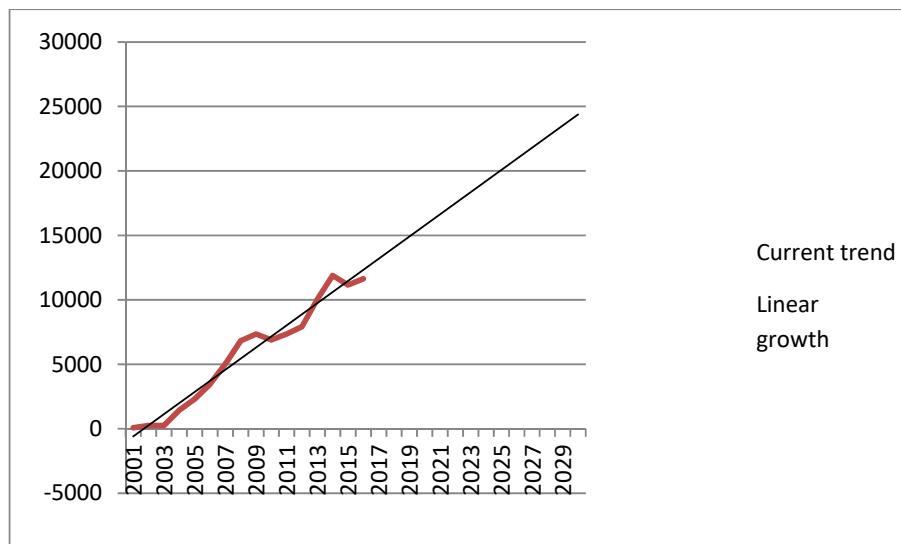
Trends are based on data of annual total generation of 5 types of WEEE: TVs, R&F, WM, mobile phones, and PC. Depth on the first three positions is 20 years, from 1997-2016; on cell phones 15 years, the period from 2002-2016, on personal computers – 16 years, the period 2001-2016.

Depth of forecast is 15 years, in tons.

Current and future Massflow trends (TV, R&F, WM, CP, PC) in Kazakhstan



Current and future trends e-waste generation of PC, tons



7. The impact of WEEE on human health and environment

The most vulnerable group is the informal sector, which is mainly represented by the self-employed people. Disassembly of WEEE is carried out in unsuitable premises, where functioning parts, valuable components are extracted for the purpose of sale. It should be assumed that the most primitive technologies causing the greatest harm to health and environment are used for these purposes. Plastic and other components, at best, go to landfills, at worst, are burned or become a source of unauthorized dumps. According to statistics, in 2016 98554 people were self-employed in RK in the category of "other types of services". Informal sector dealing with WEEE could be somehow attributed to this category.

Health monitoring is carried out by the Ministry of Health of RK.

On the e-government website you can find the document "Disease Statistics by type, region and year". In the structure of total mortality, the leading cause is circulatory system disease (22.3%), the most frequent is ischemic heart disease, vascular brain damage. The increase in the primary incidence of diseases of the circulatory system is almost 15%. The second reason is mortality from cancer (12.1%), of which 16.9% is lung cancer. The index of cancer diseases increased by 9.7% in since 2010. In third place - the death rate from accidents, injuries and poisoning (11.3%).

In the State program of healthcare development in RK "Densaulyk" for the years 2016-2019 noted that one of the problems of healthcare is the lack of concept of further development and improvement of risk assessment system, involving the creation of science-based assessment of the negative impact of environmental factors on health and the associated potential medico-biological and economic consequences. Existing information systems do not allow rapid exchange of data with other databases of interested state bodies, agencies and international organizations. The existing system of laboratory control needs constant improvement and retrofitting. One of the program goals is to reduce the harmful effects of environmental factors on the health of the population, including the control of air pollution, soil and natural water reservoirs. As well a Risk Map of the environmental impact on the health of the population will be developed, followed by monitoring the health of the population in the context of the regions.

Monitoring of environment pollution in RK

This type of monitoring is carried out by the state network of environmental observations of Republican state enterprise "Kazhydromet" - subordinated organization of ME RK.

The monitoring system includes:

Monitoring of atmospheric air is a system of observations of atmospheric air pollution in the settlements throughout RK. Observations of atmospheric air pollution are carried out in the largest cities and industrial centers. Currently, monitoring is carried out in 49 settlements at 146 observation posts, including 56 manual sampling posts and 90 automatic stations. And also, observations are carried out with the help of 14 mobile laboratories.

Analysis of air pollution is carried out by determining of 34 pollutants, such as suspended matter, suspended particles PM-2,5 particulate matter PM-10, nitrogen dioxide, nitrogen oxide, sulfur dioxide, carbon monoxide, carbon dioxide, sulfuric acid, soluble sulfates, hydrogen fluoride,

chlorine, hydrogen chloride, inorganic arsenic, ammonia, hydrogen sulfide, ozone, phenol, formaldehyde, benzene, ethylbenzene, benzene, benzo(a)pyrene, the sum of the hydrocarbons, methane, cadmium, copper, arsenic, lead, chromium, manganese, cobalt, zinc, beryllium.

Soil monitoring is carried out at 65 observation points. Samples are taken at five specific points twice a year within the borders of cities and industrial centers with subsequent determination of content of heavy metals (lead, zinc, cadmium, copper, chromium).

Monitoring of surface water quality - most of the land surface water pollution observation points are combined with hydrological stations and posts. It is obligatory to determine not only hydrochemical, but also hydrological characteristics (flow rates and water levels, average flow rate, etc.). The network of observations of surface water quality is carried out on 404 sites located at 133 water objects, including the 86 rivers, 28 lakes, and 14 reservoirs, 4 channels and 1 sea. Analysis of pollution of surface waters in selected water samples is determined by more than 60 physical and chemical parameters of water quality including temperature, water flow, suspended matter, chroma, transparency, pH, dissolved oxygen, BOD-5, COD, the major ions of salt composition, biogenic elements and main polluting substances: oil products, phenols, heavy metals, pesticides.

According to the results of the observations, the following newsletters are issued:

- Condition of the environment of the Republic of Kazakhstan;
- Condition of the environment and health of the Aral sea;
- Status of transboundary movement of toxic components.
- Operational information on high and extremely high pollution of the environment, etc.

For example, in the newsletter "Condition of environment of the Republic of Kazakhstan" for 2017, in terms of maximum permissible concentration – the maximum frequency of the maximum permissible concentration occurrence of any pollutant in the air of the city - Almaty is in the first place (<https://kazhydromet.kz/ru/bulleten/okrsreda?year=2017>). Regularly in the air of Almaty detected the presence of copper. One of the reasons for the high and very high levels of air pollution in settlements is the dispersion of emissions from industrial enterprises – the result of production processes in the combustion of industrial products.

Statistic data related to environment pollution is also publicly available, including the following indicators:

Ecological indicators of environmental monitoring and assessment

A. Air pollution and ozone depletion

1. Emissions of pollutants into the atmospheric air
2. Ambient air quality in urban areas
3. Consumption of ozone-depleting substances

B. Climate change

4. Air temperature
5. Atmospheric precipitation
6. Greenhouse gas emissions

C. Water

7. Renewable freshwater resources
8. Freshwater abstraction
9. Household water use per capita
10. Water losses
11. Reuse and recycling of freshwater
12. Drinking water quality
13. BOD and concentration of ammonium in rivers
14. Nutrients in freshwater
15. Nutrients in coastal seawaters
16. Polluted (non-treated) wastewaters

D. Biodiversity

17. Protected areas
18. Forest and other wooded land
19. Threatened and protected species
20. Trends in the number and distribution of selected species

E. Land and soil

21. Land uptake
22. Area affected by soil erosion

F. Agriculture

23. Fertilizer consumption
24. Pesticide consumption

G. Energy

25. Final energy consumption
26. Total energy consumption
27. Energy intensity
28. Renewable energy consumption

H. Transport

29. Passenger transport demand
30. Freight transport demand
31. Composition of road motor vehicle fleet by fuel type
32. Average age of road motor vehicle fleet

I. Waste

33. Waste generation
34. Transboundary movements of hazardous waste
35. Waste reuse and recycling
36. Final waste disposal

Industrial monitoring

For implementing the Code of RK "Health of the people and health care system" the Order of the Minister of National Economy of RK dated June 6, 2016 № 239 approved Sanitary rules "Sanitary and epidemiological requirements for the implementation of industrial control" (hereinafter-Sanitary rules).

Sanitary rules regulates the procedure of organization and conduction of industrial control with purpose to comply with Sanitary rules, hygiene standards, technical regulations and is obligatory for individual entrepreneurs and legal entities, irrespective of their ownership, that involved in activity on manufacturing, use, storage, transport, distribution, collection, disposal and (or) destruction of products subject to state sanitary-epidemiological supervision.

Individual entrepreneurs and legal entities in accordance with their activities are obliged to develop, document, implement and maintain an effective system of industrial control. The purpose of control is to ensure the safety for people health products, works and services, by organizing and conducting on-site self-monitoring aimed at compliance with established requirements. The objects of production control are products and epidemic significant objects, the lists of which are approved by order of the acting Minister of Health of RK dated November 17, 2017 № 836 "Approval of the list of products and epidemic-related objects subject to state sanitary and epidemiological control and supervision". Among epidemic significant objects are landfills for municipal waste and toxic waste of production and consumption of 1 and 2 classes of danger. To the production of minor epidemiological significance refers to products of mechanical engineering and medical and household appliances, except for spare parts for vehicles and household appliances.

In accordance with Sanitary rules the industrial control includes:

- 2) implementation (the organization) of laboratory researches and measurements in the cases established by documents of regulation.
- 5) assessment of risk factors, analysis of identified risks, safety criteria and (or) safety of industrial and environmental factors and determination of methods for monitoring the safety of processes (use, collection, transportation, storage, disposal, recycling, disposal), works, services, with the definition of critical control points to ensure risk management.
- 6) recording and reporting of documentation related to the implementation of production control. Duration of storage of documents is not less than three years.
- 7) development of a scheme of informing people, local Executive bodies, bodies of the public sanitary and epidemiologic service of RK on emergency situations, suspensions of production, violations of technological processes, cases of occurrence of mass (3 and more cases) and infectious diseases and poisonings connected with activity of the object, creating a threat to sanitary and epidemiologic well-being of the population;
- 8) control over implementation of measures within the control program, compliance with hygienic requirements during technological processes, timely elimination and minimization of microbiological, chemical, toxicological, virus, radiological, biological risks and outside matters. During the control adjustment of the activities and implementation of measures aimed at elimination of the revealed violations should be carried out.
9. The program of industrial control is developed taking into account the dangers (risk factors) that exists at the object.

10. Development of the program of industrial control is carried out by the individual entrepreneur, legal entity independently or with involvement of persons involved in carrying out sanitary and epidemiologic audit.

11. The developed program is revised in case changing the type of activity or technological processes.

Control is carried out with the use of laboratory tests, tests on the following categories of objects: 1) production and consumption waste (collection, use, disposal, transportation, storage, processing and disposal of waste). Control includes laboratory studies and tests of potentially hazardous factors of the production area environment. Among other factors, from the point of view of the influence of the WEEE, aerosols (dust), chemical factors are of interest: mixtures obtained by chemical synthesis and/or for the control of which chemical analysis methods are used, harmful substances with an acute mechanism of action, harmful substances of 1 – 4 hazardous classes. In carrying out activities related to the generation of production and consumption wastes, monitoring, including laboratory monitoring of the collection, use, disposal, transport, storage, recycling and disposal of production and consumption wastes, with an assessment of environmental pollution, should be provided. Data on the results of the industrial control carried out at production facilities are submitted to the departments of state bodies in the territorial subdivisions of the sphere of sanitary and epidemiological people welfare in relevant territory once a half-year by the 5th day of the following month.

In carrying out activities related to the release of all types of industrial, domestic and surface wastewater from the territories of settlements, industrial and other facilities, laboratory control should be provided for the efficiency of substances removal in treatment plants, the composition of discharged wastewater. Laboratory control is carried out over the quality of wastewater, soil, air, materials and equipment used in wastewater treatment. On sites and grounds for collecting and storage of solid waste recommended laboratory and instrumental measurements of soil contamination: heavy metals, nitrites, nitrates, hydrocarbonates, organic carbon, pH, cyanides, lead, mercuries, arsenic. Studies of atmospheric air over the waste areas of and on the border of the sanitary protection zone are carried out in cities of national and regional importance. Recommended chemicals for measurements: methane, hydrogen sulfide, ammonia, carbon monoxide, benzene, trichloromethane, carbon tetrachloride, chlorobenzene. Volumes and frequency of measurements are defined by the project of the establishment of sanitary protection zone.

Analyses carried out at landfills and wastewaters can show the dynamics of increasing the content of substances related to WEEE.

8. Awareness raising campaign about the risks linked to improper management of e-waste

CSPC has prepared and sent to specialized networks of shops selling EEE official letters with invitation to joint project activities related to environmental campaign including awareness raising and e-waste collection from people and other stakeholders. The letters were sent to "Sulpak", "Planet of electronics", "LogyCom", "Alser".

The network shops "Planet of electronics" accepted the invitation and provided the opportunity for e-waste collection in 5 shops of the city at the following addresses in Almaty:

Auezov street, 9/162 (tel. 277-56-66)

Dzhandosov street, 70 (tel. 275-17-00)

Dostyk avenue, 29 (tel. 291-79-22)

Kunayev street, 49 (tel. 273-64-79)

Sholokhov street, 13 (tel. 223-10-09)

"Planet of electronics" installed mobile eco-boxes for collecting large-size equipment and containers for collecting cell phones and batteries. Special banners were placed on the eco-boxes in order to attract the attention of buyers and visitors. In order to increase the coverage of the number of informed citizens, eco-boxes sometimes were installed near the entrance of shops so that any passer could get acquainted with the information and get the necessary consultation.

The following information posters have also been installed at the shops in order to inform all visitors about the need for proper WEEE handling.



Dear residents and guests of our city!

Network of shops "Planet of electronics" as a socially responsible company supports the initiative of the public organization "Centre of sustainable production and consumption" and take obsolete or unused household electronic and electric equipment from residents such as personal computers, printers, scanners, cell phones, domestic appliances, etc.

These kinds of domestic appliances can not be thrown into a common garbage container, as they are electronic waste and consist of some hazardous substances including heavy metals, persistent organic pollutants, etc. Landfilling of electronic wastes without proper treatment leads to soil and groundwater contamination and put at risk human health and environment. Burning of e-waste results in release of toxic gas into and air.

Remember!

Handing over electronic waste for recycling, you contribute to protection of environment and health of present and future generations.



For transportation and recycling of collected e-waste was involved a company - Ltd. "SCHROTT RECYCLING" that dealing with WEEE collection and storage. The provide vehicles and staff.

WEEE that was collect and transport for recycling during the awareness raising campaign:

WEEE title	Number
Vacuum cleaner	40
Television set	24
Washing machine	14
Refrigerator	18
Monitor	87
Системный блок	85
Laptop	13
Printer	35
Other household appliances	

9. Conclusion

Currently, the problem of proper waste management is one of the priorities in Kazakhstan, it noted in the Message of the President N.Nazarbayev to people of Kazakhstan "New opportunities for development in the fourth industrial revolution." Akims of the regions were instructed to take measures for modern disposal and recycling of solid waste with the broad involvement of SMEs. This will require updating the legislation, including the Environmental Code.

The important point is introduction of EPR in 2016 and one of the tasks is creation of a unified system of solid waste management in Kazakhstan. But at the moment the lack of infrastructure for the collection of WEEE from households is the main obstacle to achieve this goal. Targeted actions do not solve the problem, but they are important as input in changing the patterns of consumer behavior. The action carried out within the framework of the project demonstrated the willingness of some residents to hand over e-waste for recycling. When conducting information campaigns, it is necessary to point the addresses of the reception of the WEEE, and not just to talk about what harm they cause in case of improper disposal. One of positive points of awareness raising campaign is involvement of business as it support to sustainability of activities of WEEE management. "Planet of electronics" and "SHROTT RECYCLING" agreed to continue collaboration after the end of awareness raising action within this project. As well this action demonstrates that creation of infrastructure for WEEE collection may be not very expensive, main point is to involve stakeholders and define their role and responsibilities.

Making WEEE Massflow assessment and future trends for Kazakhstan it was noted that trends for different categories of e-waste are differ. For PC trends show bigger growth of waste generation. It should be taken into account for planning of recycling facilities.

Stakeholder analysis has shown that different groups have different interests. If at the state level there is an understanding of necessity to implement a safe waste management system, the main goal for producers and retailers is to increase sales and reduce costs. When implementing the waste management system, recommendations from all stakeholders should be taken into account.

10. Recommendations

The following recommendations worked out in the course of discussions with stakeholders at round table:

- Improvement of sectoral and statistical reporting, including reporting by SMEs engaged in the collection, processing and utilization of WEEE.
- Actively involve network distributors in WEEE collection and awareness raising. For example when people purchase household appliances, sellers and consultants are advised to put in operating instructions information about the necessity to proper utilization of EEE and addresses where people could bring e-waste for recycling.
- To make amendments to current legislation for introduction “take back system”.
- On regular basis conduct an information campaign using mass-media to inform people about the dangerous properties of WEEE and necessity to environmentally sound disposal.
- Local authorities should develop a scheme for WEEE collection infrastructure taking in account the density of population in different parts of the city.
- To consider the possibilities to use service centers as an option for WEEE collection places.
- To increase collaboration with all stakeholders using capacity of working group organized by “Operator EPR”

Referencies

1. The Manual for the e-Waste Assessment Methodology" (Basel Convention, UNEP, EMPA, 2012)
2. Statistical compilations published on the website of the Committee on statistics of the Ministry of national economy of RK (<http://www.stat.gov.kz>)
3. Website of ME RK (<http://www.energo.gov.kz>)
4. Information and legal system of regulatory legal acts of RK(<http://adilet.zan.kz/rus>)
5. Website of Ministry of health of RK (<http://mz.gov.kz>)
6. Website of Basel Convention
7. E-government portal "Open data" (<https://data.egov.kz>)
8. Website Kazhydromet (<https://kazhydromet.kz>)
9. UN websites on international trade
10. Website of World bank
11. Review, articles, reports related to WEEE
12. KAZDATA (<https://kazdata.kz/04/katalog-kazakhstan.html>)