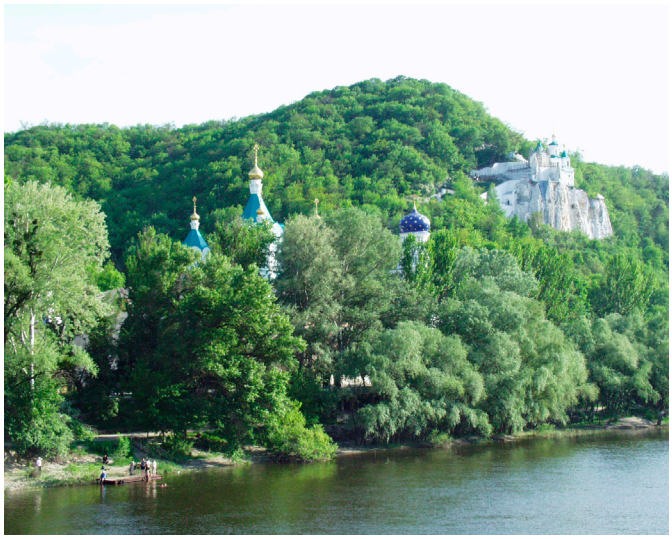
Draft Regional Strategic Plan for Solid Household Waste Management of the Oblast of Donetsk 2005-2009



The Regional Strategic Plan for Solid Household Waste Management of the Oblast of Donetsk 2004-2009 has been established with help from the Tacis Programme "Improvement of Solid Household Waste Management in Donetsk Oblast"

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1 INTRODUCTION

1.1 European co-operation

The State Department of Ecology and Natural Resources of the Donetsk Oblast asked in 1999 for a help from the European Union (EU). In 2002 EU, having implemented a tender, entrusted to the consortium Thales EC & GKW the programme EuropeAid/112554/C/SV/UA "Improvement of Solid Domestic Waste Management in Donetsk Oblast of Ukraine" whose beneficiaries are the Ministry of Environment of Ukraine and Donetsk Regional State Administration and whose main recipients are the State Department of Ecology and Natural Resources in Donetsk Oblast and Department of Housing and Public Utility Services of the Regional State Administration.

1.1.1 Relevant Project Context

The general purpose of this project is to improve the sanitary and ecological state of the region, considered as highly polluted, mainly due to industrial activities. However, the household refuse, and the lack of care about SHW contributes already to a degradation of the ecological situation.

The main assumption of the expert's team is that the past deterioration of the situation has been caused by a lack of awareness of the waste situation by the population and the political sphere, which has turned in low priorities in economic and organisational decisions. Population was not conscious of the potential health issues, did not care enough about environment, and was reluctant to pay for what is considered up to now as a useless expense. Budget financing by the local administrations put low priority to upgrade facilities, and to offer decent wages to administration staff and workers involved in this sphere. Low revenues made the business not attractive for the private sector.

1.1.2 Present state of the SHWM

The system began to experience radical changes. The SHWM formerly based on administrative command methods, state-owned specialised companies and centralised tariff system, is now settled on contractual arrangements. A process of decentralisation has started in the field of decision-making with some decisions being taken on the city level. Collection and landfill service prices are decided at the local level. The resolution of the regional state administration recommends the cities and rayons of the Oblast to take decisions as regards withdrawal of SHW collection and disposal payment from the apartment fee. Nevertheless the recent decentralisation of the solid waste management at the municipality level has not speeded up participation of private initiative.

Some examples show that in each part of the waste disposal chain where profitable operation is possible, commercial structures start to work, as in Dniepropetrovsk or Donetsk.

1.1.3 Strategic planning

The 1998 law of Ukraine «On Waste» shifts the responsibility for SHW collection and removal as well as for creation of landfills and other waste treatment facilities to local self-government bodies and state administrations. This has caused a splitting of the responsibilities between areas, a multiplicity of local facilities. Each municipality tries to solve the waste issues by itself, and rejecting assistance to neighbour (typical of the NIMBY syndrome). This approach deprives the region from a co-ordinated policy, makes difficult the construction of a lesser number of larger regional sites, more efficient and easier to control, do not allow to minimise the risks. The only way for the Region administration to have a control on the process relies on the distribution of budget funds for new investments.

Although long-term planning is well developed in Ukraine, as shows a structure and concept of the new Development Plan for the Region to 2020, one of the main issues to address in the SHWM is the lack of a long-term strategy involving all actors, with proper forecasts of waste fluxes and investments needs, based on well experimented and modern technologies.

A particularly severe aspect of the problem lies in the liquidation of old landfills, not complying with the European standards, linked with the difficulties to create new facilities, accepted by the population. New facilities, respecting modern ways of exploitation, minimise drawbacks for neighbours.

1.1.4 European expertise

The experts of the Tacis Programme (both foreign and Ukrainian) have worked all over 2003 on the analysis of the situation and the gap between the on going situation and the international standards. The results of all these studies are used for the preparation of the Regional SHWM.

1.2 Commission of the Plan

1.2.1 General methodology for public planning projects

As a project, the plan will necessarily have to be *situated*, in the sense where it will have to fit with the administrative, geographical, sociological, economical, environmental, cultural, etc., particularities of the territory on which it will be implemented.

It will also have to be elaborated in a *deliberative* way, in the sense where not only the goals of the plan and the means used to achieve these goals, but also the process of the elaboration of the plan and the means of monitoring of its realisation should be the objects of a sincere deliberation between all the concerned persons and bodies. By this way, the dialog process itself will be understood by every bodies participating to it: they will thus be able to understand exactly at which level of authority each meeting takes place. The aim is also to build collectively a process that will fit with the habits and particular preoccupations of every body. A deliberative process (instead of a totally pre-built procedure) puts everybody in face of its responsibility, and defuses every criticism on the process itself by advance.

The goal of this totally opened deliberation is to ensure that the plan will be really understood and appropriated by the administration and the authorities who will have to make this plan effective and credible with the eyes of the population. We know indeed that an active and volunteer participation is necessary to the quality and relevance of the result of this kind of project.

Thus not only the plan itself, but also the process of its elaboration, its implementation and its realisation will have to rest on a dialog process.

1.2.2 Organisation of a multilateral public dialog

This dialog process cannot be limited to a series of bilateral meetings between the responsible body and the others concerned bodies. In this case, there would be a risk that the process turns to only a series of *hearings*, with a responsible body making arbitrations, and it appeared in European Union that it is far more profitable to organise a multilateral dialog between all the concerned organisations.

The frame of this multilateral dialog could take place in what could be called the "Working Group of the Plan", since the notion of working group is well associated with the idea of deliberation and is easy to translate in many languages.

2 Existing situation and prospective

2.1 General framework

2.1.1 Demography

The Oblast of Donetsk accounts 4 774 400 inhabitants (the data as of 01.01.03).

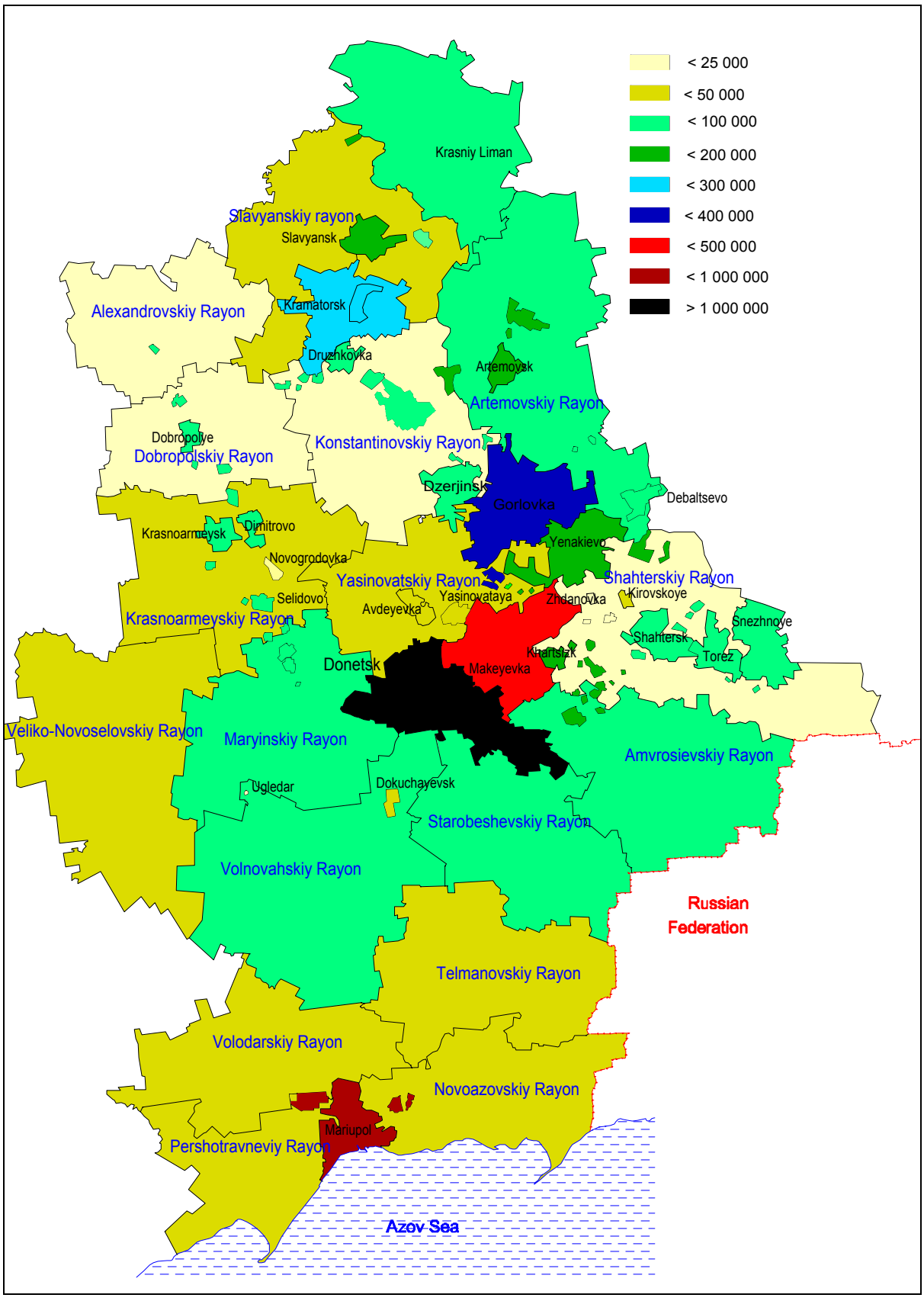
90% of the population of the Oblast live in urban areas. 29% of the inhabitants of the Oblast house in individual houses.

The demographic decreasing of the Oblast is 10.5% between 1989 and 2003. It is mainly due to a relatively weak rate of fertility (1.3 child per woman) although the interior migration rate is unknown. If we examine the rate of variation of population by administrative unit, the bracket is from 77.8% to 104.3%. This last figure (Pershotravneviy Rayon) constitutes an aberration which should be explained. Out of this particular case, the bracket is from 77.8% to 95.1%.

The Oblast accounts 45 administrative units, 28 Cities and 17 Rayons. The population of these administrative units which are in charge of the solid household management within their territory, is from 14 500 inhabitants to 1 026 000 inhabitants. These figures are recapped in *Table 1*.

	Population (1000)		Among which		Variation (%)	Area (km²)	Density of Population
	1989	**2003**	Urban	Rural	2003/ 1989		
Oblast	**5 332,4**	**4 774,4**	**4 304,8**	**469,6**	**89,5**	**26 517,5**	**180**
Cities	***4 549,7***	***4 059,0***	***4 022,3***	***36,7***	***89,2***	***4 941,9***	***821***
Donetsk	1 132,4	1 026,0	1 024,4	1,6	90,6	570,7	1 798
Avdeyevka	39,8	36,9	36,9		92,7	29,3	1 259
Artemovsk	125,4	112,0	112,0		89,3	73,6	1 522
Gorlovka	363,1	309,4	306,8	2,6	85,2	422,5	732
Debaltsevo	57,4	51,2	51,2		89,2	37,5	1 365
Dzerjinsk	97,1	85,1	81,5	3,6	87,6	61,9	1 375
Dimitrovo	64,4	55,1	54,1	1,0	85,6	22,8	2 417
Dobropolye	81,6	70,4	70,3	0,1	86,3	19,8	3 556
Dokuchayevsk	27,0	25,0	24,1	0,9	92,6	118,9	210
Druzhkovka	83,9	74,3	73,5	0,8	88,6	46,5	1 598
Yenakievo	190,0	157,8	154,0	3,8	83,1	425,2	371
Zhdanovka	15,6	14,5	14,3	0,2	92,9	2,0	7 250
Kirovskoye	32,6	30,4	30,4		93,3	7,0	4 343
Konstantinovka	106,0	93,1	93,1		87,8	66,0	1 411
Kramatorsk	235,3	213,5	212,6	0,9	90,7	355,7	600
Krasniy Liman	61,1	53,0	39,6	13,4	86,7	1 209,8	44
Krasnoarmeysk	90,2	82,2	82,2		91,1	39,2	2 097
Makeyevka	473,5	426,4	423,9	2,5	90,1	425,7	1 002
Marioupol	540,9	509,8	508,8	1,0	94,3	243,9	2 090
Novogrodovka	19,4	17,1	17,1		88,1	5,5	3 109
Selidovo	72,4	60,9	60,9		84,1	108,2	563
Slavyansk	157,3	145,2	145,2		92,3	74,2	1 957
Snezhnoye	96,6	80,5	79,6	0,9	83,3	188,8	426
Torez	112,5	93,1	93,1		82,8	104,8	888
Ugledar	18,7	16,9	16,9		90,4	5,3	3 189
Khartzisk	127,3	112,3	111,2	1,1	88,2	206,9	543
Shahtersk	88,8	69,7	67,4	2,3	78,5	51,0	1 367
Yasinovataya	39,4	37,2	37,2		94,4	19,2	1 938
Rayons	***782,7***	***715,4***	***282,5***	***432,9***	***91,4***	***21 575,6***	***33***
Alexandrosvskiy Rayon	24,5	22,5	4,1	18,4	91,8	1 010,1	22
Amvrosievskiy Rayon	61,2	54,0	27,7	26,3	88,2	1 455,5	37
Artemovskiy Rayon	58,3	52,6	16,7	35,9	90,2	1 686,8	31
Veliko-Novoselovskiy Rayon	53,7	48,5	7,3	41,2	90,3	1 901,3	26
Volnovahskiy Rayon	101,0	91,8	54,8	37,0	90,9	1 848,2	50
Volodarskiy Rayon	32,2	30,9	8,7	22,2	96,0	1 221,5	25
Dobropolskiy Rayon	22,4	20,2	2,1	18,1	90,2	949,3	21
Konstantinovskiy Rayon	23,4	20,5		20,5	87,6	1 171,7	17
Krasnoarmmeyskiy Rayon	40,6	36,8	8,2	28,6	90,6	1 315,7	28
Maryinskiy Rayon	97,6	89,1	58,0	31,1	91,3	1 350,4	66
Novoazovskiy Rayon	40,6	38,6	15,4	23,2	95,1	1 000,4	39
Pershotravneviy Rayon	27,6	28,8	14,1	14,7	104,3	792,1	36
Slavianskiy Rayon	42,1	38,4	16,2	22,2	91,2	1 273,7	30
Starobeshevskiy Rayon	60,3	55,3	29,4	25,9	91,7	1 254,9	44
Telemanovskiy Rayon	37,2	34,4	10,6	23,8	92,5	1 340,1	26
Shahterskiy Rayon	26,0	23,2		23,2	89,2	1 194,4	19
Yasinovtskiy Rayon	34,0	29,8	9,2	20,6	87,6	809,5	37

Table 1 Population of the administrative units of Donetsk Oblast



Map 1 Population of administrative units

2.1.2 Geography and equipment

The surface of the Oblast is around 26 500 km^2. The density of 180 inhabitants per km² is relatively important.

The general arrangement of the Oblast show the existence of urban corridors in a space little occupied and little populated.

From Donetsk toward the North-East, a hardly urbanized area is issued from the industrialization of the 19th century.

To the North, a corridor joins Konstantinovka, Drujkovka, Kramatorsk, Slaviansk, Krasniy Liman.

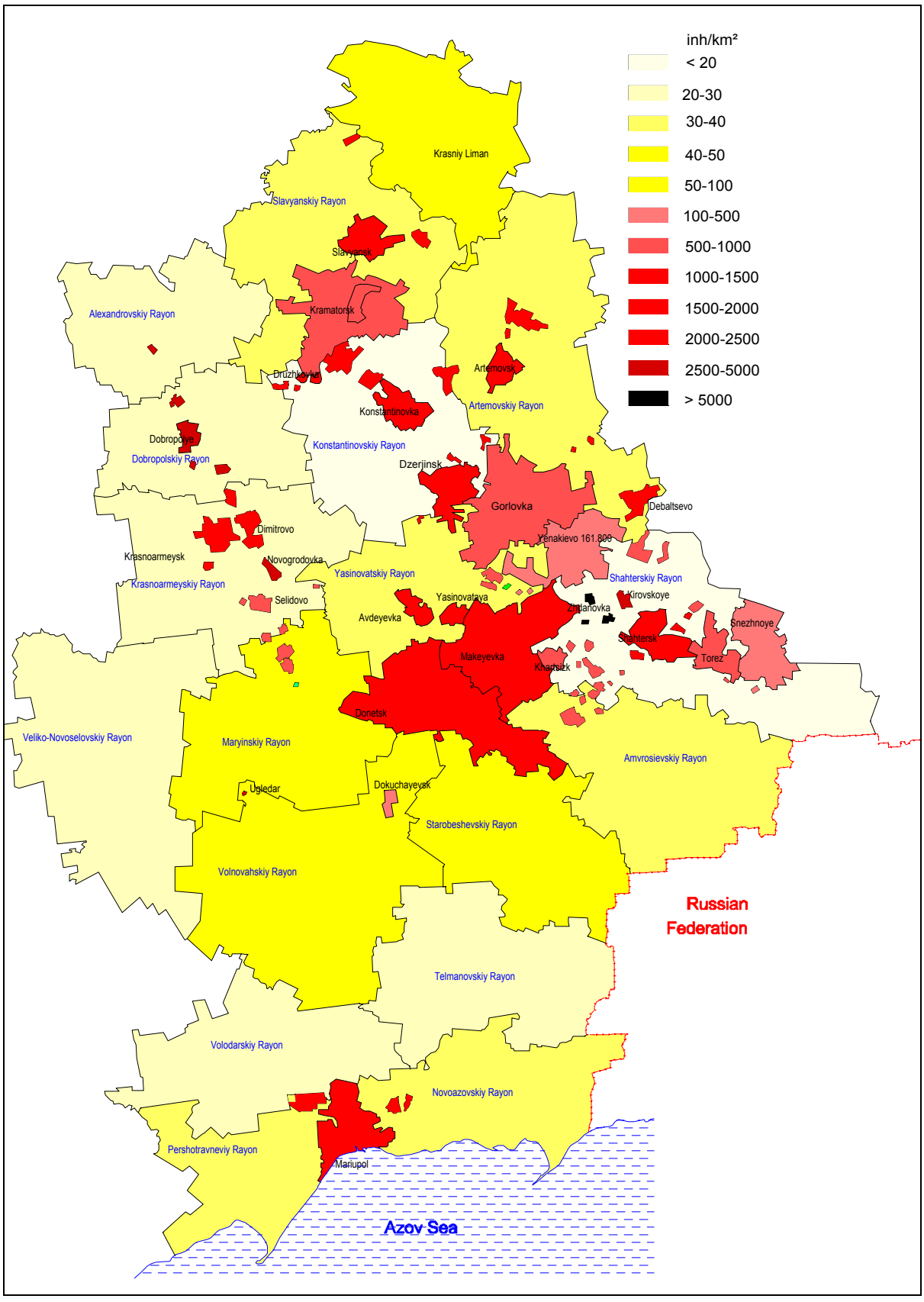
To the North-West, a North-South corridor joins small cities from Belozerskoye to Gorniak.

At the South of the Oblast, Marioupol is an important urban centre.

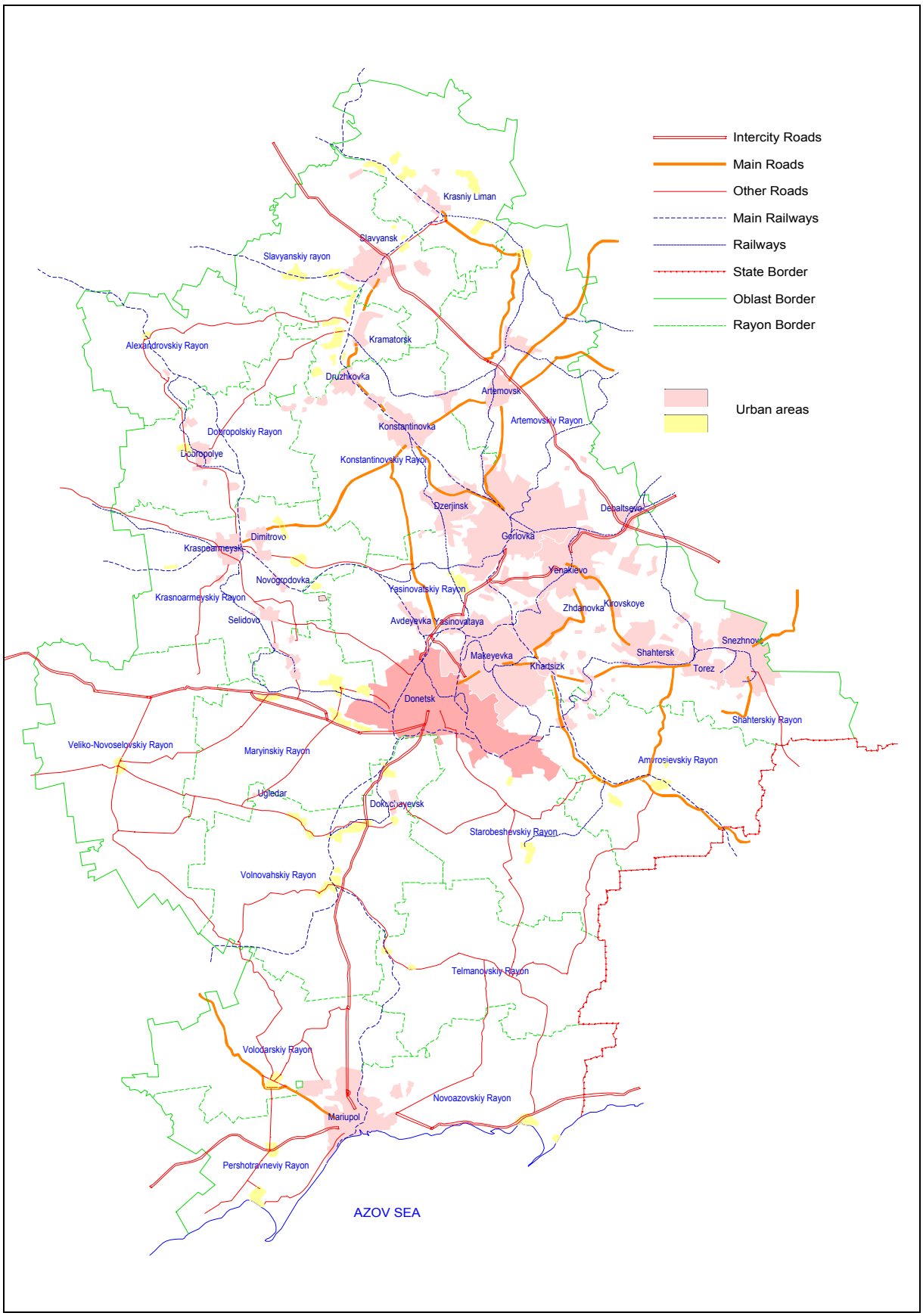
These urban zones appear on the map of densities of population (*Map 2 Density of Population of Administrative Units*).

The Oblast is equipped with a network of main roads relatively dense. Nevertheless, secondary roads joining villages are only fitted for a limited traffic.

The railway network is particularly dense, mainly in industrial zones (mine catchments) and for that reason highly populated.



Map 2 Density of Population of Administrative Units



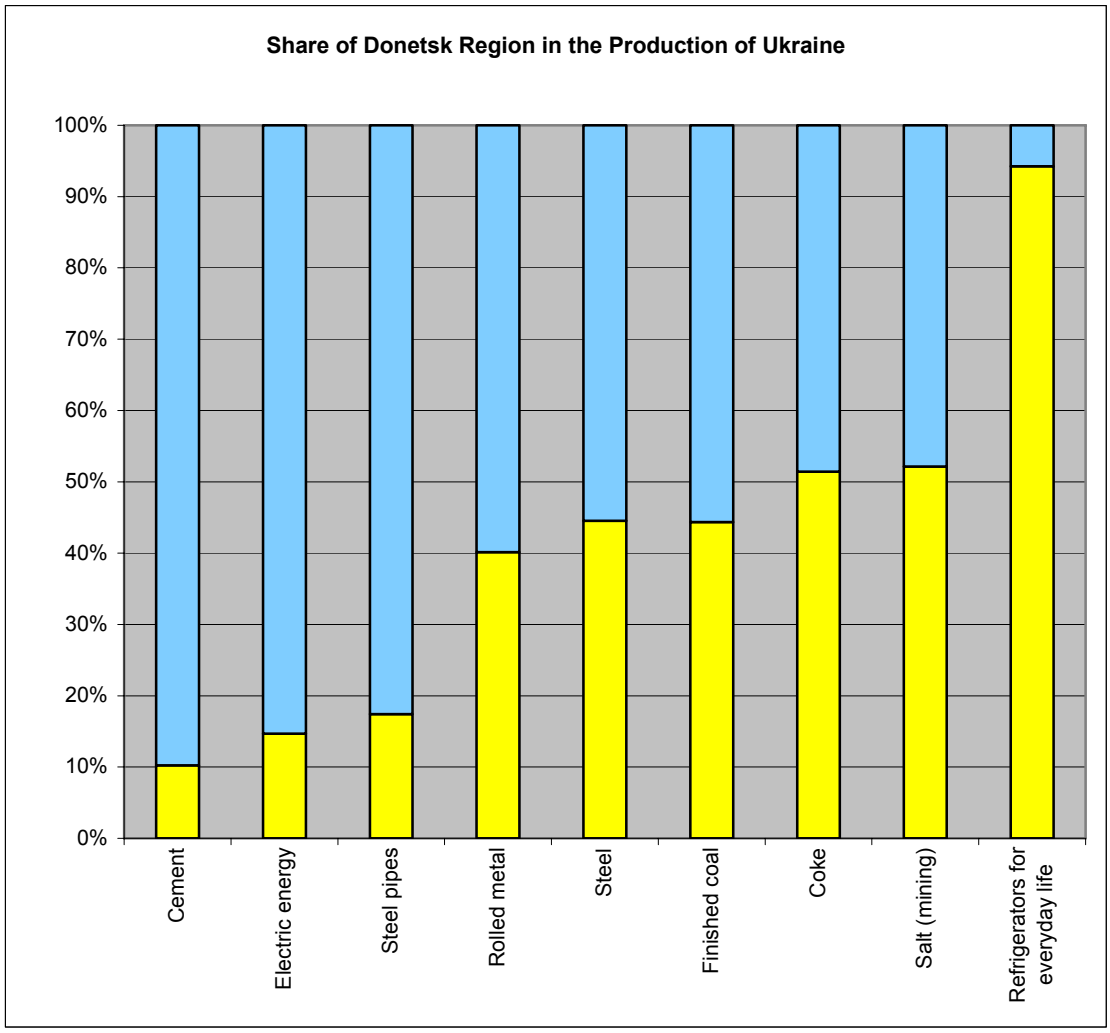
Map 3 Communication Ways

2.1.3 Economy

Donetsk Oblast is rich with mineral resources providing for the demands not only of the region but of Ukraine as a whole (altogether 36 types, the main ones being coal, rare metals, mercury, table salt, chalk, kaolin, lime, gypsum, etc.).

2.1.3.1 Industrial Production

- Part in regional GDP: 66.2%
- Part of the Oblast in the national industrial production: 20%



Graph 1 Share of Donetsk Region in the production of Ukraine

- Main specialities of the industrial production of the Donetsk Oblast: heavy industry (> 50% of the production), mining industry, metallurgical industry, chemical industry.

At the 1st January 2003, there were in the Oblast:

- 848 industrial companies
- 431 construction companies.

	1995	2000	2001	2002
Industrial goods (factual prices) of all industries, mln. UAH	12 047,5	27 493,5	35 489,4	38 593,8

2.1.3.2 Agriculture Production

- Part in regional GDP: 5.4%
- Part of the Oblast in the national agricultural production: 4.7%
- Part of the private sector: 53.2%
- Main specialities: fruits and vegetables, cereals, sunflower, potatoes, breeding

At the 1st January 2003, there were in the Oblast:

- 143 state agricultural companies, including 13 collective farms
- 847 non-state agricultural companies
- 2168 farms.

	1995	2000	2001	2002
Agricultural goods (expressed in prices of 2000), mln. UAH	3 415,1	2 943,1	3 562,4	3 570,0
- Cultivation of plants	1 915,0	1 773,7	2 264,9	2 095,0
- Animal breeding	1 500,1	1 169,4	1 297,5	1 475,0

2.1.3.3 Purchasing power

The Oblast of Donetsk is one of the richest of Ukraine, notably for the reason of its performing industry. The economic growth in the Oblast has been quite high recently and resulted in the growth of wages. In 2002, the average income by inhabitant is officially up to 450 UAH/month (note: 70 €/month). However, the existence of a sector of informal economy relatively important let to suppose major real incomes. On the other hand, since 2003, the nominal wages quickly grew but the official figures of unemployment seem always increasing.

	1995	2000	2001	2002
Average salary of working people, UAH	95,91	292,39	383,05	451,53
Number of people engaged in economic activities, thousands	2 480,7	2 125,6	2 078,3	2 033,3
Number of registered unemployed people (end of the year), people	8 472	95 132	72 140	75 974
among which: women	7 300	65 259	50 783	54 292

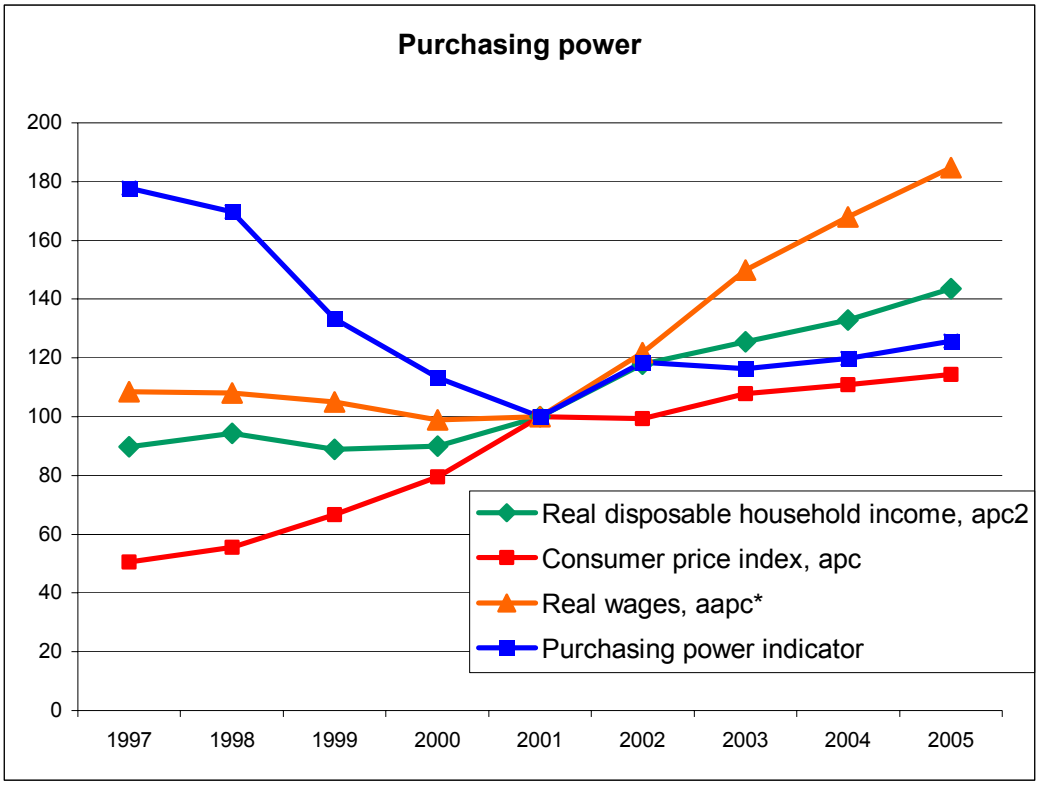
It must be noticed that if the rate of unemployment officially registered on January 1, 2003 is 2.8%, the rate calculated for 2002 according to the methodology used by ILO is 9.4%.

The economical recovery of Ukraine maintains for some years at a strong level. The mid term perspectives are favourable. Particularly the economists are expecting a

durable increase of the prices of the steel and the steel coke, now these are today the main industrial productions of the Oblast.

This economic recovery appears as a progression of the purchasing power of the households, which is an interesting indicator for the production of the household waste. It can be seen on the *Graph 2 Incomes, prices, salaries and purchasing power of the households*

(Base 100 in 2001) that since 2001, the purchasing power (calculated in index Real disposable household income / consumer price index) started again to grow. Between 1997 and 2001, this indicator had fallen of about 45%. Since 2001, it should have progressed of >20%.



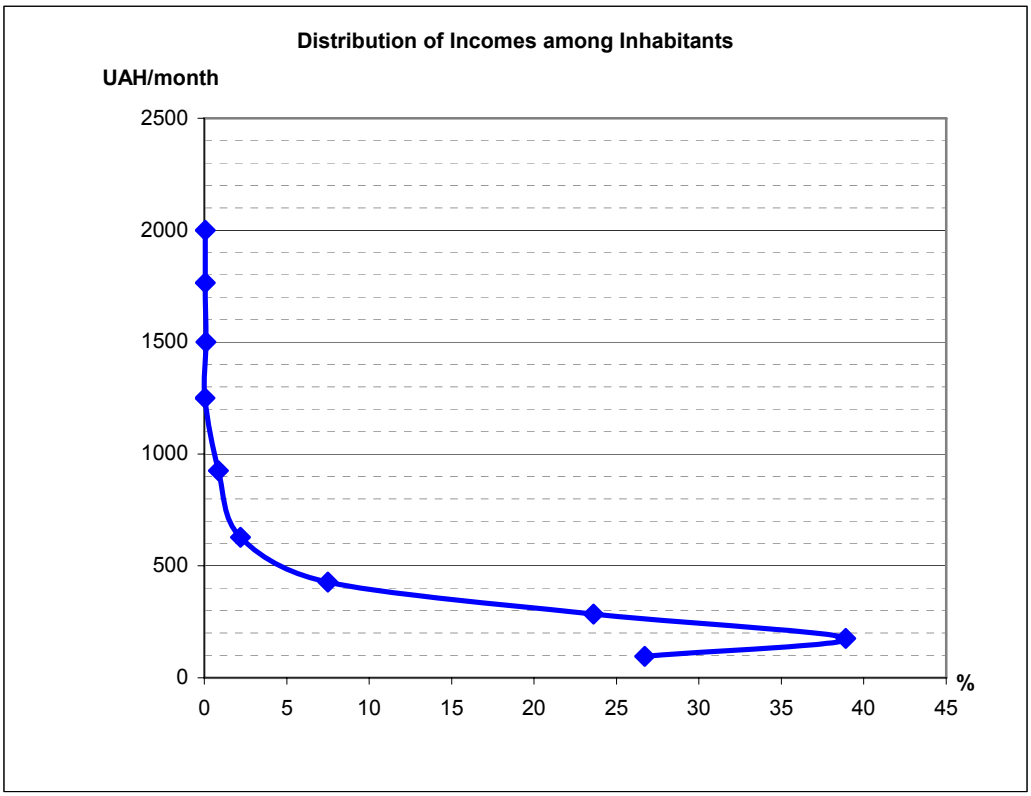
Graph 2 Incomes, prices, salaries and purchasing power of the households
(Base 100 in 2001)

It can be expected for the next years that the particular situation of the Oblast of Donetsk will be better that the Ukrainian average. Experts are forecasting a boom on the world market of steel, and to a minor extent, of coal. A large part of the regional economy is set on these two productions. This expected increasing of the regional richness should improve the purchasing power of the inhabitants.

2.1.3.4 Distribution of incomes and consumption behaviours

In June 2003 within the framework of the project an opinion poll was done by the Donetsk analytical information centre with 1120 families of the Oblast of Donetsk. The processing of the answers about the incomes of each household shows the

following distribution in UAH per month and per inhabitant (not per family) as on *Graph 3 Distribution of incomes within the* Oblast:

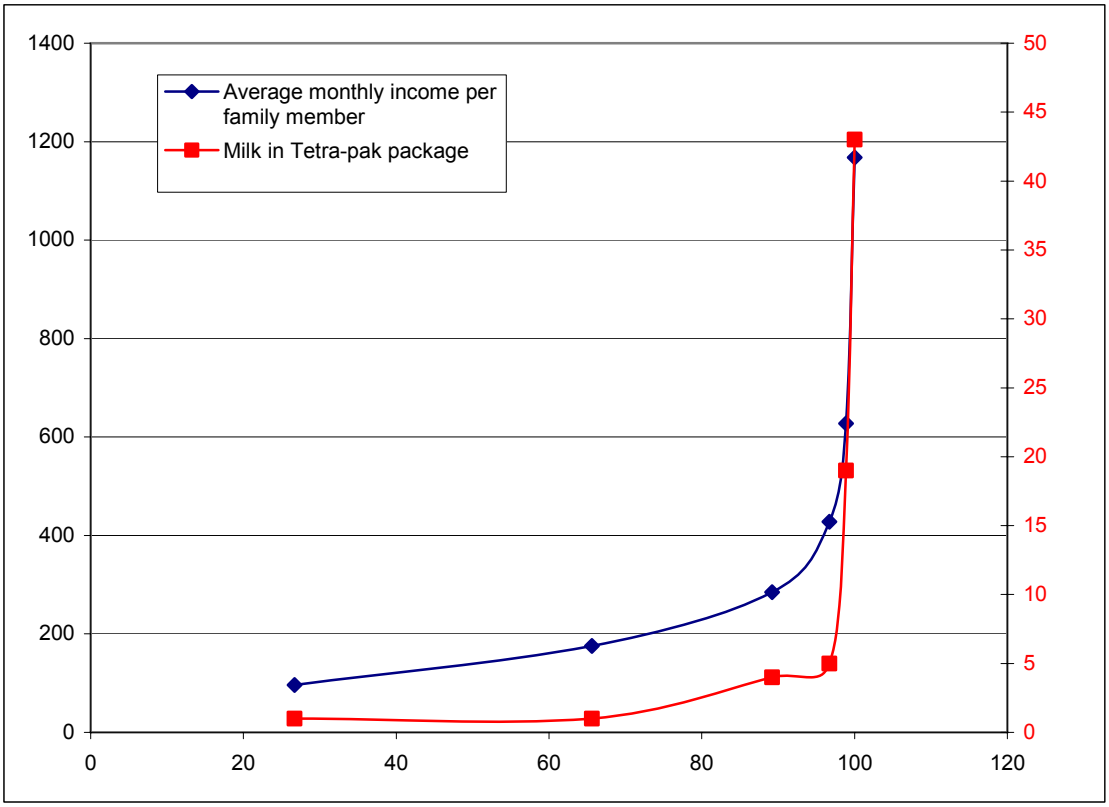


Graph 3 Distribution of incomes within the Oblast

This distribution is typical of a bubble of prosperity in an ocean of poverty. This curve is quite an hyperbole with a very strong inflection. The catching up of wages and real incomes will redress this curve, showing the recovery of a middle class.

In correlation with economics recovery, the consumption of the households increases and changes of nature. It must be kept in mind that huge differences of incomes within the people bring notable differences of consumption ways. So, not only the consumption, and so the relevant quantity of produced waste, increases with the incomes, but very high incomes are also synonymous of changes in consumption habits, with noticeably a growth of packaging and the appearance of new packages as Tetrapak for example.

That can be seen on the *Graph 4 Correlation of incomes and milk consumption in Tetrapak*, which shows the distribution of incomes per inhabitant and per month and the rate of Tetrapak in milk purchases.



Graph 4 Correlation of incomes and milk consumption in Tetrapak
(In abscissa: sum of cases, in % - In ordinate, on left: incomes per month per inhabitant – on right: frequency of milk purchases in Tetrapak)

2.2 Legal framework of waste management

The environmental legislation regulating waste management relies on the regulations of the Law of Ukraine "On Environment Protection" (1991) and the Law of Ukraine "On Waste" which was adopted in 1998, creating necessary conditions for establishment of waste management system.

The Law "On Waste" *"defines legal, organisational and economic framework for the activities dealing with prevention or reduction of waste generation, collection, transportation, storage, recycling, utilisation and removal, neutralisation and disposal, as well as with prevention of a negative impact of waste on the environment and people's health at the territory of Ukraine".*

2.2.1 Policy of the State

In accordance with Article 5 of the Law of Ukraine "On Waste":

"The main principles of the state policy in the field of waste treatment refer first of all to protection of environment and people's health from the negative impact of waste, assurance of rational use of raw materials and power resources, scientifically justifiable consideration of ecological, economic and social waste generation and utilisation interests of the society to ensure its sustainable development.

The main directions of the state policy for implementation of the indicated principles are the following:

a) assurance of collection of all of the waste, timely neutralisation and removal of waste, observance of ecological safety rules during waste treatment;

b) minimisation of waste generation, reduction of hazard presented by it;

c) assurance of a multipurpose utilisation of raw resources;

d) promotion of a maximum utilisation of waste through direct re-utilisation or alternative utilisation of waste presenting a resource value;

e) assurance of safe removal of waste, not subject to utilisation through development of relevant technologies, ecologically safe methods and tools of waste treatment;

f) organisation of control over the places or objects of waste disposal to prevent from a negative impact on the environment and people's health;

g) implementation of a set of scientific, technical and marketing research to identify and define a resource value of waste to ensure its efficient utilisation;

h) assistance in construction of waste treatment facilities;

i) social protection of people, working in the field of waste treatment;

j) compulsory record-keeping of waste based on waste classification and passportization."

The main tasks dealing with implementation of the state policy in the field of solid household waste management and the **main directions aiming at solution of these tasks have been defined in the "Programme of Household Waste Management"** approved by the resolution of the Cabinet of Ministers of Ukraine N° 256 as of March 4, 2004 and are **provided below.**

2.2.1.1 "Section 2. Goal and Main Objectives

The goal of the programme is to create the conditions that will help to ensure a collection, transportation, utilisation, neutralisation and disposal of all household waste and to limit the harmful impact on the environment and human health.

To reach this goal it is planned to fulfil such main tasks as:

- *To reduce the quantities of household waste disposed to the landfills by introducing new modern highly efficient techniques for their collection, transportation, storage, recycling, utilisation and neutralisation;*
- *To develop and introduce new equipment in the field of solid household waste management;*
- *To reform the system of sanitary cleaning;*
- *To ensure organisation of control over the functioning and closed household waste landfills to prevent from the negative impact on the environment and human health as well as recultivation of land after the closure of landfills;*

- *To create conditions for an efficient use of household waste as a power resource and introduction of a complex recycling and utilisation of their valuable components on a scientific and production basis;*

- *To ensure introduction of mechanic household waste sorting with retrieval of valuable components and their recycling in aim to produce new materials and goods.*

The problems that arise in the field of household waste management are to be urgently solved and the measures to solve them are to be financed both at the state and local levels. The question of investments into this field should be settled in a comprehensive way at the expense of all possible sources of financing (state and local budgets, funds of enterprises (upon their agreement) which ensure sanitary cleaning of populated areas). For this purpose ***it is necessary to develop and ratify local programmes of solid household waste treatment*** *as well as* ***schemes of sanitary cleaning of populated areas in accordance with the defined procedures.***

2.2.1.2 Section 3. Main directions for solving the tasks

The defined tasks are planned to be solved as follows:

- *To organise selective collection of separate components of household waste;*

- *To ensure the use of modern highly efficient waste collection lorries;*

- *To create a system of a two-stage transportation of household waste (with construction of waste transfer stations);*

- *To employ composting techniques for the organic part of household waste as well as pyrolysis, incineration and other ways of utilisation or disposal of waste components in the places of waste generation;*

- *To construct modern landfills for household waste with leachate collection and biogas utilization;*

- *To reduce a harmful impact of household waste on the environment and human health".*

2.2.2 Institutional framework of waste management

The activities in the field of waste treatment are managed through a system of state bodies: central bodies of state and executive power, regional governing bodies, local self-government bodies and their executive committees. The functions of organisational structures exercising the management at the regional level are determined by the laws of Ukraine: "On Waste", "On Local Self-Government", "On Local State Administration", etc.

2.2.2.1 Competence of local state administrations and self-government bodies

In accordance with Article 20 of the Law of Ukraine "On Waste" the competence of state administrations as regards waste treatment includes:

*c) **organisation of development and implementation of regional and local waste management programmes** as well as assurance of implementation of national programmes;*

*g) **development of schemes for sanitary cleaning of populated areas;***

h) organisation and assistance in creation of specialised companies of all forms of ownership for collection, treatment, utilisation and disposal of waste as well as for production, installation and maintenance of the relevant equipment;

*j) **organisation of collection and disposal of household and other types of waste,** including the waste of small manufacturers, construction of landfills for waste disposal as well as implementation of selective collection of useful components of waste;*

*m) **assurance of liquidation of unauthorised and uncontrolled dumps** either by itself or upon the decision of the relevant authorised bodies, etc.*

During preparation of local budget drafts local state administrations are to submit proposals as regards the attraction of money necessary for implementation of waste treatment activities".

Thus, the development and implementation of the Regional SHWM Plan is within the competence of the regional state administration.

In accordance with Article 30 of the Law of Ukraine "About Local Self-Government" such issues as collection, transportation, utilisation and neutralisation of household waste are within **the competence of local self-government bodies.**

According to Article 21 of the Law "On Waste" the local self-government bodies are to ensure:

b) development and approval of schemes of sanitary cleaning of populated areas;

c) organisation of household waste collection and removal, including waste of small businesses, creation of landfills for waste disposal, organisation of selective collection of useful components of waste;

d) approval of local and regional waste treatment programmes and control over their implementation;

e) introduction of measures stimulating subjects of economic activities, working in the field of waste treatment;

f) solution of questions dealing with location of waste treatment sites at their territory;

j) liquidation of non-authorised and not controlled dumps;

k) promotion of waste legislation among population, stimulation of involvement of population to collection and storage of waste as secondary raw materials;

l) issue of permissions as regards allocation of sites or facilities for waste storage and disposal at the territory of a village, settlement, city…

etc.

Local authorities take decisions about allocation of land for waste disposal and construction of waste treatment sites".

Thus, the adoption of the developed Regional SHW Management Plan for the Donetsk Oblast is within the competence of the Regional Council.

2.2.2.2 Competence of specially authorized bodies of executive power as regards waste treatment

2.2.2.2.1 State Department of Ecology and Natural Resources

1. In accordance with Article 23 of the Law of Ukraine "On Waste", **the competence** of the Ministry of Environment Protection of Ukraine and its local bodies, i.e. the **State Department of Ecology and Natural Resources in Donetsk Oblast** includes:

"*a) co-ordination of activities of other specially authorized executive bodies referring to waste treatment and control over implementation of requirements of ecological safety*",

b) implementation of state control over the observance of environment safety requirements,

"*f) creation of information and analytical systems and data bases about volumes of waste generation and waste treatment*",

g) issue of permissions for implementations of waste treatment operations in accordance with the legislation,

"*j) approval of locations of waste treatment sites*", etc.

So for the preparation of the underneath Regional SHWM Plan of the Donetsk Oblast, the State Department of Ecology and Natural Resources of the Donetsk Oblast is in charge of creating the database as regards household waste treatment and volumes of waste production.

2.2.2.2.2 Sanitary and Epidemiological Service

2. In accordance of Article 24 of the Law of Ukraine "On Waste", **the competence of sanitary and epidemiological service of Ukraine and its local bodies includes:**

"a) implementation of state sanitary and epidemiological supervision over implementation of state sanitary norms, rules, hygienic norms during waste generation, collection, transportation, storage, processing, utilisation, removal, neutralisation, disposal;

c) implementation of state sanitary and epidemiological expertise of design and estimate documentation for identification of location and technical and economical justification of projects dealing with construction, extension and reconstruction of waste treatment facilities;

d) issuing expert conclusions of the state sanitary and hygienic expertise as regards waste treatment facilities;

e) setting sanitary and hygienic requirements for products produced from or including waste and issuing hygienic certificates for the same; etc.

At the regional level the functions dealing with state supervision over observance of sanitary norms and rules in the process of sanitary cleaning of the territory of the

Oblast are exercised by the **Donetsk Regional Sanitary and Epidemiological Station.**

2.2.2.3 State Company (SC) "UkrEkoKomResurcy"

The state company "UkrEkoKomResurcy" created in accordance with the resolution of the Cabinet of Ministers of Ukraine as of 26.07.2001 N° 915 "On Implementation of the System of Collection, Sorting, Transportation, Recycling and Utilisation of Waste of Secondary Raw Materials" is to carry out ecological activities throughout the territory of Ukraine aiming at collection, sorting, recycling and utilisation of solid household waste as secondary raw materials. It is also supposed to contribute to decrease the volumes of solid household waste generated as well as to reduce the negative impact of waste on the environment. The company has its own production capacities as well as material and technical resources necessary for introduction of a system of collection, recycling and utilisation of solid household waste as secondary raw materials (it has its own plants for production of equipment and the possibilities to create waste sorting facilities and containers for collection and recycling of secondary raw materials).

By series of resolutions, including the ones as of November 26, 2003 №1844 and №324 as of 17.03.2004, the Cabinet of Ministers of Ukraine has practically created a legal and economic framework for organisation of the systems of collection, sorting, transportation, recycling and utilisation of waste as secondary raw materials.

By now the state company "UkrEkoKomResurcy" has almost solved the issues of:

1. Creation of a state structure for development and organisation of the system of collection, sorting, transportation, recycling and utilisation of waste, including containers (packages) of domestic production, as secondary raw materials by delegating the corresponding functions of the state company "UkrEkoKomResurcy" to its structural sub-divisions represented by regional directorates and production sites in cities and districts.

2. Use of single state tariffs for delivery of services dealing with collection, transportation, recycling and utilisation of used containers (packages) by all economic operators not depending on their forms of ownership.

3. Licensing of activities for collection, sorting, transportation, recycling and utilisation of waste.

4. Utilisation or withdrawal from Ukraine of containers (packages), brought by importers of goods at the expense of these importers by application of fixed state tariffs.

5. Utilisation of containers (packages) at the expense of economic operators that use such containers (packages) for their goods at the whole territory of Ukraine where these goods are produced.

6. Distribution of incomes, accumulated at the account of the state company "UkrEkoKomResurcy" for delivery of services as regards collection and utilization of containers (packages) and transfer of 90% of these resources to regions in order to finance investment projects and create a material and technical base for implementation of selective collection, sorting, recycling and utilization of waste.

The structural subdivison of the State Company "UkrEkoKomResurcy" for the territory of Donetsk Oblast is represented by the Donetsk regional directorate "DonetskEkoKomResurcy".

The state company "UkrEkoKomResurcy" and its structural subdivisions together with directorates and departments of the Donetsk regional state administration, regional council, executive committees of city and district councils develop and implement Comprehensive programmes for organization of selective collection, recycling and utilization of waste.

2.2.3 Entities involved in waste treatment

The law «On Waste» specifies the subjects of waste treatment activities. These are the citizens of Ukraine, foreigners, companies, institutions and organizations involved in waste treatment. All types of organization so can be involved in the treatment of household waste.

However, we should take into account unauthorised activities of certain categories of low-income citizens which can be observed nowadays in the field of waste treatment. These activities cover collection, sorting and storage of secondary raw materials (waste paper, glass, polymers) but cannot be officially registered.

The rights and obligations of actors involved in waste treatment are stated in Section III of the Law of Ukraine "On Waste" and covers the field of household waste treatment as well. Some of the obligations are worth mentioning.

In accordance with Article 15 of the Law the citizens are obliged to pay in the established order for waste collection services delivered by public utilities.

In accordance with Article 17 economic operators involved in the field of waste treatment are obliged to collect all the waste; to introduce the measures ensuring maximum utilisation of waste; to avoid waste disposal at unauthorised places; to exercise control over the conditions of waste disposal and treatment sites, etc.

2.3 Production of household waste

2.3.1 Definition of the waste concerned by the plan

There are no standards in Ukraine regulating household waste treatment. As far as waste terminology is concerned, the Ukrainian "Law on Waste" gives definitions of the main terms such as "waste", "hazardous waste" but doesn't specify "solid household waste".

"The Procedure of Service Delivery for Collection and Disposal of Solid and Liquid Domestic Waste", approved by the Order N° 54 as of 21.03.2000 of the State Committee of Architecture and Housing Policy, provides the following definition of solid household waste.

Solid household waste (SHW) is the waste generated as a result of human activities and accumulated in residential buildings, social and cultural establishments, public, educational, medical, trade and other organisations (these are the food waste, household appliances, garbage, fallen leaves, waste resulting from cleaning

or renovating apartments, waste paper, glass, polymeric materials, etc.) which can no longer be used at the place they have been generated.

Thus, during the development of the present plan the following waste is taken into account:

- Regular household waste of residential buildings, hotels, hostels (food waste, glass, paper and polymeric waste, ash, vegetation residues, etc.)
- Bulky household waste (old furniture, electric household devices, etc.)
- Waste resulting from cleaning of territories and public buildings (hospitals, markets, railway stations, beaches, parks, etc.)
- Common non-hazardous waste of commercial enterprises, administrative buildings and institutions.

2.3.2 Tonnage

As nowadays in Ukraine there is no state primary registration of data, no single form of state statistic reporting concerning the volumes of household waste generated, disposed and accumulated the result is that there is no reliable data. What makes the situation worse is that SHW disposed is never weighted. SHW dumps and even landfills recently built in Donetsk Oblast are not equipped with weighting equipment. The registration of SHW collected and disposed at dumps/landfills is done in terms of volumes in m^3 by calculation methods or by fact (through the volumes of containers). But it's clear that 1 m^3 of waste is not the same quantity in the container (150-250 kg/m^3), in the truck (250-400 kg/m^3) and in the landfill (500-1000 kg/m^3)!

All calculations for the volumes of waste generated are done on the basis of SHW accumulation norms approved in cities and rayons by local authorities which are based not on on-site measurements and studies but on norms, recommended by the State Committee of Ukraine for Housing and Public Utility Services.

In 1995 the State Committee of Ukraine for Housing and Public Utility Services has approved the "Recommended norms of solid household waste accumulation for populated areas of Ukraine", which set up the norms for two sources of waste origin: residential buildings and public organisations, establishments and institutions. The norms depend on the type of the populated area (cities or rural area, number of inhabitants, availability of recreational zone) and the level of comfort of dwelling.

In accordance with this document the recommended annual norms for different residential buildings per person are the following:

Groups of residences	Facility	Norm of SDW generation per per inhabitant				Density of waste, kg/m^3
		Average daily		Average annual		
		kg	litres	kg	m^3	
	Buildings with all modern conveniences (gas supply, centralized heating system, water supply, sewerage)					
1-2		0.64	3.07	235	1.12	210

3-5		0.67	3.00	245	1.09	225
	Buildings with no modern conveniences (without water supply and sewerage)					
1-5	with gas heating	0.88	3.52	321	1.28	250
	with coal heating	1.07	3.56	390	1.30	300
	Private sector houses with homestead land, including those in rural areas					
1-5	with gas heating	1.27	3.53	452	1.29	350
	with coal heating	1.59	3.86	580	1.41	410

Notes:
1. Norms are given for SDW without extraction of food waste. In case of extraction of food waste norms decrease by 15%.
2. For high-level facilities buildings with refuse chute norms of SDW generation are 10% higher than the same for buildings without refuse chute
3. Density of waste corresponds to its state in waste collectors before loading into waste collection vehicles.

Table 2 Average norms of solid domestic waste generation for residential buildings

Despite the fact that during 10 years since these norms have been established the volumes have increased, the norms set up by some of the cities and rayons are even lower than the recommended ones. For instance, in Donetsk for residential buildings with modern conveniences the norm is 1.05 m^3/year, while the recommended one is 1.12 m^3/year, so the norm doesn't reflect the factual situation. In contrast to that, the norm of SDW accumulation for buildings with modern conveniences in the city of Dimitrov is 1.46 m^3/year.

Thus, the only one actual way to estimate the quantities of produced waste consists in to multiply the number of inhabitants by their production estimated by sampling. This method, as imprecise it can be, nevertheless allows to value the size of the problem.

In accordance with calculations done on the basis of the above-mentioned norms of waste accumulation, with 29% population housing in the private sector, the annual production of household waste in the Oblast should comprise about **1 752 000 tons per year** (803 000 tons for individual housing and 949 000 tons for collective housing).

Housing	Rate	Population	Norm	Tonnage
	%	inh	kg/inh/y	t
Private sector	29	1 385 000	580	803 300
Collective buildings	71	3 389 400	280	949 000
TOTAL	100	4 774 400		1 752 300

Table 3Calculation of the estimated production of SHW

A more detailed calculation has been made with the figures of the number of homes of each type given in the questionnaire. This estimation is: **1 799 000 tons per year** (*Table 4*).

	1-Gas	1-Coal	2-4-Gas	2-4-Coal	5-8-Gas	5-8-Coal	9-12-Gas	9-12-Coal	Total
TOTAL	**496348**	**1519916**	**561924**	**56163**	**1137277**	**2701**	**911948**	**0**	**4686277**
Cities	***390229***	***1106459***	***489726***	***45984***	***1089483***	***2701***	***911688***	***0***	***4036270***
Donetsk	214657	185377	126631	7955	198936	0	309062	0	1042618
Avdeyevka	0	10170	1765	0	19806	0	7859	0	39600
Artemovsk	24329	13470	10714	0	56652	0	8735	0	113900
Gorlovka	2867	124106	72160	1340	92210	0	19317	0	312000
Debaltsevo	4365	10000	1849	836	32376	839	1535	0	51800
Dzerjinsk	19300	38400	5700	900	14700	0	8100	0	87100
Dimitrovo	728	15056	9445	0	26952	0	2919	0	55100
Dobropolye	8	17841	14558	8619	25753	1062	2937	0	70778
Dokuchayevsk	9000	1000	7000	0	8000	0	0	0	25000
Druzhkovka	20050	8476	3646	0	28612	0	14262	0	75046
Yenakievo	1100	86754	8875	8197	37838	0	14936	0	157700
Zhdanovka	100	1600	6636	0	6164	0	0	0	14500
Kirovskoye	260	2440	8900	50	7270	0	11480	0	30400
Konstantinovka	14199	1500	28837	0	39479	0	8985	0	93000
Kramatorsk	7473	63800	9802	0	62280	0	71445	0	214800
Krasniy Liman	1102	17582	4196	0	5708	0	1012	0	29600
Krasnoarmeysk	3129	37852	14199	22	20465	0	6000	0	81667
Makeyevka	29448	163309	77001	0	91260	0	78298	0	439316
Marioupol	4019	118159	22100	745	75551	0	265171	0	485745
Novogrodovka	0	2804	12424	0	1872	0	0	0	17100
Selidovo	95	13685	13211	2544	19485	0	4680	0	53700
Slavyansk	4049	10021	2286	0	109282	0	18462	0	144100
Snezhnoye	0	48642	6460	3418	14740	0	6340	0	79600
Torez	8333	52852	6130	4735	15164	0	5886	0	93100
Ugledar	0	0	0	0	6728	0	10172	0	16900
Khartzisk	20480	8542	7224	0	46556	0	22398	0	105200
Shahtersk	700	37300	3100	6400	16100	800	5300	0	69700
Yasinovataya	438	15721	4877	223	9544	0	6397	0	37200
Rayons	***106119***	***413457***	***72198***	***10179***	***47794***	***0***	***260***	***0***	***650007***
Alexandrosvskiy Rayon	5200	15200	1600	0	500	0	0	0	22500
Amvrosievskiy Rayon	11929	26510	4214	296	12693	0	0	0	55642
Artemovskiy Rayon	280	25039	8039	85	5249	0	0	0	38692
Veliko-Novoselovskiy Rayon	15300	24700	5200	950	2300	0	0	0	48450
Volnovahskiy Rayon	20200	16500	12000	0	1768	0	0	0	50468
Volodarskiy Rayon	1962	28000	1700	2000	123	0	0	0	33785
Dobropolskiy Rayon	0	20000	0	500	0	0	0	0	20500
Konstantinovskiy Rayon	3071	15569	1212	0	648	0	0	0	20500
Krasnoarmmeyskiy Rayon	1752	33027	50	2750	0	0	0	0	37579
Maryinskiy Rayon	11128	58350	9800	0	7800	0	260	0	87338
Novoazovskiy Rayon	10937	10000	804	0	982	0	0	0	22723
Pershotravneviy Rayon	18000	0	10000	0	0	0	0	0	28000
Slavianskiy Rayon	0	36680	1570	0	150	0	0	0	38400
Starobeshevskiy Rayon	2102	31300	11060	0	11068	0	0	0	55530
Telemanovskiy Rayon	38	32566	979	884	1933	0	0	0	36400
Shahterskiy Rayon	720	20416	1070	514	480	0	0	0	23200
Yasinovtskiy Rayon	3500	19600	2900	2200	2100	0	0	0	30300
Norm of w aste production (kg/y)	452	580	321	390	235	390	245		
Production of w aste (t/y)	224349	881551	180378	21904	267260	1053	223427	0	**1799922**

Table 4 Calculation of the production of SHW

But the data obtained by asking all administrative units of the oblast involved in the field of waste treatment are very far of this theoretic production. We have asked in 2003 the collected quantities in m^3 and in tons for the year 2002.

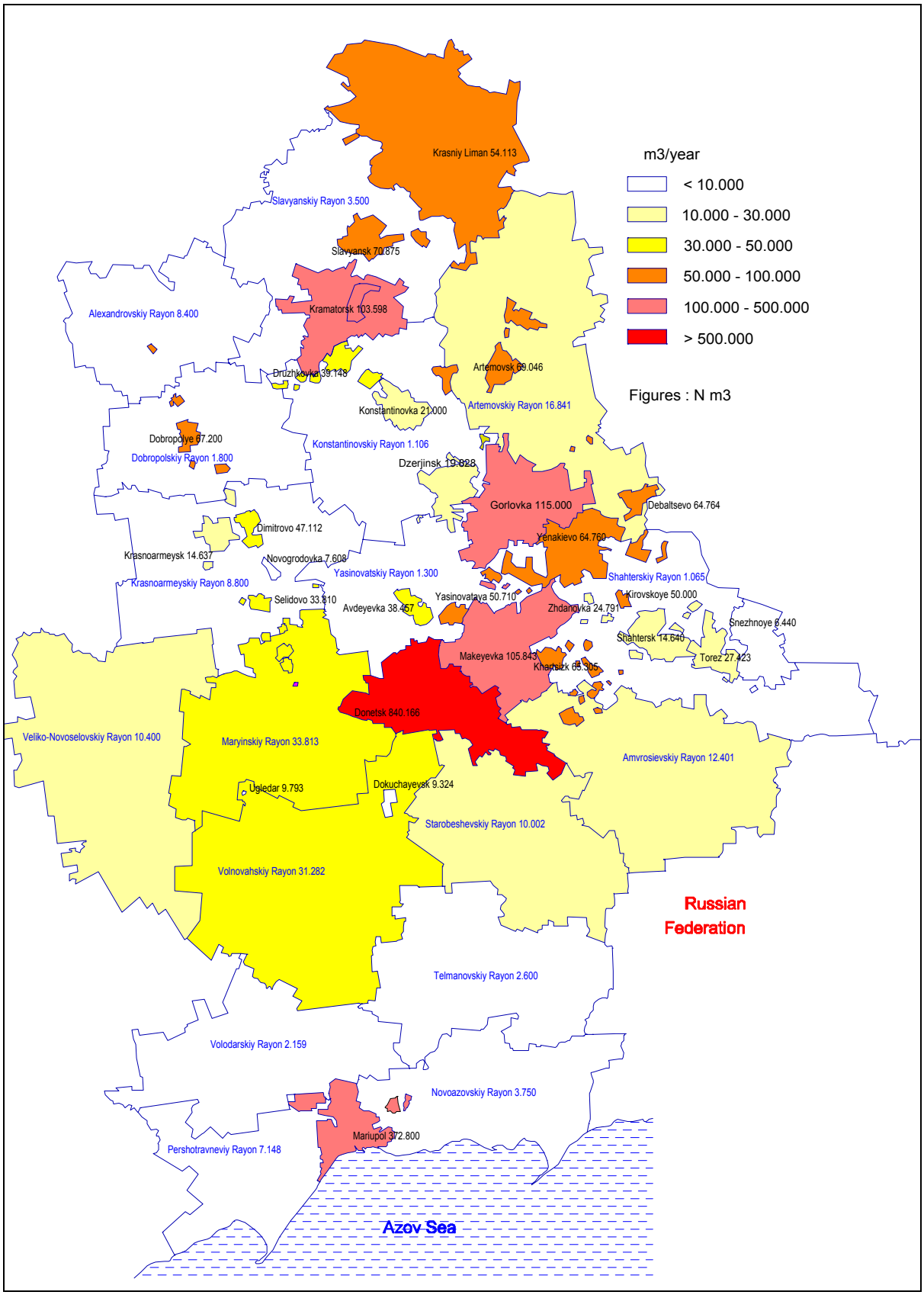
Very often the expressed figures in tons are only the result of a calculation applying a standard rate of 0,25 t/m^3 to the quantities in volume. In fact, the obtained figures are generally based upon the capacity of the collection containers and the number of truck rounds.

In this *Table 5* are inserted the figures from the Department of Housing and Public Local Utilities as it calculates the production of household waste and the figures of the commercial waste (waste from commerce, craft industry, collective equipments) and the municipal waste (markets, street cleansing, but also the picking up of wild dumpsites). All these figures are coherent between themselves: the questionnaire was focused on household waste, strictly speaking, but the activity of the local utilities is also concerned by the commercial waste and the municipal waste.

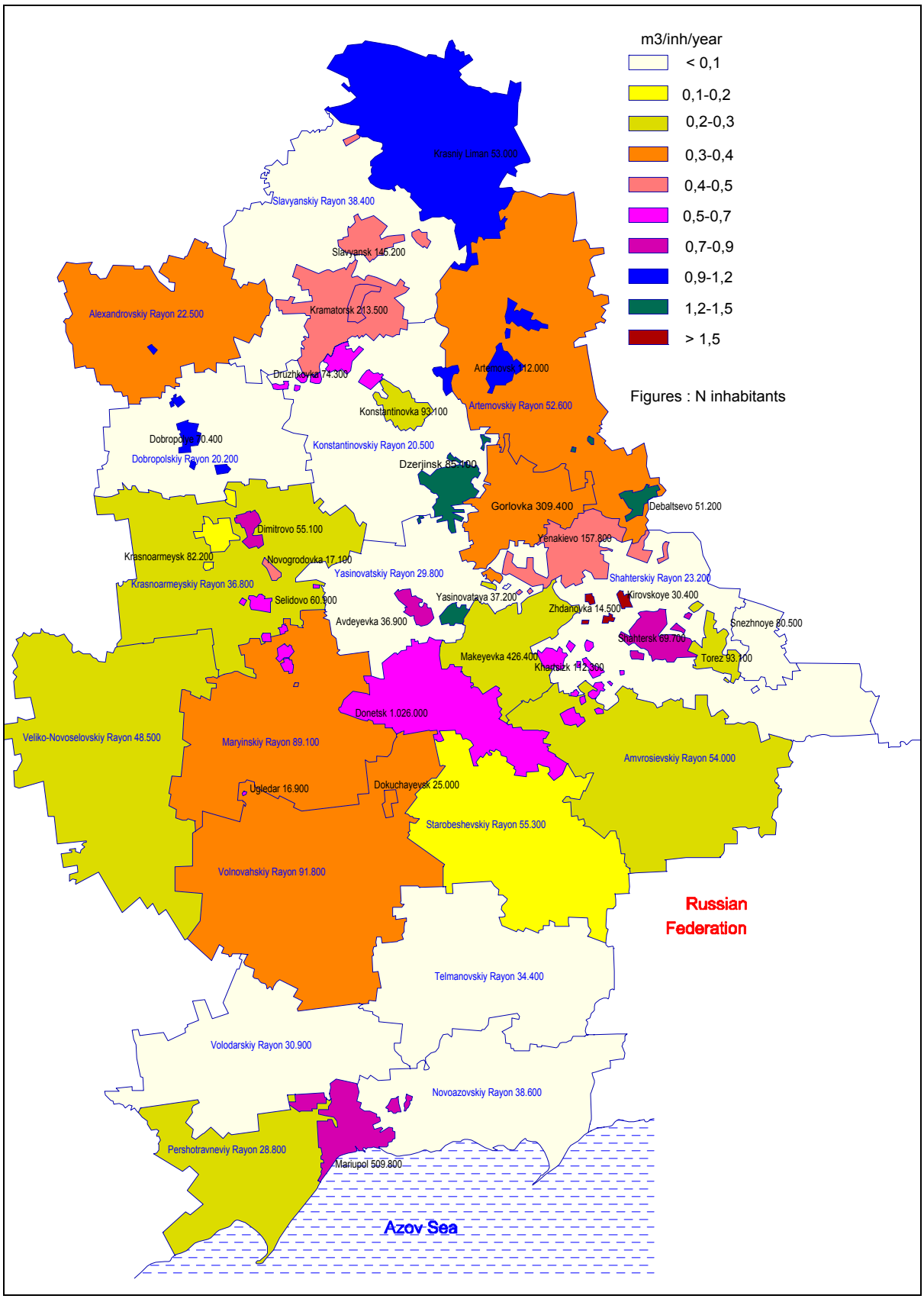
	Population 01/01/03 x 1000	Surface km²	Volumes of SHW collected in 2002						Density of SHW kg/m³	Volume of SHW per capita (residential sector) m³/year
			Residential sector m³	tons	Commercial waste (except for residential sector) m³	Municipal waste m³	Total m³	Data of Dept of Housing and Public Utility Services m³		
Oblast (total)	**4 774,4**	**26 517,5**	**2 564 438**	**648 762**	**1 192 959**	**383 612**	**4 139 601**	**3 457 100**	**253**	**0,537**
Cities (total)	**4 059,0**	**4 941,9**	**2 408 071**	**596 238**	**1 096 587**	**282 883**	**3 787 436**	**3 215 200**	**248**	**0,593**
Donetsk	1 026,0	570,7	840 166	210 041	243 955	76 600	1 160 721	1 081 200	**250**	**0,819**
Avdeyevka	36,9	29,3	38 457	8 653	33 627	6 100	78 184	36 400	**225**	**1,042**
Artemovsk	112,0	73,6	69 046	21 190	34 892	4 344	108 282	66 300	**307**	**0,616**
Gorlovka	309,4	422,5	115 000	14 950	45 000	25 000	185 000	133 200	**130**	**0,372**
Debaltsevo	51,2	37,5	64 764	16 196	69 818	3 460	138 042	11 700	**250**	**1,265**
Dzerjinsk	85,1	61,9	19 828	4 957	15 025		34 853	27 600	**250**	**0,233**
Dimitrovo	55,1	22,8	47 112	11 778	4 184	660	51 956	57 300	**250**	**0,855**
Dobropolye	70,4	19,8	67 200	16 800	67 523	6 189	140 912	60 000	**250**	**0,955**
Dokuchayevsk	25,0	118,9	9 324	2 331	23 089	727	33 100	32 400	**250**	**0,373**
Drujkovka	74,3	46,5	39 148	9 826	20 046	3 972	63 100	57 900	**251**	**0,527**
Yenakievo	157,8	425,2	64 670	23 345	17 708	3 602	85 981	69 100	**361**	**0,410**
Zhdanovka	14,5	2,0	24 791	4 958	3 052	4216	32 058	20 900	**200**	**1,710**
Kirovskoye	30,4	7,0	50 000	12 500	4 000	121	54 121	50 000	**250**	**1,645**
Konstantinovka	93,1	66,0	21 000	5 250	19 250	5 540	45 790	46 600	**250**	**0,226**
Kramatorsk	213,5	355,7	103 598	27 454	34 323	3 488	141 409	142 200	**265**	**0,485**
Krasniy Liman	53,0	1 209,8	54 113	13 530	55 920	3 217	113 250	90 900	**250**	**1,021**
Krasnoarmeysk	82,2	39,2	14 637	2 214	2 000	2 030	18 667	10 700	**151**	**0,178**
Makeyevka	426,4	425,7	105 843	26 910	68 258	43 893	217 994	300 700	**254**	**0,248**
Marioupol	509,8	243,9	372800	93000	191 400	-	564 200	563 600	**249**	**0,731**
Novogrodovka	17,1	5,5	7 608	1 978	0		7 608	11 000	**260**	**0,445**
Selidovo	60,9	108,2	33 810	8 711	4 308	6 070	44 188	23 000	**258**	**0,555**
Slaviansk	145,2	74,2	70 875	17 850	10 651	61 531	143 057	81 900	**252**	**0,488**
Snejnoye	80,5	188,8	6 440	1 610	13 624	2 987	23 051	22 000	**250**	**0,080**
Torez	93,1	104,8	27 423	9 324	31 184	11 032	69 639	50 200	**340**	**0,295**

	Population 01/01/03 x 1000	Surface km²	Volumes of SHW collected in 2002						Density of SHW kg/m^3	Volume of SHW per capita (residential sector) m^3/year
			Residential sector m^3	tons	Commercial waste (except for residential sector) m^3	Municipal waste m^3	Total m^3	Data of Dept of Housing and Public Utility Services m^3		
Ugledar	16,9	5,3	9 793	2 448	4 403	1 025	15 222	17 800	**250**	**0,579**
Khartsizsk	112,3	206,9	65 305	13 626	28 329	3 459	97 093	53 900	**209**	**0,582**
Shahtersk	69,7	51,0	14 610	3 652	36 962	1 629	53 201	31 900	**250**	**0,210**
Yasinovataya	37,2	19,2	50 710	11 156	14 056	1 991	66 757	64 800	**220**	**1,363**
Districts (total)	**715,4**	**21 575,6**	**156 367**	**52 524**	**96 372**	**100 729**	**352 165**	**241 900**	**336**	**0,219**
Alexandrovskiy D.	22,5	1 010,1	8 400	2 100	1 150	1 200	10 750	3 300	**250**	**0,373**
Amvrosievskiy D.	54,0	1 455,5	12 401	5 500	3 052	779	16 232	14 700	**444**	**0,230**
Artemovskiy D.	52,6	1 686,8	16 841	1 835	4 236	2 628	23 704	2 200	**109**	**0,320**
Velikonovoselkovskiy D.	48,5	1 901,3	10 400	2 600	0	1 000	11 400	2 000	**250**	**0,214**
Volnovahskiy D.	91,8	1 848,2	31 282	25 040	38 400	28 200	97 882	44 200	**800**	**0,341**
Volodarskiy D.	30,9	1 221,5	2 159	540	123		2 282	25 600	**250**	**0,070**
Dobropolskiy D.	20,2	949,3	1 800	900	0	1 300	3 100	1 800	**500**	**0,089**
Konstantinovskiy D.	20,5	1 171,7	1 106	277	0	13	1 119	600	**250**	**0,054**
Krasnoarmmeyskiy D.	36,8	1 315,7	8 800	2 200	2 000	4 320	15 120	1 200	**250**	**0,239**
Marinskiy D.	89,1	1 350,4	33 813	3 519	40 707	57 000	131 519	86 300	**104**	**0,379**
Novoazovskiy D.	38,6	1 000,4	3 750	1 125	1 036		4 786	2 700	**300**	**0,097**
Pershotravneviy D.	28,8	792,1	7 148	1 787	2 496	303	9 947	29 900	**250**	**0,248**
Slavianskiy D.	38,4	1 273,7	3 500	875	0	2 036	5 536	1 500	**250**	**0,091**
Starobeshevskiy D.	55,3	1 254,9	10 002	2 501	2 838	1 800	14 639	17 800	**250**	**0,181**
Telmanovskiy D.	34,4	1 340,1	2 600	600	0		2 600	2 700	**231**	**0,076**
Shahterskiy D.	23,2	1 194,4	1 065	800	334	150	1 549	4 100	**751**	**0,046**
Yasinovatskiy D.	29,8	809,5	1 300	325	-	-	0	1 300	**250**	**0,044**
"Official Data"									**250**	

Table 5 SHW known production per Administrative Unit (2002)



Map 4. SHW Production and Disposal by Administrative Units (m^3/year)



Map 5. Collection of SHW per inhabitant (in m^3/y)

2.3.2.1 Quality of the information

The data provided in *Table 5* as regards volumes of solid household waste disposed has been taken from questionnaires distributed among city executive committees and district state administrations which are in charge of solid household waste treatment. Simultaneously there is provided the data of the Department of Housing and Public Utility Services of the State Regional Administration requested from cities and rayons of the Oblast. In many cases they differ a lot from each other which shows that the level of data reliability is low and the system of primary registration of data by public utilities is poorly developed. It seems that not all of the city and rayon public utilities have carefully calculated the volumes of waste collected and disposed at landfills and it is also possible that estimations have been prepared on the basis of different approaches.

The data about SHW volumes provided by public utilities have been calculated taking into account the capacity of containers and trucks and the number of rounds, and thus are expressed in m^3. As there is no system of weighting of SHW all numeric data concerning the volumes of SHW disposed, expressed in tons, are the ones that are calculated by converting m^3 in tons using the density of waste. However, there are only few cities that have carried out studies allowing to define the average density of SHW for municipal buildings and private sector. At the same time it might happen that even such studies are not always properly done. For instance, in Gorlovka based on the results of studies there has been established the following average density of SHW – 130 kg/m^3, which is twice as low as the recommended value and seems doubtful. The data concerning density of SHW in Shahterskiy and Volnovahskiy Rayons (750-800 kg/m^3) also causes some doubts. As it can be seen from *Table 5*, most of public utilities convert m^3 in tons using an officially recommended average density 250 kg/m^3.

In Western-European countries it is practiced to register the data in tons on a regular basis. This is done by weighting waste collection trucks at special weighting equipment which transfers the data in a computer format. Such a system allows to receive true data.

2.3.2.2 Critical analysis

Even if the liability of the provided figures is open to criticism, they are nevertheless significant of a reality that everybody knows and they allow to situate a little better the problems.

- Rate of collection of domestic waste in cities and rayons of the Oblast
    - Average rate for the Oblast

    The tonnage collected in normal conditions by the administrative units should be as order of 650 000 t/year.

    The theoretic tonnage according to the official rates (realistic because close those of other countries) and to the number of inhabitants in each type of housing should be 1 752 000 t/year.

    The rate of normally collected waste should be so 37% all over the territory of the Oblast.

    - Dispersion

The official rates of household waste accumulation in cities and districts of the Oblast are presented in volumes: from 1 m^3/inh/y in collective housing and 2 m^3/inh/y in individual housing.

On that base, the administrative units which announce a collected tonnage of an order of 1.5 m^3/inh/y are close to the 100% collected.

32 administrative units of 45 should be under the 0.5 m^3/inh/y, so under 40% collected.

- Rural factor

If the 28 cities show very diverse performances (from 0.1 to 1.8 m^3/inh/y), all the rayons are under 0.4 m^3/inh/y.

These figures confirm the very low performance of the collection of waste in rural areas.

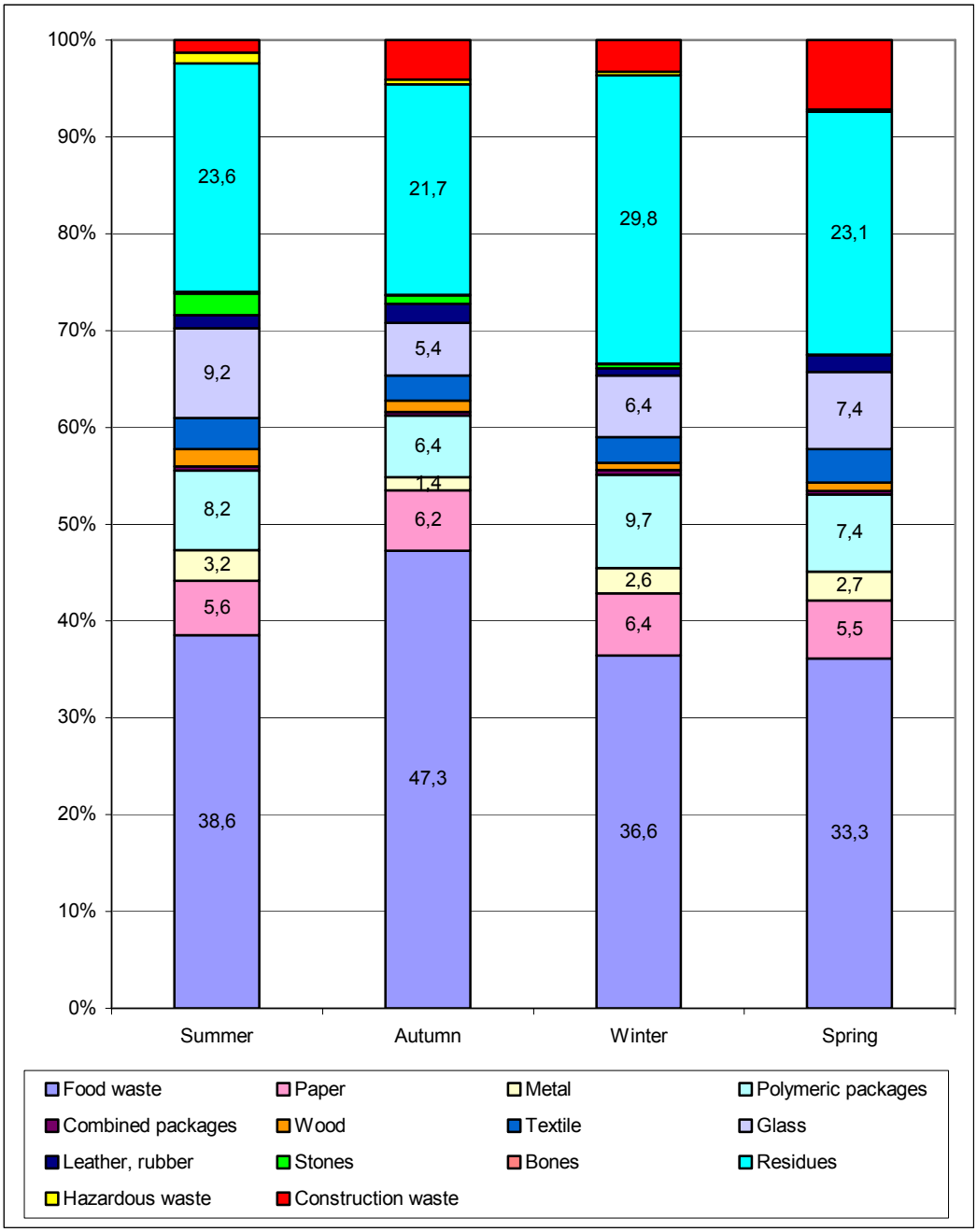
2.3.3 Characteristics of the production

The composition of the household waste varies according to the season, the type of housing, the level of incomes of the family, etc. It has been studied with the following method.

- The first study (including the opinion poll) allowed to determine the socio-types among the population of the Oblast, among them 8 were kept as pertinent.

- On the territory of the Oblast, 18 containers have been selected in aim to represent the 8 socio-types.

These containers have been carefully supervised to avoid an unauthorised retrieval of recyclable waste. The containers have been emptied, their contents have been analysed. All in all 4 waste composition studies have been implemented (spring, summer, autumn and winter). The *Graph 5* indicates the average composition of the containers for each season. This sampling doesn't presume the global quantities of waste (most likely subject to changes depending on the season). Naturally it doesn't integrate the part of the household waste that has been put away before the disposal in the container.



Graph 5 Average composition of household waste in the Oblast (by weight)

Note: Among the household waste, it can be found around 1% of toxic waste (batteries, solvents, etc…).

After 4 seasons, the average composition of solid household waste in the Donetsk Oblast is estimated as:

% (by weight)	Fraction
39,5%	Food waste
5,9%	Paper
2,5%	Metal
7,9%	Polymeric packages
0,4%	Combined packages
1,1%	Wood
2,9%	Textile
7,4%	Glass
1,4%	Leather, rubber
1,1%	Stones
0,1%	Bones
25,3%	Residues
0,6%	Hazardous waste
3,9%	Construction waste
100,0%	

Table 6 Average composition of SHW

2.3.4 Existing system of secondary raw materials storage and recycling

As it is seen from the analysis of household waste composition the waste accumulated in the Oblast contains up to 6% of waste paper, up to 8% of plastic, more than 7% of glass and other components that are valuable recyclable materials. An efficiently organized system of waste collection in populated areas should take into account this factor and be focused on retrieval of these useful components for further utilisation. However, there is no selective collection of SHW by population in the Oblast today envisaging collection of separate fractions into individual containers and requiring preliminary sorting of waste generated by the inhabitants (that is in houses/apartments) (the first experiment dealing with selective collection of waste is being implemented by the Tacis project in Slaviansk). For organization of selective collection it is necessary to find considerable means (specialized containers, vehicles) and what is most important is to train the inhabitants and to find relevant incentives.

Today in the Oblast the system of collection and storage of the secondary raw materials is already in operation. It works through special collection points. The activities concerned with collection and preparation of certain types of waste as secondary raw material are subject to licensing in accordance with the laws of Ukraine “On Licensing” and “On Waste”. Licenses are given by the Ministry of Ecology and Natural Resources of Ukraine. By today some 64 companies and private entrepreneurs from the Donetsk Oblast have licenses for this type of activity. Among them there are large and branched companies as DonEkoResurcy,

Donetskvtorresurcy, DonetskEkoKomResurcy, Oblpotrebsoyuz, etc. But in spite of the fact that the extent of preparation of the secondary materials has increased over the last several years it still remains low, especially as regards raw materials from SHW of dwelling sector.

Development and construction of facilities for recycling of stored raw materials in the Oblast has been very important and active recently: a big plant for recycling of waste paper and a number of facilities for recycling of plastic waste have been commissioned in Donetsk which confirms the growth of interest towards this type of secondary raw materials.

List of existing facilities for recycling of secondary raw materials in Donetsk Oblast

N°	City, company	Type of activity
Polymeric waste		
1.	Gorlovka, joint-stock company of a closed type «Stirol-PAK»	Recycling of polyethylene, polystyrene, polypropylene, with production of household goods
2.	Druzhkovka, joint-stock company of a closed type «Plant Remschetmash»	Recycling of polymeric waste
3.	Snezhnoye, utility company «Vnorpolymerpererabotka»	Production of polyethylene films, pipes, etc. using polymeric waste
4.	Donetsk, «Ukrvtorplast» Ltd.	Recycling of used polyethylene, polystyrene
5.	Khartsyzsk, «Promin» Ltd.	Recycling of polyethylene waste, production of pipes
6.	Makeevka, «Ukrdonprommet»	Recycling of polymers (1000 tons/years)
7.	Donetsk, «VMP» Ltd.	Recycling of used polyethylene films
8.	Marioupol, “Technology” Ltd.	Recycling of plastic
9.	Donetsk, private company “Bolius”	Recycling of plastic
Waste paper		
10.	Donetsk «Donetsk – Vtorma» Ltd.	Production of paper for corrugated cardboard from waste paper
Waste glass		
11.	Konstantinovka, open joint-stock company «Kristall»	Recycling of used glass
Secondary textile materials		
12.	Donetsk, “Migma” Ltd.	Recycling of used glass
Hazardous waste		
13.	Konstantinovka, open joint-stock company «Megatex»	Utilization and complex recycling of used accumulator batteries
14.	Gorlovka,	Collection, storage, treatment of waste

N°	City, company	Type of activity
	«Nikit-Service» Ltd.	containing mercury
15.	Donetsk, open joint-stock company «Donetsk Machine-building Plant «Astra»	Collection, storage, transportation of used batteries of lead accumulators
16.	Konstantinovka, joint-stock company of a closed type «Svinets» *(lead)*	Utilization of waste containing lead (batteries of lead accumulators)
17.	Donetsk, «Union-Nefteproduct» Ltd.	Collection, transportation, storage, utilization of used oil products

2.4 Existing collection system

2.4.1 Municipal enterprises

The municipal companies of the public utility sector are in charge of the waste collection, transportation and disposal. They are financed by the contracts they pass with JEKs and individuals in residential sector as well as the contracts with companies, institutions and organisations. So they are in charge of the recovery of the fees due for the services delivered.

They are 82 such companies in the Oblast. They amount 1035 workers. Generally they are directly under the supervision of their municipality, which is the owner of the assets (premises, trucks, etc…).

According to the results of the public opinion carried out by the Donetsk Analytical and Information Centre in 2003, 35% of the polled inhabitants consider that the household waste collection is done in their street / yard less than once a week. Among them 18% consider that no collection is organized for them. On total, 64% of the polled are unsatisfied of the service.

In the case of individual houses, half the polled declare to practice the wild dump although 27% declare to dispose their waste at a particular place of their street.

The municipal enterprises cannot ensure a correct development of their equipments (trucks, containers, …) for the reason of insufficient finance means. The system of the contracts with the individuals oblige these enterprises to do by themselves the recovery and it can happen that the **rate of non-payment** (or of non-contraction) **reaches more than 50%**. In other respects, too high interest rates forbid these enterprises to help with bank loans in aim to make the necessary investments.

It should be noted that there are no big regional companies (inter-municipal) in the Oblast delivering services to several cities and districts which could be financially sustainable and efficient.

2.4.2 Private companies

Some local self-government bodies have started to entrust more frequently some tasks in household waste collection and disposal to private companies. Most of

them get involved in SHW collection, some companies operate dumps, the others combine both activities.

In Donetsk, the company ISTOK has been devoted to cleansing a part of the Leninsky district of Donetsk city. This area is 10 km large, with about 100 buildings from 1 to 9 floors. The building conditions are rather low, with high expenditures for engineering networks (water, heating,...) and entrances. The company operates two city dumps (rent contract).

At the same time ISTOK is building a sorting plant for SHW collected in two sub-districts and plans to construct recycling facilities for sorted waste.

For the moment, there's not a lot of examples of privatisation of the household waste management. It must be underlined that the contractual relationships between the municipalities, the private companies, the JEKs and the inhabitants are not clear and are missing a strong legal and regulatory framework.

2.4.3 Technical aspects of SHW collection

The system of sanitary cleaning of populated areas of the Oblast (mainly in cities) is based on planned and regular removal of household waste exercised with the help of stationary and removable containers installed at special platforms. In private sector of cities as well as in rural areas there prevails a door-to-door system of collection (the inhabitants put the waste in front of their doors in their own containers or bring waste directly to a waste collection truck).

The sites for container platforms are chosen by representatives of housing organisations and agreed with a sanitary service and a company in charge of SHW collection. The sites should be located not closer than 20 m to residential buildings and recreational zones and not further than 100 m from the most remote entrance to a residential building. The platforms should have an access road, firm cover and a fence in line with the architecture and it's very seldom the case. The sizes of platforms and a number of containers are defined on the basis of daily volumes of SHW accumulation. The containers at platforms should have a distance of 350 mm between themselves, 1 m from the fence and 1.5 m from the road.

These requirements in most cases are not met. The park of containers is obsolete and has started to be renewed only during the last two years. In 2004 in some cities of the oblast, including Donetsk, they have started to use plastic containers with lids. The questions concerning the system of SHW collection have been included in the questionnaire distributed among public utilities, but no all of the

respondents answered it. The data about the park of containers and waste collection trucks as of beginning of 2003 are provided in tables below.

Cities, districts	Population thousand people	Number of containers of different capacity					Capacity m3	Capacity l/inh
		0.55 m3	0.75 m^3	1.0 m^3	10 m^3	TOTAL, items.		
Oblast	**4774,4**	**7 714**	**13 805**	**2 683**	**152**	**24 184**	**17 281**	**3,6**
Cities	**4059,0**	**7 452**	**13 216**	**2 633**	**152**	**23 301**	**16 645**	**4,1**
Donetsk	1026,0	2 077	3 294	1 814	152	7 185	5 427	5,3
Avdeyevka	36,9	705	134	0		839	488	13,2
Artemovsk	112,0	535	27	0		562	315	2,8
Gorlovka	309,4	120	960	120		1 200	906	2,9
Debaltsevo	51,2	134	133	0		267	173	3,4
Dzerjinsk	85,1	303		0		303	167	2,0
Dimitrovo	55,1	0	318	0		318	239	4,3
Dobropolye	70,4	0	569	0		569	427	6,1
Dokuchayevsk	25,0	200	54	0		254	151	6,0
Druzhkovka	74,3	159	496	22		677	481	6,5
Yenakievo	157,8	82	446	0		528	380	2,4
Zhdanovka	14,5	36	22	122		180	158	10,9
Kirovskoye	30,4	117	182	0		299	201	6,6
Konstantinovka	93,1	298	119	43		460	296	3,2
Kramatorsk	213,5	896	1 664	0		2 560	1 741	8,2
Krasniy Liman	53,0	34	0	85		119	104	2,0
Krasnoarmeysk	82,2	18	73	0		91	65	0,8
Makeyevka	426,4	0	1 693	0		1 693	1 270	3,0
Marioupol	509,8	0	1 499	264		1 763	1 388	2,7
Novogrodovka	17,1	0	0	0		0	0	0,0
Selidovo	60,9	300	35	45		380	236	3,9
Slavyansk	145,2	147	299	10		456	315	2,2
Snezhnoye	80,5	0	240	0		240	180	2,2
Torez	93,1	0	264	60		324	258	2,8
Ugledar	16,9	159	0	0		159	87	5,1
Khartzisk	112,3	262	288	33		583	393	3,5
Shahtersk	69,7	115	257	15		387	271	3,9
Yasinovataya	37,2	755	150	0		905	528	14,2
Rayons	**715,4**	**262**	**589**	**50**	**0**	**883**	**636**	**0,9**
Alexandrosvskiy Rayon	22,5	0	0	30		30	30	1,3
Amvrosievskiy Rayon	54,0	0	47	0		47	35	0,6
Artemovskiy Rayon	52,6	0	32	0		32	24	0,5
Veliko-Novoselovskiy Rayon	48,5	0	0	0		0	0	0,0
Volnovahskiy Rayon	91,8	88	207	0		295	204	2,2
Volodarskiy Rayon	30,9	0	26	0		26	20	0,6
Dobropolskiy Rayon	20,2	0	0	0		0	0	0,0
Konstantinovskiy Rayon	20,5	0	44	0		44	33	1,6
Krasnoarmmeyskiy Rayon	36,8	0		0		0	0	0,0
Maryinskiy Rayon	89,1	0	64	0		64	48	0,5
Novoazovskiy Rayon	38,6	48	0	0		48	26	0,7
Pershotravneviy Rayon	28,8	0	18	0		0	14	0,5

Slavianskiy Rayon	38,4	0	0	20		20	20	0,5
Starobeshevskiy Rayon	55,3	124	135	0		259	169	3,1
Telemanovskiy Rayon	34,4	2	0	0		2	1	0,0
Shahterskiy Rayon	23,2	0	16	0		16	12	0,5
Yasinovatsky D.	29,8	0	0	0		0	0	0,0
Not taken into account, specific to Donetsk								

Table 7 Park of containers

As it can be seen from the table, among **24 184** containers used in the Oblast, the total capacity of which is 17 thous. m^3, 95% are installed in cities. There mainly used the containers of 0.75 m^3. The analysis by cities of the Oblast has shown that the best situation in terms of number of containers per inhabitant is in the cities of Yasinovataya, Avdeyevka, Zhdanovka and the worst it is in districts.

Household waste is collected by trucks (mainly in urban areas) and tractors with trailers (mainly in rural areas). In the Oblast as a whole (by 01.01.2003) at the disposal of companies there are 506 waste collection trucks, 121 tractors and 71 trailers of the total capacity of 7.5 thous. m^3.

However, most of the vehicles are morally and physically obsolete and should be renewed.

	N inh (x1000)	Trucks				Tractors			Trailers				Vol/inh l/inh	SDW from residential sector 2002 m3	Vol/inh m3/inh	N rounds
		Park	In good state	In Repair	Total Vol m3	Park	In good state	In Repair	Park	In good state	In Repair	Total Vol m3				
Oblast	**4 774,4**	**506**	**424**	**80**	**7 206**	**121**	**105**	**15**	**82**	**71**	**11**	**327**	**1,58**	**2 564 438**	**0,54**	**342**
Cities	**4 059,0**	**453**	**374**	**77**	**6 828**	**73**	**62**	**10**	**40**	**38**	**2**	**178**	**1,73**	**2 408 071**	**0,59**	**341**
Donetsk	1 026,0	178	130	48	3 760	0	0	0	0	0	0	0	3,66	840 166	0,82	224
Avdeyevka	36,9	6	5	1	79	5	5	0	5	5	0	28	2,87	38 457	1,04	362
Artemovsk	112,0	15	14	1	180	2	2	0	2	2	0	12	1,71	69 046	0,62	363
Gorlovka	309,4	11	9	2	95	3	3	0	3	3	0	18	0,37	115 000	0,37	1000
Debaltsevo	51,2	8	8	0	68	3	3	0	0	0	0	0	1,33	64 764	1,26	947
Dzerjinsk	85,1	11	7	4	65	8	8	0	0	0	0	0	0,76	19 828	0,23	303
Dimitrovo	55,1	10	10	0	189	0	0	0	0	0	0	0	3,43	47 112	0,86	251
Dobropolye	70,4	23	22	1	294	10	10	0	10	10	0	31	4,61	67 200	0,95	206
Dokuchayevsk	25,0	3	3	0	34	0	0	0	0	0	0	0	1,36	9 324	0,37	272
Druzhkovka	74,3	12	11	1	135	0	0	0	0	0	0	0	1,82	39 148	0,53	291
Yenakievo	157,8	9	8	1	72	3	3	0	3	3	0	10	0,52	64 670	0,41	788
Zhdanovka	14,5	1	1	0	8	0	0	0	0	0	0	0	0,52	24 791	1,71	3288
Kirovskoye	30,4	3	1	2	28	2	1	1	1	1	0	8	1,18	50 000	1,64	1390
Konstantinovka	93,1	10	8	2	128	0	0	0	0	0	0	0	1,37	21 000	0,23	168
Kramatorsk	213,5	19	18	1	137	2	1	0	0	0	0	0	0,64	103 598	0,49	766
Krasniy Liman	53,0	8	7	1	53	1	1	0	1	1	0	7	1,13	54 113	1,02	903
Krasnoarmeysk	82,2	12	10	2	95	0	0	0	0	0	0	0	1,16	14 637	0,18	155
Makeyevka	426,4	12	12	0	112	7	7	0	7	7	0	35	0,34	105 843	0,25	735
Marioupol	509,8	41	36	5	692	0	0	0	0	0	0	0	1,36	372 800	0,73	537
Novogrodovka	17,1	2	2	0	6	2	2	0	1	1	0	3	0,53	7 608	0,44	830
Selidovo	60,9	5	5	0	55	3	3	0	0	0	0	0	0,90	33 810	0,56	622
Slavyansk	145,2	19	17	0	202	14	6	8	4	2	2	10	1,46	70 875	0,49	336
Snezhnoye	80,5	3	2	1	23	0	0	0	0	0	0	0	0,28	6 440	0,08	286
Torez	93,1	2	2	0	20	0	0	0	0	0	0	0	0,21	27 423	0,29	1381
Ugledar	16,9	2	2	0	19	2	2	0	2	2	0	10	1,72	9 793	0,58	337
Khartzisk	112,3	18	14	4	180	1	1	0	1	1	0	6	1,65	65 305	0,58	352
Shahtersk	69,7	5	5	0	50	3	2	1	0	0	0	0	0,72	14 610	0,21	292
Yasinovataya	37,2	5	5	0	53	2	2	0	0	0	0	0	1,42	50 710	1,36	958

	N inh (x1000)	Trucks				Tractors			Trailers				Vol/inh l/inh	SDW from residential sector 2002 m3	Vol/inh m3/inh	N rounds
		Park	In good state	In Repair	Total Vol m3	Park	In good state	In Repair	Park	In good state	In Repair	Total Vol m3				
Rayons	**715,4**	**53**	**50**	**3**	**378**	**48**	**43**	**5**	**42**	**33**	**9**	**149**	**0,74**	**156 367**	**0,22**	**297**
Alexandrosvskiy Rayon	22,5	1	1	0	8	1	1	0	1	1	0	6	0,60	8 400	0,37	617
Amvrosievskiy Rayon	54,0	3	3	0	18	1	1	0	1	1	0	6	0,44	12 401	0,23	523
Artemovskiy Rayon	52,6	7	5	2	43	5	1	4	5	1	4	12	1,05	16 841	0,32	305
Veliko-Novoselovskiy Rayon	48,5	1	1	0	11	2	2	0	0	0	0	0	0,23	10 400	0,21	913
Volnovahskiy Rayon	91,8	4	4	0	45	6	5	1	4	3	1	12	0,62	31 282	0,34	548
Volodarskiy Rayon	30,9	2	2	0	11	0	0	0	0	0	0	0	0,34	2 159	0,07	206
Dobropolskiy Rayon	20,2	2	2	0	15	0	0	0	0	0	0	0	0,74	1 800	0,09	122
Konstantinovskiy Rayon	20,5	2	2	0	11	0	0	0	0	0	0	0	0,51	1 106	0,05	98
Krasnoarmmeyskiy Rayon	36,8	3	3	0	9	4	4	0	4	4	0	12	0,58	8 800	0,24	414
Maryinskiy Rayon	89,1	10	10	0	60	12	12	0	16	12	4	56	1,30	33 813	0,38	292
Novoazovskiy Rayon	38,6	1	1	0	7	0	0	0	0	0	0	0	0,18	3 750	0,10	556
Pershotravneviy Rayon	28,8	6	6	0	52	3	3	0	0	0	0	0	1,81	7 148	0,25	138
Slavianskiy Rayon	38,4	1	1	0	15	0	0	0	0	0	0	0	0,39	3 500	0,09	231
Starobeshevskiy Rayon	55,3	6	5	1	58	3	3	0	1	1	0	3	1,10	10 002	0,18	164
Telemanovskiy Rayon	34,4	2	2	0	11	6	6	0	6	6	0	27	1,10	2 600	0,08	73
Shahterskiy Rayon	23,2	2	2	0	6	2	2	0	1	1	0	3	0,39	1 065	0,05	128
Yasinovtskiy Rayon	29,8	0	0	0	0	3	3	0	3	3	0	12	0,40	1 300	0,04	100

Table 8 Park of collection vehicles

2.4.4 Non collected waste

A low percentage of inhabitants covered by mechanised SHW collection as well as untimely collection of waste bring to appearance of wild dumps both in cities and rural areas.

It can be estimated, by difference between the declarations of the Questionnaire **(650 000 tons** regularly collected but **1 030 000 tons** picked up (SHW + waste from social and cultural establishments and other companies + municipal waste, including the waste resulting from cleansing of dumpsites)) and the theoretical production of SHW **(1 750 000 tons)** that **720 000 tons** to **1 100 000 tons** per year are not regularly collected or disposed.

In aim to be clear, the local utilities declare they collect in normal conditions 650000 tons per year. From his side, the Department of Housing and Public Utilitiy Services has figures amounting household waste, municipal waste and commercial waste.

	Residential sector	Commercial waste (except for residential sector)	Municipal waste	Total	Data of Department of Housing and Public Utility Services
m^3	**2 564 438**	**1 192 964**	**383 615**	**4 139 608**	**3 457 100**
tons	**648 762**				

The debate is that the notions of commercial waste and municipal waste include some household waste as the liquidation of the dumpsites. So if we consider the point of view of the collection, the figure as 650 000 tons per year are collected in regular conditions is liable. But if we consider the point of view of the disposal, the figure of the disposed household waste if between 650 000 and 1 030 000 tons per year.

The non-collected waste, if by default of service, if because a non-payment, are disposed on unauthorized sites, or burnt in the garden or in the stove (in the case of individual houses) or again gathered and burnt, either just outside the little towns and the villages, either in the street.

Beside that, the public spaces non systematically maintained are often strewn of refuses (plastic bottles, papers, plastics, glass bottles, …).

Out of the little aesthetic aspect, urban dumpsites can put sanitary problems and don't correspond to an efficient management way, because the municipal services will have then to cleanse them in conditions worse than a classical collection.

2.4.5 Spontaneous selective collection

Some of the waste is retrieved from the general flow in order to be sold later on. It's principally about the glass and the cardboard, whose the sorting is made by the individuals, the caretakers and mainly the scavengers.

About the ¾ glass, so 90 000 t/year, and ½ paper-cardboard, so 38 000 t/year, are so recycled in the facilities of the region, transiting through intermediary

purchasing points. Plastics are not systematically searched. The rates concerning glass and paper-cardboards are rather good. Their improvement should require a sorting preliminary to the disposal in the bin. Nevertheless, the creation of a centralized network of collection will put some social problems, in the measure it should deprive a population among the most fragile of an indispensable resource.

2.5 Financing management of waste

A tariff system includes several components:

- The general framework of the tariff;
- The organization of the relationships between the collector and the customer (usually under a contractual form);
- The modes of calculation of the invoice;
- The modes of recovery;
- The administrative organization for the execution of these functions.

Nota bene

In aim to simplify, it will be use forward the terms :

Private sector to speak about the sub districts of individual housings

Collector to speak about the enterprise of collection of household waste

Consumer to speak about the customers of the collection company, whatever it concerns indistinctively the inhabitants of the private sector, of the collective housings or other customers as enterprises (commerce, …).

2.5.1 Description of the existing system

The existing system of tariff and payment for the household waste disposal is built upon three major principles. These principles, which may have an implicit character, fund the finance relationships between the City, the Collector and the Consumers:

1. *direct payments* – the consumer or his representative pays directly to the company for waste collection services;

2. billing for service delivery based on the factual volumes of waste collected from collecting housing, expressed in m^3;

3. billing for service delivery based on SHW accumulation norms **established by local authorities** in m^3 (for the residents of private houses).

2.5.1.1 Analyse

For historical reasons bound to the crisis of non-payment (wages and bills), the system of tariff and payment of the disposal of household waste became by the same **complex** and **inefficient**[1].

By practice, the relationships are done in fact essentially between the customers and the collectors. By the fact, the City doesn't intervene in the tariff if not on only three points:

- Definition of tariffs used by the public utility responsible for waste disposal : price per m^3 of collected waste and m^3 of waste disposed at the landfill (for residential buildings and budget organizations)
- Definition of regulated volumes (norms of household waste accumulation in m^3 per year per person for residential sector and for other facilities per calculated unit), on the basis of which there are calculated the tariffs for inhabitants of the private sector.
- Approval of a type-contract.

2.5.1.2 Direct payment

The payment of the service is directly done from the consumer to the collector, out of that the City or any administrative structure help as intermediary. The direct payment is an ancient tradition, going back to the communist period.

It must be distinguished three cases:

1. Collective housing;

2. Private sector;

3. Enterprises and other organizations.

The direct payment takes two aspects:

1. For the private sector and the enterprises, payment by the consumer to the collector by a money transfer in the hands of the Spare Bank ("Ochadny Bank");

2. For the collective housing sector, the system includes two stairs: payment of the charges by the inhabitants to the JEK, then payment by the JEK to the collector.

2.5.1.3 Tariffs

Applied tariffs are so of two natures:

	Paid by:	To:	Unit of payment	Average tariff	Average annual payment for the family of 3 persons
Residents of collective housing, represented by JEK, enterprises and other organisations					

[1] *The improper functioning of the present system results from the inconsistency or inefficiency either of its principles or their implementation. It can be stated that the system which is formally based on the principle "the polluter pays" transforms, however, into the system where "the non-payer pollutes".*

Collective housing	JEK	Public utility	Number of m^3	8 UAH/m^3	24 UAH (assuming that 1 $м^3$ is per person)
Enterprise	Enterprise	Public utility	Number of m^3	9 UAH/m^3	Данные отсутствуют
Residents of private sector					
Private sector	Inhabi-tants	Public utility	Number of residents	1 UAH/ month/ person	36 UAH/year
(The figures provided in the table represent average values)					

Table 9 Tariffs

A detailed state of the tariffs has been dressed in date of July 1st, 2003. It shows a large dispersion for the tariffs managed by the Cities.

Before 2004 the fee for waste collection for the residents of multi-storied buildings has been included into an apartment fee paid for technical maintenance of the building. The apartment fee has been calculated in accordance with tariffs set for m². JEK was free to use this money depending on the relevant needs.

As an example, let's take a family of 3 persons living in collective housing and occupying a surface of 54 m² (18 m² per person on the average).

Collective housing	Inhabita nts	JEK	Number of m²	Tariff for SHW collection included into apartment fee	Amount of payment for a family of 3 persons
			54 m², i.e.18 m² per person on the average	0,02 – 0,05 UAH m²/month	13-32 UAH/year

Table 10 Fees per family

The analysis of the above-mentioned table allows to speak about the following difficulty run across by JEKs: they should pay to waste collection utility on the basis of UAH 24 (see table 9) per family but can receive from a family from 12 UAH to 32 UAH.

In order to improve the tariff policy in the field of solid household waste collection the Oblast has adopted the resolution issued by the Chairman of the Regional State Administration on 09.09.2003 №563 "On Tariffs for Housing Maintenance", in accordance with which the powers for tariff-setting has been transferred to executive committees of village, settlement and city councils. The resolution has provided recommendations for tariff-setting for housing maintenance services, for singling out waste collection payments and establishment of a separate tariff for waste collection. The work in this direction has already been started in a number of cities of the Oblast. For instance, in

Donetsk the amount of payment for waste collection per person is UAH 0,68 per month, allowing to collect UAH 24 per year from the family of 3 persons.

2.5.2 Recovery

2.5.2.1 Collective buildings

As it is shown by the table provided above, the load by inhabitant is around 4 UAH per capita and per annum, based on an average rental surface of 18 m² per capita, and 0.02 UAH/m²/month. This amount is perceived by the JEK among with the whole of the charges for apartment and transferred later on to a public utility that delivers the services. There exist other forms of payment as well. For instance in Donetsk an instalment (5% of the amount of the charges) has been used to be transferred to the Saving Bank directly on the account of the collector.

This amount is insufficient if it's based upon official values. Within one year, an inhabitant in collective housing produces 1 to 1.5 m^3 waste, whose the official cost is 6 to 8 UAH/m^3. He pays barely half the official price.

2.5.2.2 Private sector

For an average theoretic quantity of 1.5 m^3 for the private sector, the payment is UAH 12 per capita per annum or UAH 8 per 1 m^3. This price is the average price of the company for the whole of the collection activities. For a dense sub-district of individual houses, on the base of a weekly collection, it covers the costs of collection and disposal in landfill.

The calculation should show that in case of a 100% collection, the real cost should be UAH 6 with the existing technology: collection in 10 litres buckets, with a tipper truck and 2 loading helps.

By the contrary it is insufficient to face the real expenses of collection in a low density sub-district or when a large part of the houses are not under contract.

Last, it is appalling for the enterprise which has not any motivation to do the collection, clearly more costly than in the collective housing sub-districts.

2.5.2.3 Enterprises

Budget organizations and institutions pay for waste collection services by contract based on factual volumes and in accordance with the tariff established by city authorities. The procedures for definition of the volumes of waste are the same as the ones used by JEKs. For non-budget companies a public utility can fix higher tariffs than the ones used for JEKs, however, the profit margin cannot exceed 20%.

It should be noted that many companies collect household and common industrial waste by themselves paying only for waste disposal at the landfill.

There is no control of the factual contents of containers. That means it is not possible to identify hazardous waste which can be among the waste of companies, and they can be only revealed during the disposal at the landfill.

2.6 Landfills

2.6.1 Functioning of the landfills

In accordance with the Questionnaire, the local authorities of cities and rayons of the Oblast manage 300 SHW dumps/landfills (including the dumps of village councils). Only 64 of them are used for disposal of SHW collected in a mechanised way by public utilities, 41 of these dumps are located in 28 cities of regional subordination. Many of them have already exhausted their capacities, other will be full in the short-term perspective as there are more than 30 dumps that have already been operated for 20 to 50 years.

The passports for waste diposal sites allowing to include a dump into the regional inventory of waste disposal sites have been developed only for 29 dumps, i.e. 10%.

As a rule, the facilities used for SHW disposal have not been constructed as technical structures in accordance with design documentation, that's why they do not have a geomembrane and are not properly equipped. Many of them do not have documents confirming the right for using the land. As the existing dumps do not meet sanitary and ecological requirements the State Department of Ecology provides permits for disposal of waste only at 30-40 SHW dumps/landfills annually.

Usually a visual control takes place at the entrance of the dump. The disposal of waste, delivered at the dump by other companies (self-collection) is done on a commercial basis. As a rule, there is used a voucher system (for disposal of a certain volume of waste one is to buy vouchers which are to be submitted upon delivery of waste to a dump).

Normally, the dumps belong to public utilities engaged in waste treatment activities. However, there have been registered few cases when such facilities have been transferred to private companies.

Almost at all of the landfills, starting from a certain size, certain categories of low-income citizens are very active in sorting secondary raw materials. Such activities take place in an unauthorised way within extremely anti-sanitary and unsafe conditions. The fires are a usual practice.

It should be noted that as soon as a Ukrainian Law "On Waste" has been published and a permitting system has been introduced for disposal of waste, since 2000 SHW landfills in the Oblast have started to be designed and constructed in accordance with current sanitary and ecological requirements. By now landfills (1st part) have been constructed in the cities of Svetlodarsk, Ilovaysk, Chasov-Yar, Ugledar, Avdeyevka (Avdeyevka Coke-Chemical Plant) where waste is disposed to. A number of landfills in other cities has started to be constructed.

2.6.2 Dumpsites

500 to 1000 sites of wild dumping exist within the Donetsk Oblast. It put a problem both environmental and sanitary, in the measure these dumpsites are made without any caution and bring a diffuse pollution all over the territory. This

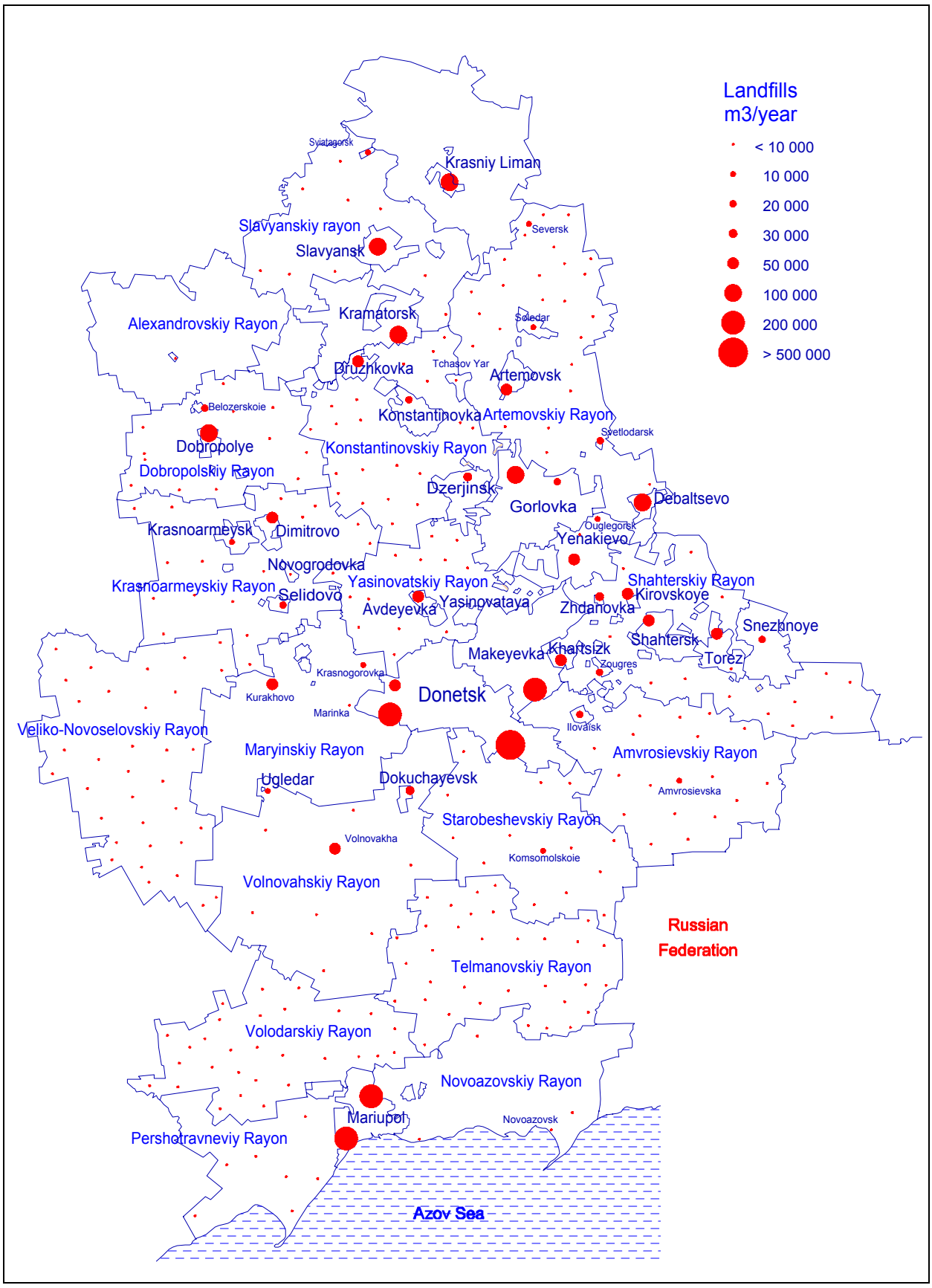
pollution is mainly done by infiltration. Otherwise, these dumpsites are often only covered of soil instead of cleansed.

Liquidation of unauthorised dumps is within the competence of local self-government bodies. This kind of activities are organised in cities and rayons of the Oblast on the annual basis, especially in spring. For instance, during the spring season of this year there has been liquidated more than 1.5 thous. dumps with the total volume of 150 thous. m^3. However, most part of the dumps appear again in the same places as it is mainly a poor waste collection which results in appearance of dumps.

2.6.3 Existing landfills

The answers that could be extracted from the Questionnaire sent to the administrative units are incomplete. Nevertheless they have the merit to exist and they are reproduced on the *Map 6 Landfills used by administrative units* on which the landfills are put on according to the yearly volume of disposed household waste.

The less that can be said is that there's an atomisation of the landfills. It's typically the situation of past practices. Each one is putting the waste in the closest hole. Unfortunately such an approach is still in use.



Map 6 Landfills used by administrative units[2]

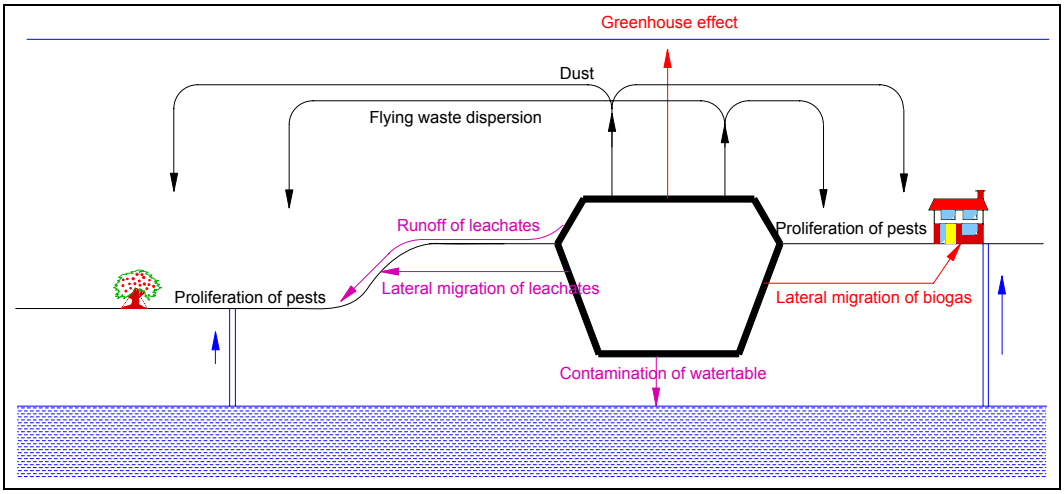
[2] declarations from the Questionnaire

2.6.3.1 Environment risks

The most immediate risk is about the fires (garden fires, village fires, landfill fires). The burning of complex mix as household waste such produces a lot of toxics: hydrochloric acid, volatile organic compounds, dioxins, etc. The dioxins, notably, are extremely carcinogenic, non biodegradable, and accumulate at the summit of the food chain.

In other respects, the disposed waste contain toxic waste (solvent, batteries, etc.), whose the combustion provokes too a dispersion of heavy metals and other toxic molecules.

The leaching off of the landfill by the rain put also a major environmental problem, in the measure the leachates are not managed: then they are the vector of the contamination of the surface water by run off and/or of the watertable by infiltration.

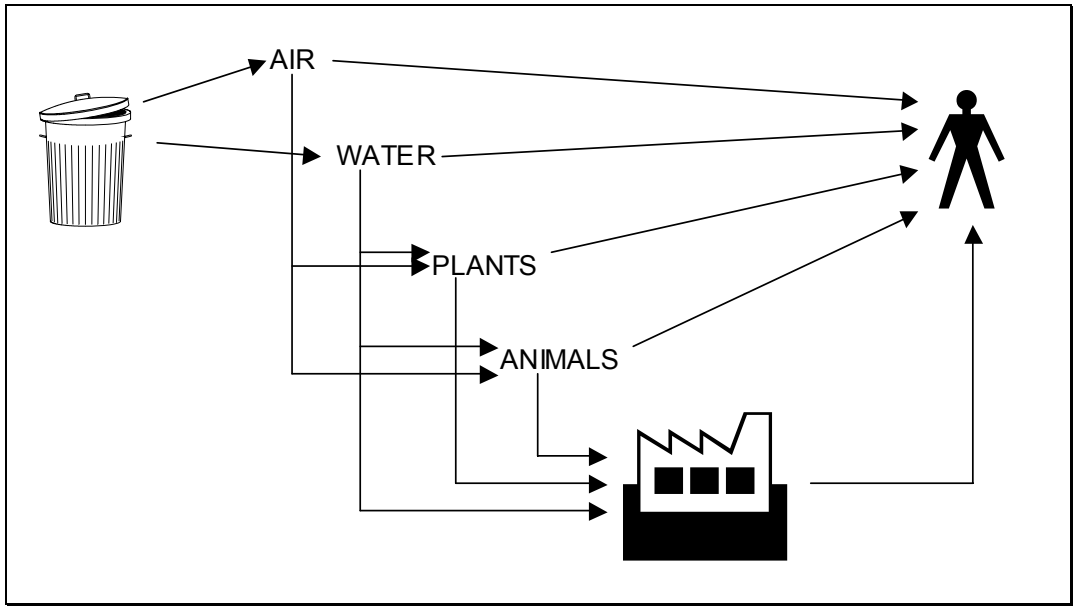


Drawing 1 Emissions of pollution from Dumpsite and Exposure Pathways

2.6.3.2 Health risks

These pollutions caused by the landfills, and notably the smokes, make to run important sanitary risks to the scavengers (in addition to the risks of accident), to the salaries of the landfill, even to the neighbourhood.

Out of evident human considerations, it must be considered the amount of the huge public expenses that could represent in mid and long term the management of the sanitary consequences of the lack of the on going taking into account of the problem.



Drawing 2 Contamination Pathways

The possible contamination chains usually taken into account for human health are:

Gas, dust, aerosols	Air				Human Breathing
Gas, dust, aerosols	Air	Plants			Human Feeding
Gas, dust, aerosols	Air	Plants	Animals		Human Feeding
Leachates	Surface water				Human Drinking
Leachates	Surface water	Plants			Human Feeding
Leachates	Surface water	Plants	Animals (wild & breeding)		Human Feeding
Leachates	Surface water		Animals (wild & breeding)		Human Feeding
Leachates	Surface water			Food Industry	Human Feeding
Leachates	Groundwater				Human Drinking
Leachates	Groundwater		Animals[3] (breeding)		Human Feeding
Leachates	Groundwater			Food Industry	Human Feeding
Waste dispersion		Animals			Human Feeding
Fire propagation					Disaster

Table 11 Possible contamination chains

[3] Breeding of animals uses network water for animal drinking

2.7 Others

2.7.1 Rubble

The rubble (the conbstruction waste generated as a result of liquidation of mines and other production facilities is not considered here) and other inert waste disposed at dumps don't put any environmental or sanitary problem. The problem is principally in their transport unto a storage site. It should be solved within the framework of an existing legal waste management framework and the Regional Plan will not pay a special attention to it.

2.7.2 Household hazardous waste

The household waste contain hazardous waste in low quantities. This presence puts some problems in case of leaching at landfills, individual burning of waste or incineration at waste incineration plants.

Toxic household waste are mainly:

- Batteries and accumulators
- Paints and solvents
- Fry oils and car oils
- Out of date remedies
- Aerosols
- Out of date electrical and electronics devices
- Medical devices containing mercury, luminescent lamps

The whole of these waste is nowadays spread in the environment, either by landfilling, either by burning as there is no system of collection of such waste in the Oblast.

2.8 Prospective

2.8.1 Socio-economical scenarios

Ukraine knows for some years a strong economical growth. This growth manifests itself by a rise of the average purchasing power and a change of the consumption ways of the most favoured part of the population. Already it can be noticed that the part of the population having the highest incomes, not only consumes more, but also consumes differently: new products, individually packaged goods, etc.

So the persistence of the economical growth will imply the generalization of some of these behaviours, which will inevitably involve an increase of the quantity of packages (plastics, paper, cardboard). In parallel, it can be seen in such a case a decrease of the production of organic waste and an increase of the complexity of these packages (multi-materials, multi-layers).

The Western-European experience shows that to change the behaviours in matter of waste is a long and exacting task, and that the reduction of the production is difficult to do, even where volunteer public policies have been led. If the regulation, the normalization or the tax incentives are relevant of the national level, on the other hand, it is possible at the level of an Oblast to anticipate the negative changes of behaviour toward environment and to try to prevent them by awareness actions.

2.8.2 Expectations of the population

Only 27% inhabitants are satisfied of the frequency of the waste collection. In other respects, the large majority of them say to be concerned by the problem of waste, as so by their dissemination in the nature, their effects on underground water, than by their presence or their odour in daily life.

It is noticed a relatively strong adhesion of the population to the idea of to act for the reduction of their own waste: 35% say for example to be ready to sort their waste and to bring them in appropriate places.

It must be noticed that the environment protection associations have recently developed.

Quantity of Legal Citizens' Associations *(for the end of the year)*	1995	2000	2001	2002
Environment protection (ecological) associations (communities)	17	63	67	66

2.8.3 Forecast

If the production of waste risk to increase in next years, it is impossible to estimate in which proportion. Depending to the economical growth, this increase could reach some % per year.

On the other hand, it is unavoidable to improve the collection, so a better collection will provoke less fires, less wild dumpsites, less dispersion, and so inevitably **a hard increase of the quantities to be disposed**.

The disposal of these increasing quantities will require the progressive overture of sanitary landfills able to absorb a stream doubtlessly over 1 800 000 tons per year. In aim to limit these streams to be landfilled, while sparing on the cost of treatment, it's advisable to develop at the maximum the individual composting and the recycling.

More than 50% of the household waste are not collected by the collection companies neither the municipal utilities. It will require at less to double the capacity in aim to ensure a satisfying collection to everybody. It will require investments in containers and trucks, but the implementation of transfer stations should improve the efficiency of the trucks by reducing the time necessary to go to the unloading point.

The selective collection of fermentable matters in collective housing can be experienced but will not probably constitute a possibility extendable to the Oblast for the reason of the effort it requires in such housing. But in individual housing it's possible to encourage the individual composting in aim to divert in term one third of the fermentable which are there produced, so around 160 000 tons nowadays and 200 000 tons in term.

The recycling is already 90 000 tons per year for glass and 38 000 tons per year for paper-cardboard. The rate of collection of the paper-cardboard will not increase without a sorting by the individuals in aim of a separate collection. But even in this case, to reach 100% of effective recycling is impossible.

To collect the remaining 30 % glass will also require the start-up of an organized separate collection system.

The rate of recycling of plastics (potential 93 000 tons per year), supposing it should be systematically collected, should not overpass 50%.

Globally, it is so conceivable that the effective rate of recycling reach in term 10 or 12% of the household waste, instead of 7.5% nowadays.

Supposing an actual production of 1 752 000 tons per year which should increase by 3% per year, the needs of landfilling capacity in 2014 should be then around 1 697 000 tons per year. The capacities of sanitary landfilling being nowadays null, it must be opened sanitary landfills covering the whole territory.

2.8.4 Economical prospective

The cost of the existing SHW management can be estimated at 1 UAH/month/family. It's near the amount paid by the inhabitants to the JEK for those who are living in collective buildings. In the private sector, it's theoretically 3 UAH/month/family but less than 30% of the concerned inhabitants are really paying that. For the active population, it was in 2003 a size order around 0.25% of the annual income. In comparison, in Western Europe, it's around 0.5%.

One main goal is that the SHW management gets as soon as possible its financing autonomy. The total needs of money of the Oblast for that are far to be covered.

1/ Less than 50% of the inhabitants are paying, so it's possible to double the waste budget.

2/ The waste tariff can be doubled, so it's possible to double again the waste budget.

3/ The incomes of the inhabitants are expected to increase strongly in the next years and the tariffs should follow this recovery.

But the question of low income inhabitants stays unsolved. A lot of people will not participate to the economics recovery, mainly retired people, handicapped, pensioners, jobless, … The State provides subsidies to the local entities for the waste fees of these inhabitants. But it seems that the procedure for receiving such a subsidy is long and inconvenient for the population.

It is expected that a considerable role in increasing the ratio of payments for public utility services by inhabitants will be played by reforms initiated in the sector of housing and public utility services. The reforms, among other things,

include new forms of residential building maintenance, namely: creation of associations of co-owners of multi-storied buildings and special services for operation of residential buildings; transfer of the right to maintain residential buildings to private companies, improvement of a tariff policy.

2.9 Analysis of on-going regional programmes in the field of household waste management

Nowadays in the Oblast there are no Programmes or Plans focused exclusively on the management of solid household waste. Nevertheless, there is a number of regional programmes that include measures in the field of SHW management. Among them:

- Programme of industrial and household waste utilisation in the Donetsk Oblast for the period by 2005, approved by Decision of the Donetsk Regional Council as of 24.03.2000 # 23/12-275 (hereinafer referred to as Programme 1).
- Programme of environmental protection and assurance of ecological safety in the Donetsk Oblast for 2001-2005 # 3/22-551 (hereinafer referred to as Programme 2).
- Programme of development of housing sector of the Donetsk Oblast for 2000 and for a period by 2005, approved at the session of the Regional Council as of 29.02.2000 # 23/11-236 (hereinafer referred to as program 3).
- Comprehensive programme on organization of collection, storage and recycling of solid and liquid household waste in Donetsk Oblast for a period between 1996 and 2005, approved by the Chief State Sanitary Inspector of Donetsk Oblast and ratified in 1995 by the Deputy Executive Chairman of the Regional Council (further referred to as Programme 4).

Activities, envisaged in these programmes, are later on included into annual programmes of social and economic development of Donetsk Oblast in accordance with which budget financing is implemented. It should be noted that Programme 2 was accepted later than others and incorporated practically all activities of Programmes 1 and 3 as well as additional activities, and specified amounts of financing, necessary for their implementation.

SHW management activities in regional programmes can be conventionally divided in accordance with certain directions:

- Preparation of design documentation and construction of SHW landfills;
- Preparation of design documentation and construction of waste recycling plants (facilities);
- Preparation of design documentation, putting to order and reconstruction of existing landfills;
- Activities on introduction of selective collection of SHW;
- Activities on recycling of certain types of secondary raw materials.

Development of regional programmes is based on programmes and proposals of cities and districts. That is why the activities of regional programmes are structured in accordance with administrative units of the Oblast and include activities of city and district programmes.

According to Programme 2 by the year 2005 in cities and districts of the Oblast the following measures are planned: construction of 23 new landfills, reconstruction of existing landfills in 25 cities and districts of the Oblast. In fact, by now 5 new landfills are built, construction of 6 more has started, and design documentation for 8 landfills is under preparation. Besides, reconstruction of 2 landfills has started, projects for reconstruction of 7 existing landfills are developed. Corresponding information is presented on Map 7.

As far as development of feasibility studies and construction of waste recycling plants (including thermal treatment and pyrolysis) are concerned, from 7 activities that have been planned only 1 is under implementation (waste recycling plant is being built in Kramatorsk). Feasibility studies for two waste incineration plants in Makeevka and Dimitrov have been developed, but have failed to pass the state ecological expertise.

Implementation of all the activities of Programme 2 should result in ecologically safe storage and utilization of 1625 thousands tons of solid household waste per year that is 93% of theoretically calculated annual amount of SHW in the Oblast (1750 thousand tons per year). Besides, these activities cover the territory with population of 3618 thousand people, that is 76% of all the population of the Oblast.

For fulfillment of all the activities in the field of solid household waste management Programme 2 envisages financing in the amount of 125 million UAH, 91 millions of which are to be allocated for construction and reconstruction of landfills, and 34 millions - for preparation of feasibility studies and construction of waste recycling plants. However, it should be taken into account that factual cost of many activities will be higher than the planned estimates. Often only conventional or approximate costs are indicated in the programme that can be explained by the lack of experience and standartised approach to design and construction of landfills during preparation of the Programme in the year 2000.

This is especially conspicuous at the analysis of planned costs for implementation of construction of SHW landfills (the amount varies from 140 thousand UAH in Avdeevka to 5 million UAH in Svetlodarsk and to 49 million UAH in Mariupol). In fact, development of a design documentation and the first stage of construction of the landfill in Svetlodarsk required 3 millions while the capacity of the landfill is 6 thousand tons per year.

The activities can be financed either from one or from several sources simultaneously. The following sources of financing are envisaged in the programmes:

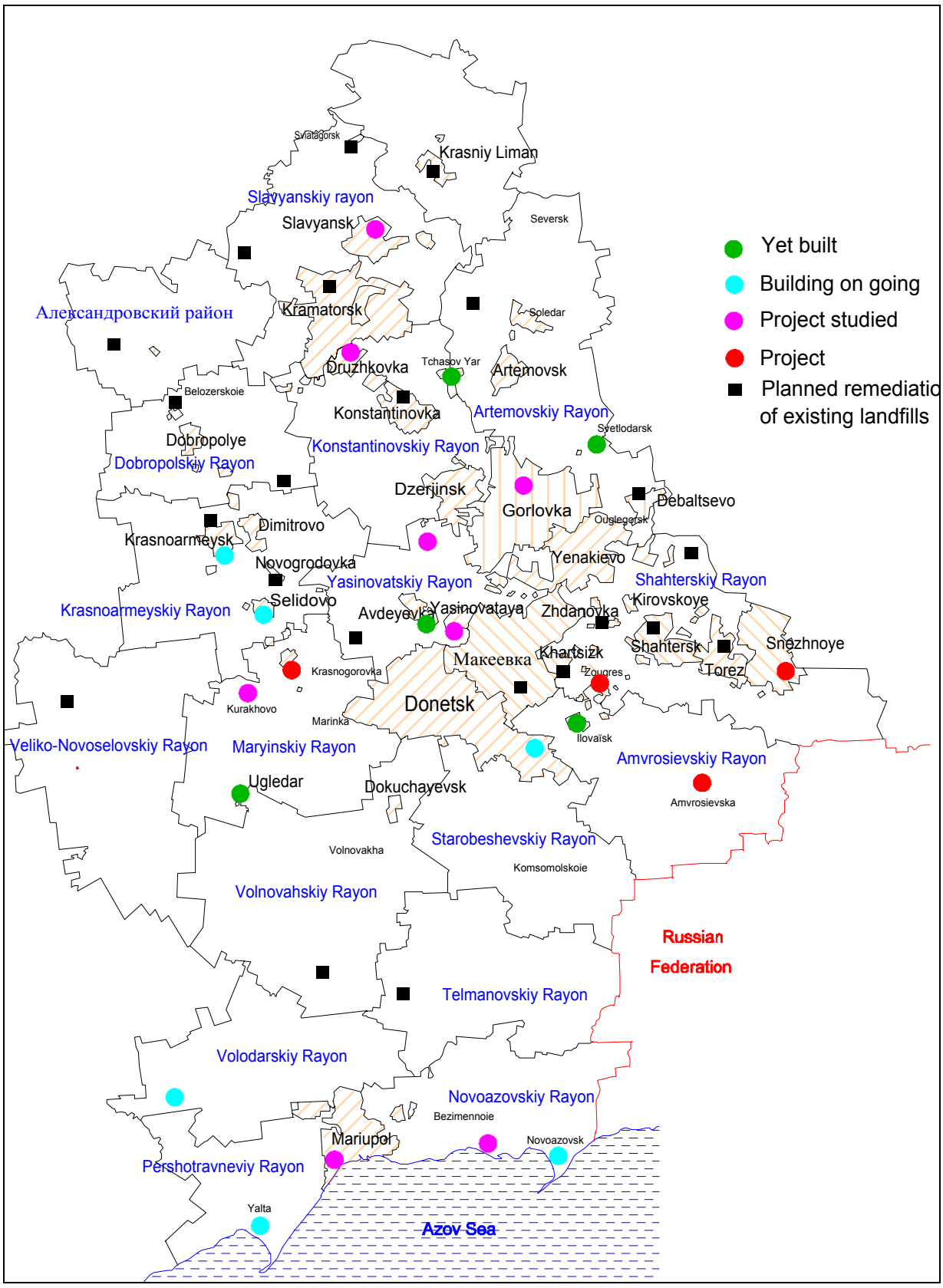
- State budget
- Local budget
- Regional environmental protection fund
- City environment protection fund

- Means of companies
- Other sources (including grants).

Construction of landfills within the existing situation is a costly activity that requires huge investments. However, the investors and private capital are practically not involved in this sphere due to absence of guarantees securing the pay-back (return) of investments. This, in its turn, is connected with the current system of tariffs that does not allow to set long-term tariffs with a necessary profit margin. Beside that, taking into account large costs and absence of means in public utilities and in budgets of cities and districts the Regional fund of environmental protection becomes the main source of financing of construction of these facilities. Thus, in the year 2002 for construction and reconstruction of landfills 9,3 million UAH was taken from this fund, 1,6 million - from the state fund of environmental protection and 3,9 million UAH from local budgets altogether. In 2003 1,6 million UAH was allocated from the regional fund, while from local budgets it was only 0,5 million UAH. Besides, practically all cities and districts send their requests for receiving financing from the regional budget.

Attention should be paid to the fact that sometimes landfills planned for construction are supposed to be too close to each other. Thus, in the Yasinovatsky rayon two neighboring land plots were allocated for construction of the landfill of Yasinovataya city and the regional landfill of “Social Renaissance of Donbass” Ltd.

Thus, we may conclude that the approaches to planning the landfill construction should be changed. It is important to optimize their location based on the necessity to render waste collection services to several cities or districts and to concentrate all sources of financing on them.



Map 7 Construction and reconstruction of SHW landfills planned by the existing Programme by 2005

3 Objectives

3.1 Long-term political objectives

3.1.1 To reduce the risks while controlling the costs

The household waste provoke in the whole Oblast heavy attempts to the environment. Some are transitory but others are irreversible, as the pollution of watertables and the emission of dioxins. But it's well about to bequeath to the future generations a territory where it will be still possible to drink the tap water and to eat food produced on place without to fear for health.

From a strictly financial point of view, a long term management must also avoid future repair costs. The protection of our environment is so also an affair of economical rationality. It requires to use the best available technologies, i.e. the technologies the most performing at a reasonable cost and at a reasonable level of complexity.

To protect environment is a target by itself, but a preserved environment is also an unavoidable element of the development of the Oblast.

For this objective, it's indispensable to get a better knowledge of the problem, in aim that in future the subject should be better controlled, the management more efficient, and the results quantifiable.

3.1.2 To control the quantity of waste to be disposed

The cheapest and the most easy to dispose waste is the one which is not produced. This evidence brings naturally the public authorities to look for to limit at the minimum the quantities of waste they are in charge. That passes throughout a well fitted regulation, encouraging the keeping of the good habits as the purchase of loose goods (although the westernisation of Ukraine makes to fear that the packaging multiplies), establishing manufacturing standards respecting environment, and so …, which overpasses the frame of the present Plan.

At the regional level, an effort of responsibilitization of the whole population will be done, by, for example, the education of the children, the sensitisation of the teachers, the encouragement of exemplary actions, in aim to sharpen the civic sense of anybody on this subject.

3.1.3 To reduce the quantity of ultimate waste

An ultimate waste is a waste that cannot be valued within the technical and economical conditions of the moment. It's so only possible to incinerate it (which eventually produces other ultimate waste) or to store it, which doubtlessly constitutes a cost, an environmental nuisance, as wall as a wasting of matter and energy. So it's about to reduce at the minimum the quantity of ultimate waste, by applying various solutions in the following order of priorities:

1. Reduce production of waste

2. Reduce toxicity of waste
3. Re-use or recycle materials
4. Re-use the matter by composting
5. Value the energetic content by the biogas
6. Store or incinerate

3.1.4 To encourage the intercity co-operation

A waste management respectful of the environment requires competencies, technical means, investments, etc, that a small or medium municipality cannot take in charge alone. So it's necessary to encourage the municipalities to gather, first in aim to organize an efficient collection. On other hand, technical and costly facilities as sorting centres and sanitary landfills have an optimal economical size largely exceeding the needs of one municipality or of one rayon. This co-operation could pass trough the creation of multi-municipal enterprises, i.e. by the put in common of technical and financial means, even by the "autonomization" of the existing municipal utilities, which with the municipalities could pass contracts.

3.2 Strategic objectives

3.2.1 Awareness of the importance of waste problems

In the first phase during until 2009 it's about that the population of the Oblast rise awareness of the importance of the problem of waste. Education, sensitisation, and information, even the repression for example, must aware each of the 4 774 400 inhabitants that to throw waste anywhere constitutes an act un-civic and reprehensible, and that to burn household waste is a hard attempt to environment and makes run sanitary risks important in term.

3.2.2 100% waste collection services paid by inhabitants in 2009

The local utilities are missing financial assets to realize the indispensable investments to carry out their mission. But a rigorous management of the problem of household waste requires that the collection becomes an universal service within the Oblast, because every homes produce waste.

In that aim it is indispensable that each home pays its contribution to this service of general interest. The recovery of the amounts due by the homes and the JEKs is so a first importance mission for the local utilities. Facing the emergency of this problem, a volunteer action is necessary which expresses by to target **100% recovery of the amounts due by the homes and the JEKs in 2009.**

Quite an important role should be played by reforms initiated in the housing and public utility sector and accompanied by introduction of new forms of housing maintenance. There operate in the Oblast 300 associations of co-owners of multi-storied residential buildings, specialised housing operation services have been created in such cities as Avdeyevka, Dimitrovo, Kramatorsk, Donetsk,

Kurakhovo. On a tender basis 42 private companies have won the right to provide maintenance services for 7.6 mln. m^2 of dwelling (13% of the total surface of multi-storied buildings).

3.2.3 100% of household waste collected in 2009

In parallel, it is indispensable to justify the claimed amounts by an improving service. It's also to end quickly the two hardest consequences, on an environmental point of view, of the insufficiencies of the on going management of the waste, that are fires and dumpsites. This objective must be realized in concomitance with the first, i.e. in 2009. It will require investments for containers, trucks, even in transfer stations, but lighter solutions must also be explored as the enlargement of the timetable of the use of the trucks. However, one should bear in mind that in this case the trucks will be worn out quicker.

3.2.4 100% of ultimate waste in sanitary landfills in 2014

Incineration with smoke treatment requires very huge investments and produces by itself ultimate waste: bottom ash that must be inerted before landfilling, and very toxic dust which for no solution of storage is foreseen within the Oblast.

The storage will stay the only one solution for the ultimate waste in mid term. But the modern technology of sanitary landfills makes of them reactors of production of biogas, so bringing an energetic recovery of waste. So it's to settle sufficient capacities of sanitary landfills instead of existing landfills and dumpsites, more secure in matter of environment and health. It will constitute huge investments, but relying on a first sanitary landfill quickly built help with international financing bankable on the base of the economical recovery and the decrease of the interest rates, this objective must be realized within 10 years, so in 2014.

Once the objectives "100% fees recovered", 100% waste collected" and "100% ultimate waste disposed in sanitary landfills", then it could be considered that public authorities took under control the household waste in the Donetsk Oblast.

3.2.5 Development of recyclable capacities

The State Programme of Solid Household Waste Treatment envisages up to 2011 an implementation in Ukraine of a system of recycling and utilisation of valuable components of household waste, introduction of technologies allowing to efficiently use household waste as power resources as well as production of new domestic equipment for household waste treatment.

Taking into account a complicated ecological situation in the Donetsk Oblast as well as a heavy load on the atmoshpere caused by human activities (the density of emissions of pollutants into the air is 9 times higher than the average value for Ukraine) the priority in solid household waste treatment in Donetsk Oblast should be given not to waste incineration but to retrieval of valuable SHW components, storage of secondary raw materials and their utilisation.

That's why before 2009 it is planned to start in the Oblast the activities aimed at selective collection of valuable components of SHW, to extend the network of secondary raw materials collection and storage centres, to build waste sorting facilities, to construct secondary raw materials recycling capacities that have already been planned by the active programmes and to create additional ones. At the same time it will help to gradually solve the problem of "ultimate waste" disposal at landfills, i.e. of waste not subject to utilisation and to reduce the volumes of disposed waste. It is also necessary to start the production of machines and equipment in order to create an industry of solid household waste utilisation.

In this respect, some particular aspects have to be kept in mind.

1. The regional scale cannot be considered as exclusive. Most of the facilities for recycling the secondary raw materials must be planned as a rule at the national level. A glass factory or paper mill for instance must be designed with a capacity, which exceeds the amount of glasses or paper able to be recovered in one single Oblast. This is not the same situation for other recyclables as plastics. Small workshops for plastics can compete easily with bigger facilities.
2. Market driven-mechanisms must play as largely as possible. The Regional budget as well as the local city budgets have not to be used for competing with private entrepreneurs, and to risk money of tax-payers in uncertain business. The Regional authorities have to create a climate able to attract investors, by simplifying procedures, organising direct connections with waste sorting facilities and securing quantities and price level of sorted waste materials through control and contractual relationships. Mechanisms as tender and concession should be compulsory before using direct public investment, which can happen only in case of market failure.
3. Information about waste recyclables must be largely publicized and cannot be under secret as today, preventing new investors to enter the business. The Region authorities must publish information and can facilitate the meeting of the supply and demand by creating a website of secondary raw materials exchange.
4. The specialisation of the region in mechanic works give a strong base for development of sorting and recycling facility construction industry. The region authorities must help existing companies to turn their activities towards these new areas of business, through training of new specialists, developing information and research centres, organisation of tenders for the future sorting plants (instead of construction by city departments), reduction of taxes for investment in these branches.

3.2.6 Experimentations of alternative management

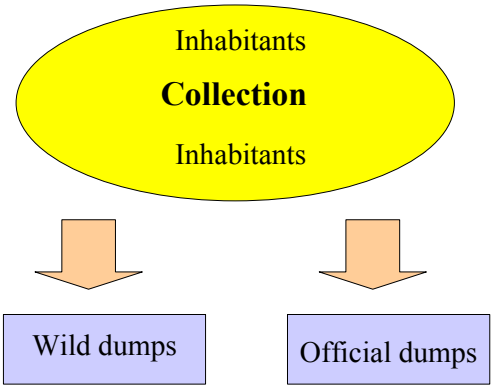
In parallel to these objectives of control of the channel from a global point of view, it will be useful to launch experiments of innovating collection, of separation of toxics, of sorting, of recycling, of composting. Starting from an actual rate of recycling of 7%, it will be agreed to aim at an effective recycling rate of 12% in 2009. it will be to improve the collection rate of glass and paper and to launch experiments aiming to determine if the separate collection is

preferable to the sorting of rough waste, to verify the economical viability of these processes, etc.

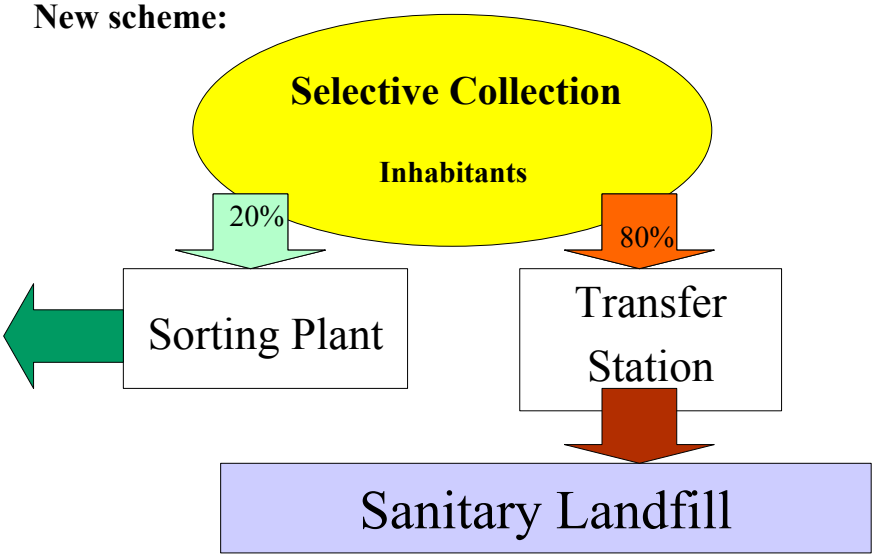
3.2.7 General assessments and forecasts

In accordance with the strategic tasks aiming at improvement of the existing system of SHW management the general scheme of SHW management must gradually change due to 100% coverage of the population with a mechanised system of SHW collection and waste disposal at official dumps (and in the future – at sanitary regional landfills), introduction of selective collection of SHW by the population, creation of waste sorting facilities with retrieval of valuable components, extension of the network of waste collection, storage and recycling centres, composting of waste.

Existing scheme

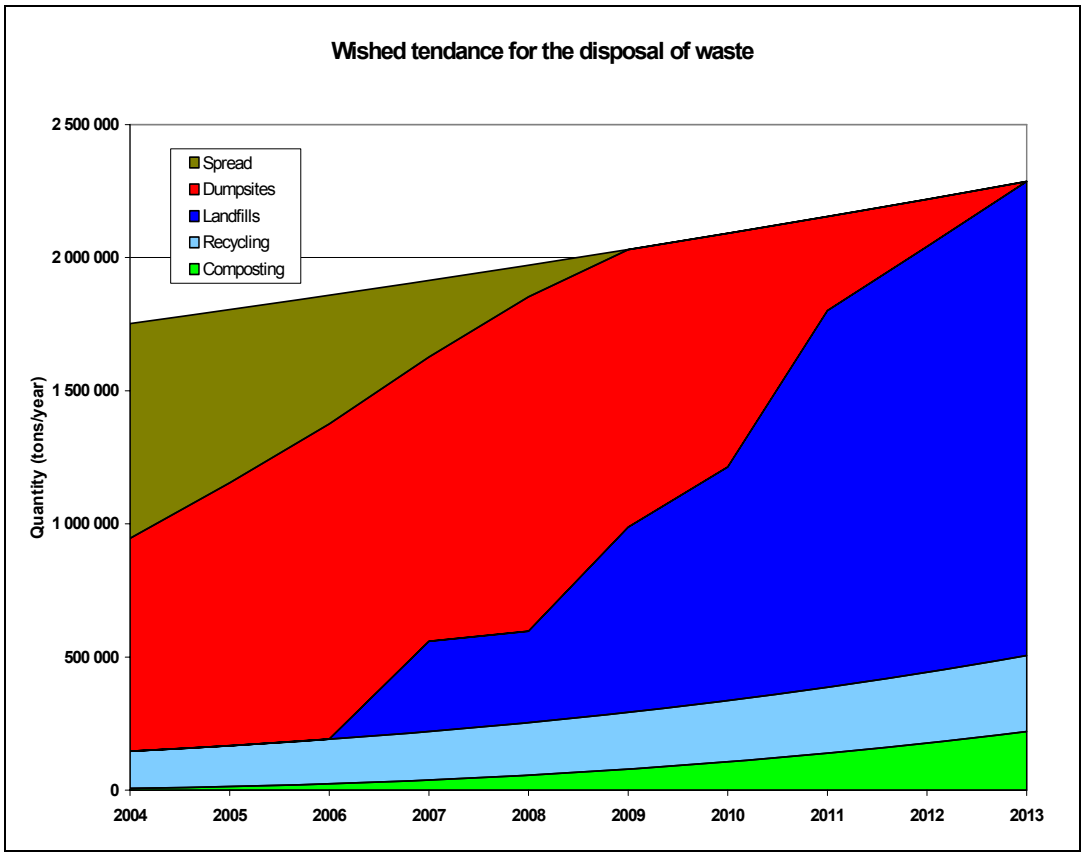


New scheme:



The following *Graph* shows the tendencies of development of household waste treatment techniques:

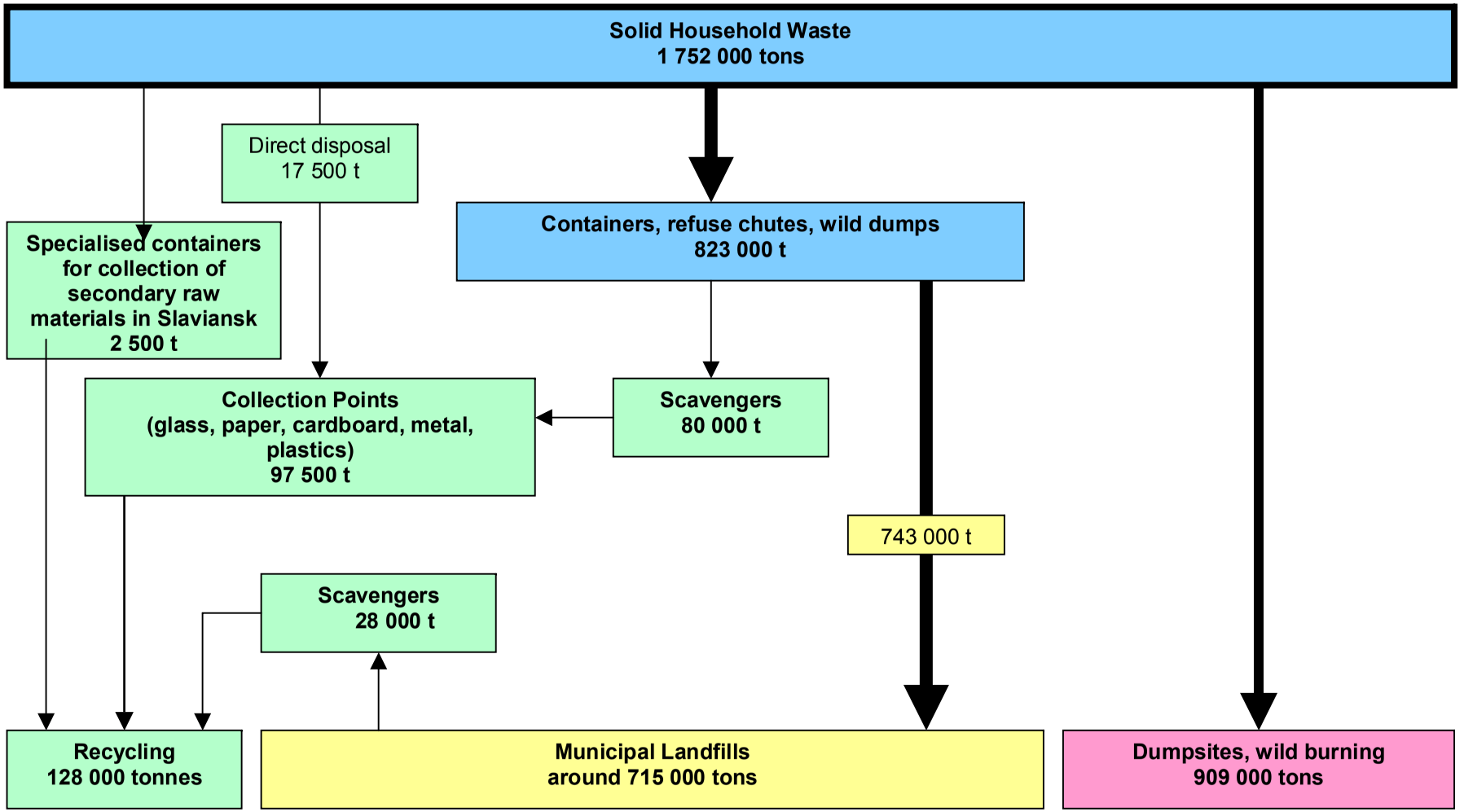
- at the base, a development of composting and recycling;
- at the top (white segment), a foreseen growth of the production of household waste;
- between both, the sharing between existing landfills (red) and dumpsites and fires (brown), then the rise of capacity of the sanitary landfills (blue).



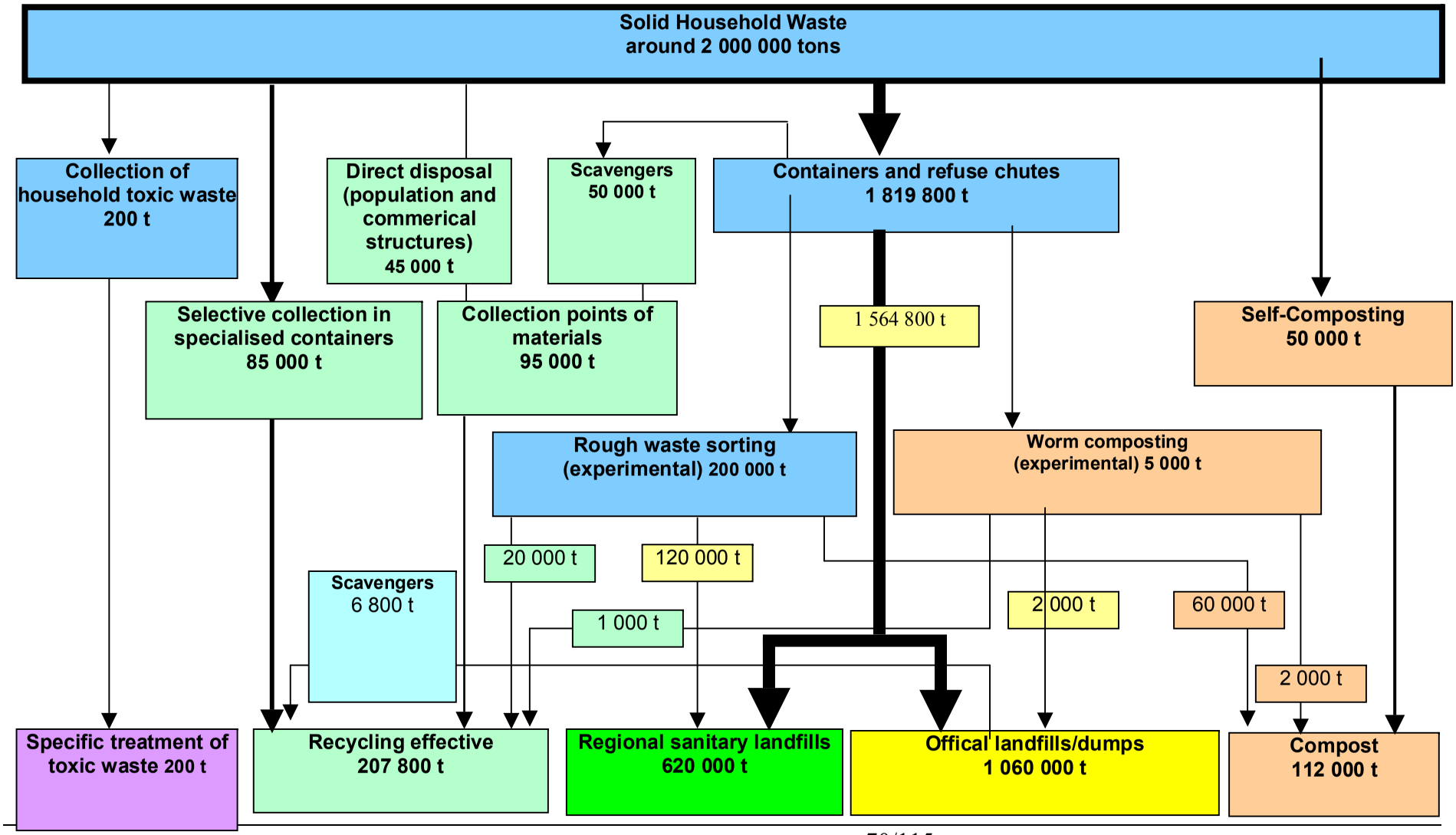
Graph 6 Evolution of the disposal to be scheduled, in size order, by type of disposal

The quantities of SHW in 2004 and foreseen for 2014 are resumed on the two following synoptics. The techniques of waste treatment are generally presented at the following three schemes.

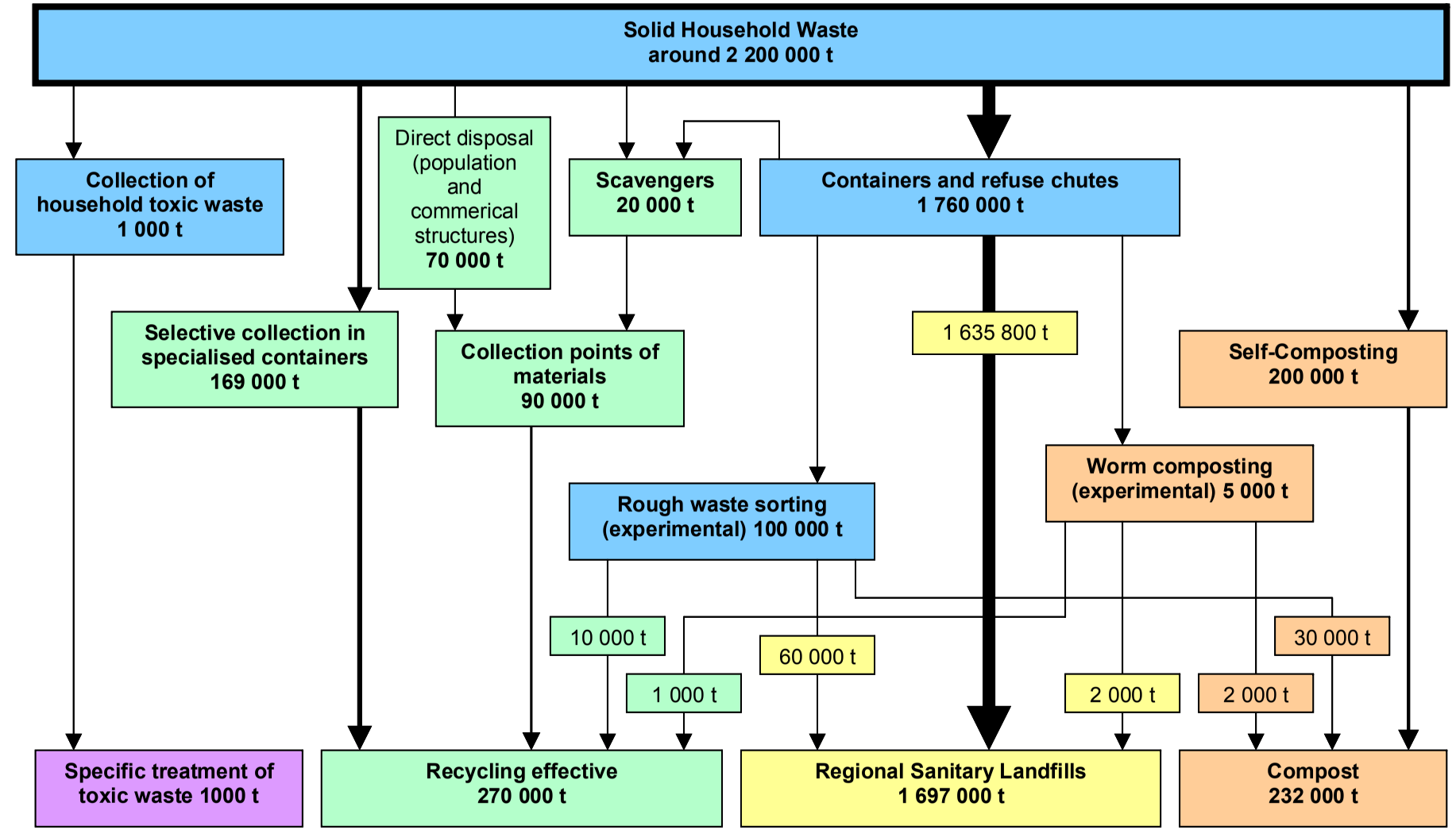
Situation assessed in 2004



Objectives 2009



Objectives 2014



4 Action Programme concerning the production, the collection and the disposal

4.1 Education, information, sensitisation

4.1.1 Training of waste workers

The employees and the executives of the waste collection and landfill operation companies must receive training aiming to combine respect of environment, technical efficiency and economical viability.

The training of the employees of the companies in charge of waste collection and landfill operation can be organised by the Department of Housing and Public Utility Services of the Regional State Administration at the Centre of Professional Development and Re-training of the Regional State Administration with participation of the State Department of Ecology. The training may be organised within the framework of a new Tacis project.

4.1.2 Training of teachers of primary school and teachers of natural sciences

Children are privileged vectors of a change of behaviour of the population toward waste, their production by the homes, then their management in each family. It is indispensable that the primary school teachers and the professors of natural sciences and geography should be trained to the problematic of the waste management, in aim they could teach every children in this domain.

The training of the primary school teachers and the professors concerning at less one age class should be carried out during the years 2005 and 2006. The first pedagogical equipment has been designed and taken in charge by Tacis for the pilot-project in Slaviansk. A pedagogical case will be designed and distributed. For training of teachers it would be advisable to involve the Institute of Post-graduate Education.

4.1.3 Exemplary actions, events

Public authorities will encourage symbolically and financially all initiatives aiming to an awareness of the problem of the waste management or to an invitation to a more citizen behaviour.

Municipalities, administrations and public enterprises will be invited, not only to adopt an exemplary behaviour (sensitisation of the personal, use of ecological processes and materials, sorting of the waste at source, selective collection in the offices, …), but also to initiate and to sustain all exemplary action.

4.1.4 General public

The Regional Solid Household Waste Management Strategic Plan is a public document. Its large circulation is necessary to show the transparency of the collective choices and to justify the particular decisions in the interest of the general public.

The population will be informed of the draft plan and invited to take knowledge of it. The Oblast council, the regional administration, and the municipalities disposing of an website will put in consultation the project of plan itself and its summary. All elected councils disposing of a periodical are invited to use it to sensitise the general public and to remind laws and regulations about waste.

The expression of the citizens will be collected by the way of e-mail addresses, of a mailbox of the administration. Public meetings presenting the project of plan may be organized. The remarks and questions of the public will be synthesized in a report. This report will be sent to the working group who will answer point by point.

4.1.5 Elected, administrative executives and local officials

The Plan will be transmitted to a maximum of elected people, of administrations executives, of economics leaders, of journalists, of intellectuals, etc. Starting from October 2004 it will be necessary to publish a periodic bulletin which will become an important factor facilitating the understanding of the significance of the considered problems as well as a tool for dissemination of information about the progress in development and later on a progress in implementation of the SDW Management Plan. As an option, such a bulletin can be published in the ecological newspaper "Nash Kray" or in the "Herald of Sanitary and Epidemiological Station".

4.2 Organisation of the collection

4.2.1 Different approaches toward the choice of the collection system

The existing Ukrainian system is based on light trucks and basic containers put in a disposal point common for one or a few buildings. In today's conditions, it's the cheapest equipment for the waste collection in urban areas.

There are described below the advantages and drawbacks of the existing system of SDW collection in Ukraine.

Advantages	Drawbacks
Low Investment cost of trucks	Low efficiency of containers downloading in trucks
Able to drive on existing landfills	Limited capacity of trucks (2-2.5 tons), implying a lot of time spent in trips between the collection area and the landfill So, a high rate of fuel consumption per

	collected ton
	No waste transfer stations, so long average distance between collection areas and landfills
Home-made containers	Fragility of the attachment of the container, implying a lot of repairs and a waste of time to pick the container with the elevator of the truck
1 worker /truck	No time to clean the disposal point
Low salaries of the employees	

The Western Europe systems should offer some advantages but also some drawbacks:

Drawbacks	Advantages
High Investment cost of trucks	High efficiency of containers downloading in trucks
Too heavy to drive on existing landfills	High capacity of trucks (9-10 tons), saving the time spent in trips between the collection area and the landfill So, a low rate of fuel consumption per collected ton
	Waste transfer stations, reducing the average distance for collection trucks, waste reloaded on huge trucks to the landfills (1 driver and less fuel/ton)
Expensive containers provided by private manufacturers	Easy to carry to the truck (rolls) Easy and fast to empty in the truck No necessity to clean the disposal point
3 workers /truck	
High salaries of the employees	

The advantages of the existing system will progressively disappear with the expected economical recovery: growth of the salaries and of the fuel costs, but the decisions have to be taken for 8 years (life length of the trucks).

So a particular attention will be paid to balance the investments between a catching up of the immediate needs with existing technologies, cheap for some years but open to a quick obsolescence, and a bet on new technologies answering the needs of the future.

4.2.2 Solving the problems of renewal of vehicles and containers

The technico-economical standard is that the life length of the collection trucks is 8 years as: "*At the same time the vehicle fleet of specialised public utilities is*

obsolete, almost 75% of cars have exhausted their life-time and are to be written off from the balance sheets. Despite of the fact that the norm is 12%, only 1% of the vehicle fleet is renewed.[4]*"*

The life length of the usual containers, associated with the existing trucks, seems to be no longer than 5 years.

The situation of the local utilities is a vicious circle: bad service, low rate of payment, no money for investment. The principle of the financing autonomy of the local utilities is only a principle. In aim to break this vicious circle and to reboot a virtuous circle, an input of money must be done in the renewing of the equipment: new trucks and new containers. The subsidies of the State will be as a priority allocated to the efficiency of the waste collection.

The collection is today ensured with trucks (mainly in urban areas) and tractors + trailers (mainly in rural areas). The park of existing vehicles was asked in the Questionnaire. Some didn't answer these questions. The results are showed in.

It can be targeted to renew the existing park within a period of 5 years. The needs are per year 100 trucks and 50 tractors + trailers.

4.2.3 Increasing the capacities of the enterprises

In aim to collect 100% waste produced by the household, the collection companies or the local utilities must use the best available technologies in rural middle. So, in a small village, it's not necessarily opportune to invest in a truck, a tractor canning be used for the collection. On other respects, downtown, there will be no hesitation in some cases to experiment or to generalize new norms in a concern of economies of scale.

The declared trucks and trailers sum a volume of 7 500 m^3. Bearing in mind that some of the companies didn't provide any data this figure might increase up to 9000 m^3.

The hypothesis taken into account are: a truck can do 2 collection rounds a day (collection and trip to the landfill), and a trailer can do 1 collection round a day; the quantity of waste to be collected may be shared in 7/8 in urban areas and 1/8 in rural areas. So the objective of 100% collected is 1.8 Mt *(according to the data of General assessments and forecasts)* in 2009, so 6.4 Mm^3 (density of 0.41 for the private sector and 0.25 for the collective buildings), shared in 5.6 Mm^3 in urban areas and 800 000 m^3 in rural areas. In aim to satisfy these needs, the park of vehicles should be:

5 600 000 m^3 / 300 days / 2 rounds / 11 m^3/truck = 850 trucks

800 000 m^3 / 300 days / 1 round / 5 m^3/trailer = 530 tractors + trailers

According to the existing park, the increasing of collection capacity is (as size order) 350 trucks and 340 tractors + trailers. Taking into account the fact that a number of rayons has not provided the data about the existing park of tractors and trailers the demand for such kind of vehicles might be lower.

[4] Resolution as of March 4, 2004, N° 265, Kiev

The collection companies will have to optimise the use of the existing equipment before to envisage new investments. This passes by example by the settlement of a second crew where there's only one actually, which can double the rate of utilization of the equipment.

Nevertheless, in most cases, a program of re-equipment will be necessary, at least concerning the containers.

A modernization of the collection of the refuse-chutes is indispensable for reasons of as efficiency as hygiene: that pass by the use of roll-containers at the bottom of the columns.

4.2.4 Organisation of the enterprises

SHW collection is a specific job. The recovery of the due amounts, as far they concern a contract as a tax, is an other job. The operation of a landfill is a third one (see below).

It seems logical that municipalities pass contracts with the collection enterprises (even if that ones stay public enterprises). These contracts will contain:

- the service sold, precisely described (streets, districts, frequency of the picking up, quality of the work, …);
- the price and the conditions of payment;
- the clauses of evaluation of the service;
- the penalties to forecast in case of non-respect of the contract;
- etc.

This kind of organization supposes that the collection enterprises become independent bodies, owning their equipment, employing salaries, contracting loans, etc. These enterprises must be in condition to merge if their capacities are insufficient or in aim to realizes economies of scale.

It is also indispensable that these enterprises adopt a normative analytical accounting, integrating the assets, the financial charges, etc.

4.3 Development of sorting-recycling

4.3.1 Objective

Around 7% of the weight of the waste is actually recycled (notability glass and paper). By improvement of the collection, by experiencing the volunteer disposal of recyclable materials, by extending the network of secondary raw materials collection centres and increasing the capacities of sorting, it's to reach 12% of effective recycling in 2014.

4.3.2 Experimentation of Kramatorsk and Donetsk

A sorting facility of rough waste from three cities – Kramatorsk, Slaviansk and Drujkovka with a 100 000 tons per year capacity will be settled in Kramatorsk in 2004. It will allow to check the economical viability and the technical interest of this solution. It should allow to reach a rate of recovery of matter (recycling or composting) of 30 to 40%.

In parallel in Donetsk the private company "Istok" Ltd. carries out the construction of a waste sorting facility designed for 100 thous. tons of rough waste.

This experiment will be assessed according to the rate of effective recycling and of composting, subject to a sufficient financial efficiency. In case of success, it will be to develop the capacities of sorting of rough waste within the Donetsk Oblast.

4.3.3 Experimentation of Slaviansk

Within the framework of the Tacis project upon the initiative and with the support of the Slaviansk city administration an experiment is carried out with the inhabitants of the pilot zone aiming at selective collection of SHW. The idea of the experiment is that the inhabitants voluntary dispose glass and other types of secondary raw materials (polymeric materials, paper, metal) in specific containers (one for glass and the other one for other types of secondary raw materials) installed at specially equipped platforms. The waste from specialised containers is planned to be delivered to the Kramatorsk waste recycling plant for final sorting. At the same time this experiment should demonstrate the efficiency of sorting and rate of collection of valuable components after selective collection of waste by the inhabitants.

This rationalization of the selective collection will be assessed according to the rate of collection which will have to be superior to the one that can be seen today, to its economical efficiency and to the attitude of the population toward the project.

4.3.4 Creation of the first «wastery» in Donetsk

The wasteries are places clean and secured where the general public can bring the waste it is forbidden or not practicable to put in the bin.

An experimental wastery is proposed to be created in Donetsk, biggest urban centre of the Oblast, in aim to incite the individuals to bring there their bulk refuse and their toxics, and the craftsmen to bring their bulk or heavy refuse. The investment is several thousands UAH that should be granted by the Oblast Council and the Municipality. The operation requires the employment of at least one person for the guest. The transport and the disposal of so collected waste will also be in charge of the Municipality.

The modes of future disposal of toxic waste stay to be defined, but a treatment, even imperfect, is always preferable to a spreading in Nature.

The pilot project of wastery must be accompanied with a large campaign of promotion. This project will be assessed according to the frequenting and the quantity of brought waste.

4.3.5 Experimentation of waste room

A building yard accounting some tens of homes must can justify, in the existing economical conditions, the settlement of a kept waste room. The purpose is to improve the rate of collection of glass, paper-cardboard, toxics, etc, by calling to the public-spiritedness of the inhabitants.

The room, which has not to be necessarily expensive, could be held either by a caretaker or other person, who should be as "M./Mrs Waste" of the yard. This keeper could be paid by the sale of the materials, this wage canning be complemented by the JEK. By the way, this service could reduce the quantity of bins to be collected and justify a reduction of the contribution of the JEK to the collection.

An experiment of this concept will be developed in a sub-district of a big city. It will be assessed according to its viability and the collected quantities.

4.3.6 Waste recycling facilities

Within the programmes carried out in the Oblast (national and regional Programmes of Utilisation of Industrial and Household Waste for the Period up to 2005, the Programme of Environment Protection and Assurance of Ecological Safety of the Donetsk Oblast for 2001-2005, annual Programmes of Economic and Social Development of the Oblast, cities and districts) up to now there have been constructed the capacities for recycling of valuable components of domestic waste (see Table in 2.3.4), while a number of other activities is at the stage of implementation or planned to be implemented by 2009, also within the framework of a system of collection, sorting, transportation and utilisation of solid domestic waste established by the regional directorate "DonetskEkoKomResurcy" and other organisations.

SHW recycling projects scheduled in the Oblast (01.01.2004)	
Place and name of activities	Organisations in charge for implementation
Donetsk	
Commissioning of a unit for recycling used-up tyres	"Donbasskhimresurcy" Ltd.
Construction of a waste sorting facility in the Petrovsky sub-district	"Scientific and production firm ISTOK" Ltd.
Gorlovka	
Commissioning of a unit for recycling accumulator batteries with electrolytes	Donetsk regional directorate "DonetskEkoKomResurcy"
Debaltsevo	

Commissioning of a plant for thermochemical recycling of solid organic waste	Donetsk regional directorate "DonetskEkoKomResurcy", public utility "Pyrolysis", State Department of Ecology and Natural Resources in the Donetsk Oblast
Kramatorsk	
Construction of a unit for thermo-chemical utilisation of SHW and waste resulting from human activities as substitution fuel in the production of clinker	Open joint-stock company "Kramatorsk cement factory "Pushka"
Construction of a SHW recycling facility	Executive committees of city councils: Kramatorsk, Slaviansk, Drujkovka
Slaviansk	
Plant for recycling of PET bottles	Donetsk regional directorate "DonetskEkoKomResurcy"
Commissioning of a unit for production of foam glass from cullet	Donetsk regional directorate "DonetskEkoKomResurcy"
Various	
Implementation of collection, recycling and utilisation of SHW as secondary raw materials in the cities of Avdeyevka, Gorlovka, Donetsk, Yenakievo, Mariupol, Slaviansk, Snejnoye, Torez, Schakhtersk	Donetsk regional directorate "DonetskEkoKomResurcy"

4.3.7 Action of "DonetskEkoKomResurcy"

The Resolution of the Chairman of the Donetsk Regional State Administration as of 11.10.2002 N° 486 «On activities aimed at improvement of conditions of collection, sorting, transportation, recycling and utilization of waste as secondary raw materials», signed by V.F. Yanukovich, has defined the tasks to be solved by the Donetsk Regional Directorate "DonetskEkoKomResurcy" and local self-government bodies, which are to work together in this direction.

The activities of the Donetsk Regional Directorate "DonetskEkoKomResurcy" are based on the state and regional programmes of waste treatment, approved by the relevant resolutions of the Cabinet of Ministers of Ukraine as of 28.06.97 N° 668 with changes and addendums and decision of the Donetsk Regional Council as of 24.02.2000 N° 23/12-275.

In 2003 the Donetsk Regional Directorate "DonetskEkoKomResurcy" carried out a series of organizational activities aimed at creation of the state system of collection and recycling of solid household waste as secondary raw materials. Based on the proposals agreed with city executive committees and directorates of the regional state administration, included into the programmes of cities after having been submitted by the Donetsk Regional Directorate, there has been defined a series of environment protection activities, which have later on become a part of the Draft Programme of Economic and Social Development of the

Donetsk Oblast for 2004, sections "Environment Protection" and "Use of Secondary Raw Materials".

The Programme foresees construction of plants for recycling of secondary raw materials and implementation of a system of selective collection and recycling of solid household waste.

The total economic effect from implementation of projects will be 13 mln. UAH. In the cities of the Oblast about 440 new working places will be created.

4.3.8 Development of the recycling channels

Tacis has dressed a first inventory of the solutions of recycling and the outcomes of the recyclable materials within the Donetsk Oblast and the neighbour Oblasts. The municipalities and rayons need to get a transparent and complete information about the facilities of recycling. This inventory of the market will be published on paper and on the websites of Tacis and of the Administration.

These data constitute a help for decision for the elected, the administrations, the craftsmen, the industrialists. On the other hand, it cannot be ignored that industries which can absorb these secondary raw materials have technical requirements. These must be written under the form of contractual specifications.

4.4 Composting

4.4.1 Objective

The composting in individual housing requires that the inhabitants put away the organic waste by putting them in a special bin which will take only food waste and some paper. This bin must be covered because of odours. It must be then regularly emptied in a specific container which must itself be regularly emptied in aim to avoid odours and insects.

If an experiment must be led with a volunteer municipality, it's not yet possible to conclude about the realism of the idea to generalize such practices which are well operating only with populations very sensitive to environmental questions (Netherlands, Germany, …).

But in individual housing, the family garden can constitute a complementary incitation which may be determining. By the way it is relatively simple to self-build a composter of less than one cubic meter help with, for example, some pallets. Remaining that organic waste can amount until 60% of the total weight in rural middle, this potential is important and can constitute a non negligible conditioner for the garden.

The household composting could amount 20% of the waste produced in individual housing in 2014.

4.4.2 Promotion of household composting

Tacis 2 will be asked to take in charge a set of pilot projects in several villages. These projects must be operating for spring 2005. they will be assessed for fall 2005. a phasing of the promotion of the individual composting all over the Oblast could then be realized.

4.4.3 Experimentation of the "worm-composting"

A pilot facility of worm-composting (composting of the organic matters of the rough waste by ground worms) is on going of finalization in Svetlodarsk. This facility will have a capacity of 5 000 tons per year. It is conceivable that this process allows to get a rate of composting of about 40% with the possibility of a facilitated sorting at the end.

4.5 Improvement of the data

All the facilities used for the sorting or the disposal of waste will be equipped with a weighbridge. All data about SHW management will be expressed in mass: kilogram or ton.

5 Programme of actions concerning the disposal of ultimate waste

5.1 Resorption of the dumpsites

5.1.1 To fine all new dumpsites

Never any new dumpsite will be tolerated. Public awareness campaigns should include an invitation for the general public to report about any new dumpsite, inform about ecological consequences of the illegal disposal of SHW, explain the responsibilities for violation of environmental legislation. For this purpose it is necessary to strengthen sanitary and environmental controlling bodies as well as local administrations. The persons violating waste legislation by illegal disposal of waste should be punished also through administrative commissions created at municipalities. It might be worthwhile to create specialised subdivisions on the basis of militia bodies delegating them the powers to impose an administrative responsibility for illegal waste disposal. It can be an "environmental militia" as the one created in the city of Donetsk.

5.1.2 Mapping

It can be roughly estimated that the wild dumpsites are an amount of one million tons, shared among several hundred sites. Tacis proposed a systematic inventory entrusted to the Inspectors of Environment, which will allow to map these dumpsites and to assess the risk they represent. This inventory will allow to constitute a database and to determine then programs of Resorption-remediation, privileging the potentially most hazardous situations. In order to put illegal dumps on the map the cities are recommended to use GPS devices and based on those maps to create a regional database.

5.1.3 Programme of resorption

It is necessary to activate the work of standing commissions (regional, city and rayon ones) for treatment of abandoned waste created in accordance with the Resolution of the Cabinet of Ministers of Ukraine as of 03.08.98 №1217. Based on the results of consideration of cases of abandoned waste identification (unauthorised SDW dumps), local self-government bodies and local state administrations should decide on how to proceed. After making the inventory of unauthorised dumps and putting them on the map it is necessary to develop a programme of their liquidation considering the risk they present. The environment inspectors should study the potential risk of illegal dumps. The sites presenting the highest risk for the environment should be rehabilitated as a first priority measure.

For implementation of these works it is necessary to have some labour resources and equipment, that's why from now on one should start thinking about the relevant finances.

5.2 Organisation of the landfilling

5.2.1 Closure of existing landfills

As soon as the capacities of sanitary landfills will be available in an area, it will be to close the existing used landfills.

The method will consist in to cover them with a layer of soil (if possible clay soil), after having re-shape them with bulldozer in aim to give them soft slopes and a dome shape on which rainwater will run.

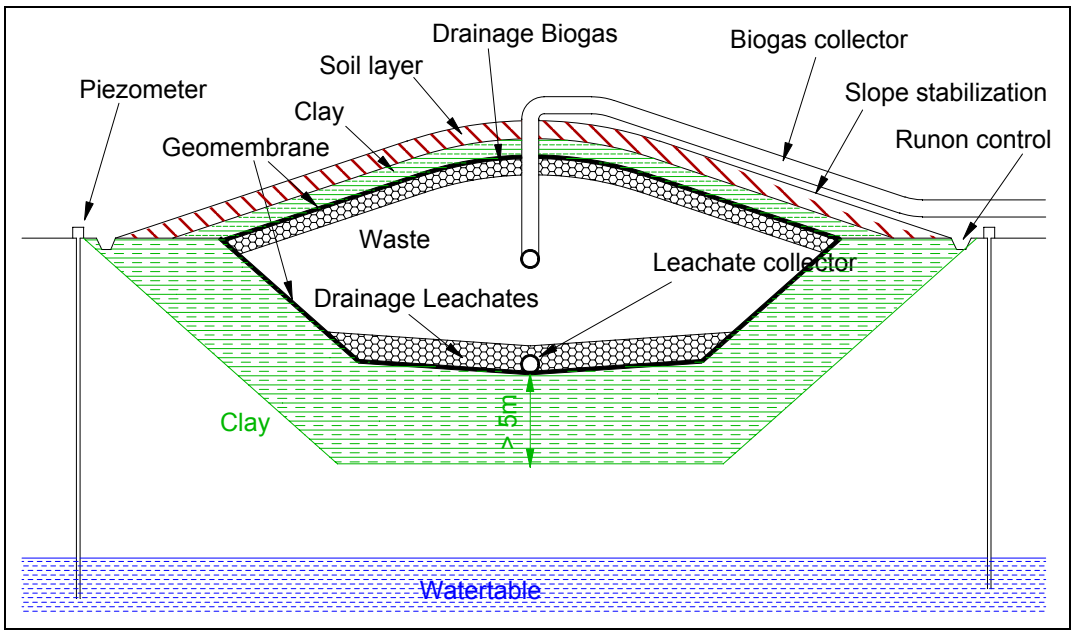
Nowadays there are more than ten SHW dumps in the Oblast which has been operated for many years by city public utilities, have exhaused their capacities and have been closed, however, no special technical measures have been undertaken for their closure. Only two city dumps (cities of Avdeyevka and Ilovaysk) have developed projects for dump closure including the measures for prevention and restriction of the negative impact on the environment.

5.2.2 Sanitary landfills

The sanitary landfill is distinguishable from a dumpsite in the way it is designed and built in aim to ensure the security of environment in short, mid and long term. Its immediate cost is higher than a single landfilling but it represents by counterpart a security insurance, including financial consideration.

Landfills are a common method of waste management for both untreated waste and the residues from treatment technologies and require careful construction as well as continuous maintenance and monitoring.

The cross-section of a completed and closed secure landfill is shown in Drawing 3. Appropriate liners to protect the groundwater from contaminated leachate, run-off control, leachate collection and treatment, monitoring wells and appropriate final cover design are integral components of an environmentally sound waste landfill.



Drawing 3 Schematic Cross-Section of a Secure Landfill

The primary concern at landfills is to prevent groundwater contamination. Design and management emphasize prevention of leachate formation and migration. Prevention methods include: (a) elimination of free liquids (liquid waste should be dewatered or solidified before placement), (b) diversion of surface waters (run-on), (c) use of relatively impermeable daily and final cover to minimize infiltration of precipitation, (d) compaction of wastes, (e) use of cells throughout the landfill, (f) collection and treatment of leachate, and (g) groundwater monitoring.

Approaches to keep water out of landfills are:

- Proper siting to avoid wetlands, flood plains and areas of high groundwater
- Diversion of surface run-on
- Minimize exposed waste surfaces
- Avoid ponding of precipitation on the site
- Proper use of intermediate cover material
- Prompt covering and closing of inactive areas
- Proper closure and post-closure management

The ideal waste landfill is one which is underlain by many meters of impermeable clay in a non-seismic zone. Waste landfills should not be placed above a draining water aquifer.

At some landfills it may be worthwhile extracting gas for use as a fuel but to be successful a number of requirements have to be met. These are:

(a) A suitable use for the gas must be identified.

(b) The landfill must have a minimum depth of at least 10 m of biodegradable material.

(c) There must be a large quantity of waste already deposited. Experience suggests that at least 0.5 million tons is required.

(d) The waste should not be too old. Wastes deposited for between 5 and 10 years seem generally to produce the highest gas yields.

(e) The water level should be at least 5m below the landfill surface.

Saturated conditions are not conducive to landfill gas collection. By these criteria, venting gas to the atmosphere or flaring will remain the only control option for most landfills. However, at some landfills it may be worthwhile utilizing the gas as a process fuel, for electricity generation or, conceivably, as a chemical feedstock.

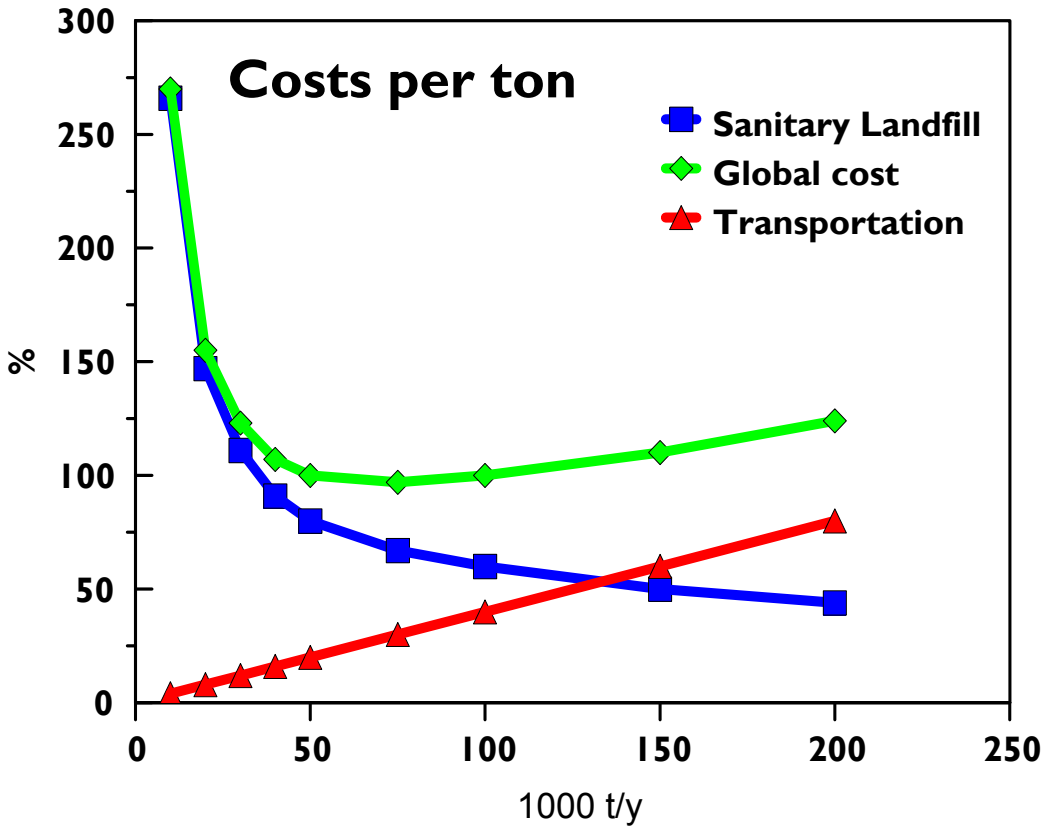
5.2.3 Global cost

Such facility requires huge investment and has non negligible operation costs.

The final result is that the modern landfill:

- represents an initial investment of (size order) 5 M€;
- has an operation cost (all charges included) of (size order) 10 €/ton.

In aim to minimize the costs, a sanitary landfill must receive the biggest possible tonnage which will improve the amortization per ton. But as more the area deserved increases, as more the average transportation costs increase. The sum of the two costs passes by a minimum as shown on *Graph 7*.



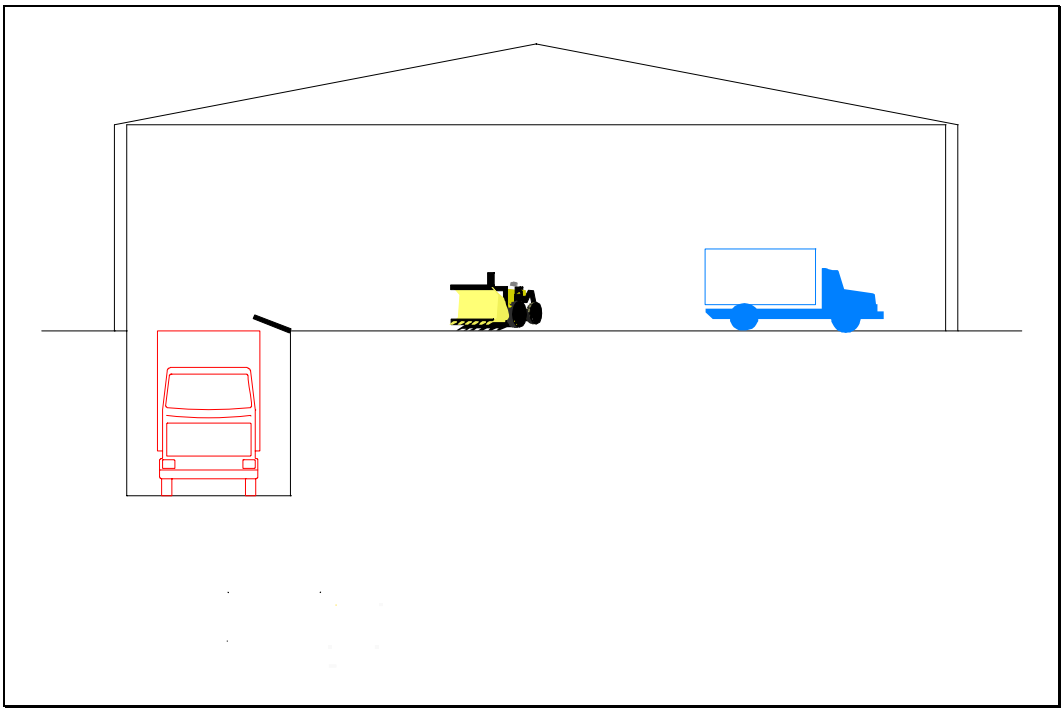
Graph 7 Global cost of landfilling/annual flow

Generally, there's a zone of optimisation of the global cost between 50 000 t/y and 200 000 t/y.

5.2.4 Transfer facilities

In aim to avoid the collection trucks have too long distances to run, it is necessary to build transfer stations in which they will unload in aim to concentrate on their main role which is to collect.

A transfer station allows then to carry higher masses of waste by a well fitted mean (trucks of higher capacity, with a driver alone, and consuming less gas par ton x kilometre, eventually by railway in some cases).



Drawing 4 Scheme of a transfer station

The transfer station is a closed building, on 2 levels:

- **Upper level**: the collection trucks download the waste on a concrete platform; the waste are spread in aim to pick up big elements as cardboards and wood pallets; then the waste are pushed in the transportation trucks; a mobile iron flap extends the platform over the transportation truck.
- **Lower level**: a corridor is sized for the transportation trucks.

Both at upper and lower levels, doors (entrance and exit) allow to close the transfer station. The water and juice of the waste are collected and connected to the public waste water network. The transfer station must be emptied during the non working days.

5.2.5 Organisation of the landfilling at the maturity of 2009

5.2.5.1 Waste production catchments

The location and the sizing of the landfills obey to some principles. It has been said that there's and optimum of size (between 50 000 and 200 000 t/y), and that the main consideration for the location is the existence of a good clay layer.

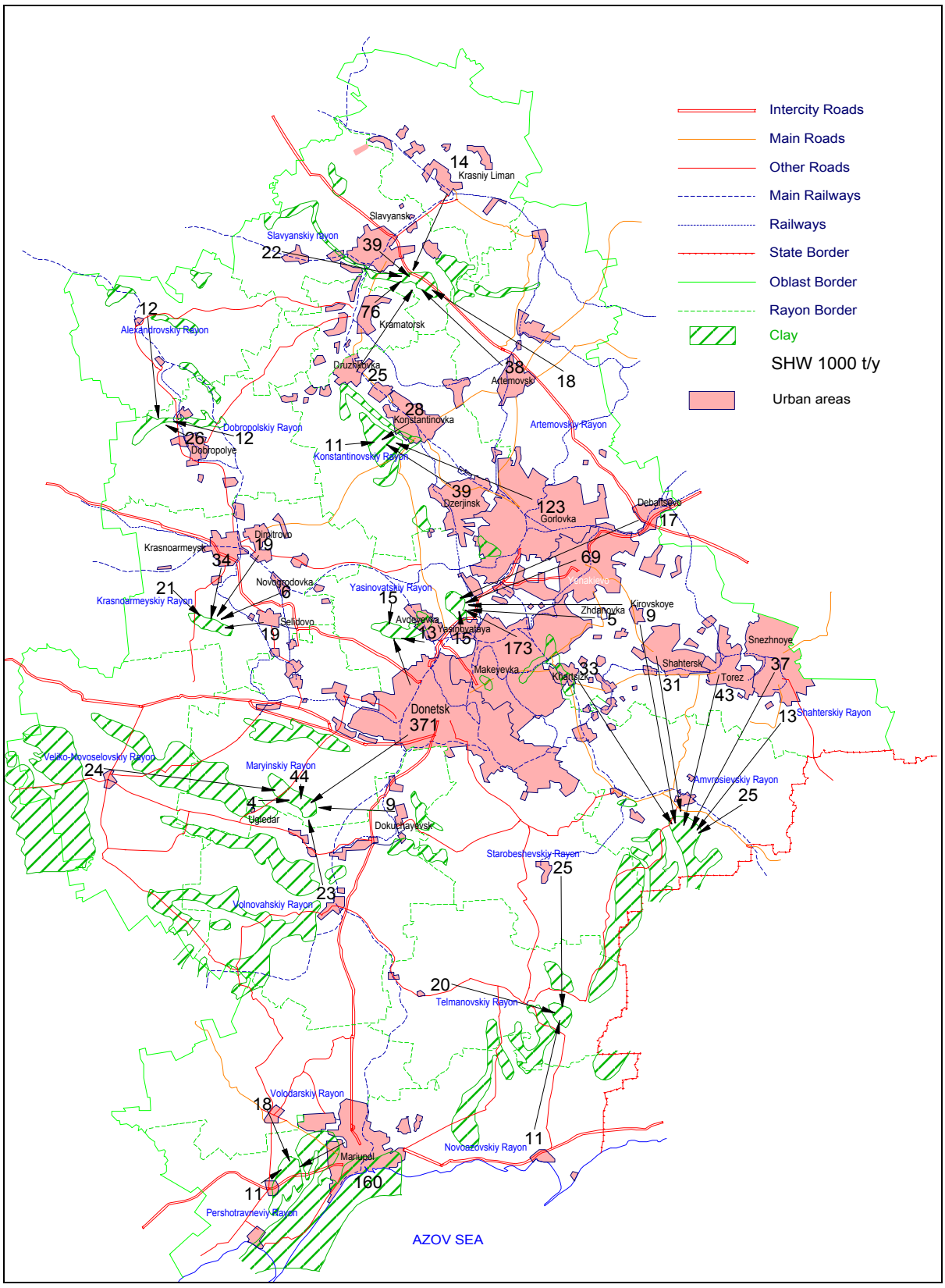
Firstly, the optimum of size can be converted in optimum of population deserved. Aiming that within the duration of the Plan, the whole population of the Oblast will be collected, with the usual rate of a production of 400 kg/inh/y, the optimum of deserved population will be for a landfill between 125 000 and 500 000 inhabitants. This number of inhabitants must be found within a radius of reasonable transportation distance. With 80 m^3 semi trailer, 70 km are a maximum.

The following Table 12 shows an example of sizing. It gives a good potential for each landfill with reasonable transportation distances. The case of the conurbation of Donetsk-Makeyevka requires 3 or 4 landfills.

Zone		Population (1000)	Area (km²)	Waste t/y
	Oblast	**4 774,4**	**26 514**	**1 799 000**
1	Krasniy Liman	53,0	1 210	14 000
1	Slavianskiy Rayon	38,4	1 274	22 000
1	Artemovsk	112,0	74	38 000
1	Artemovskiy Rayon	52,6	1 687	18 000
1	Drujkovka	74,3	46	25 000
1	Slaviansk	145,2	74	39 000
1	Kramatorsk	213,5	356	76 000
	Total	**689,0**	**4 721**	**232 000**
2	Alexandrosvskiy Rayon	22,5	1 010	12 000
2	Dobropolskiy Rayon	20,2	949	12 000
2	Dobropolye	70,4	19	26 000
	Total	**113,1**	**1 978**	**50 000**
3	Dimitrov	55,1	23	19 000
3	Krasnoarmeysk	82,2	39	34 000
3	Krasnoarmeyskiy Rayon	36,8	1 316	21 000
3	Novogrodovka	17,1	5	6 000
3	Selidovo	60,9	108	19 000
	Total	**252,1**	**1 491**	**99 000**
4	Yenakievo	157,8	425	69 000
4	Zhdanovka	14,5	2	5 000
4	Debaltsevo	51,2	38	17 000
4	Kirovskoye	30,4	7	9 000
4	Makeyevka	426,4	426	173 000
4	Yasinovataya	37,2	19	15 000
	Total	**717,5**	**917**	**288 000**

Zone		Population (1000)	Area (km²)	Waste t/y
5	Dzerjinsk	85,1	62	39 000
5	Gorlovka	309,4	423	123 000
5	Konstantinovka	93,1	66	28 000
5	Konstantinovskiy Rayon	20,5	1 172	11 000
	Total	**508,1**	**1 723**	**201 000**
6	Donetsk 1/2	513,0	286	185 000
6	Maryinskiy Rayon	89,1	1 350	44 000
6	Ugledar	16,9	5	4 000
6	Velikonovoselkovskiy Rayon	48,5	1 901	24 000
6	Volnovahskiy Rayon	91,8	1 848	23 000
	Total	**759,3**	**5 390**	**280 000**
7	Novoazovskiy Rayon	38,6	1 000	11 000
7	Starobeshevskiy Rayon	55,3	1 255	25 000
7	Telmanovskiy Rayon	34,4	1 340	20 000
	Total	**128,3**	**3 595**	**56 000**
8	Marioupol	509,8	244	160 000
8	Pershotravneviy Rayon	28,8	792	11 000
8	Volodarskiy Rayon	30,9	1 221	18 000
	Total	**569,5**	**2 257**	**189 000**
9	Amvrosievskiy Rayon	54,0	1 455	25 000
9	Khartzisk	112,3	207	33 000
9	Dokuchayevsk	25,0	118	9 000
9	Shahtersk	69,7	51	31 000
9	Shahterskiy Rayon	23,2	1 194	13 000
9	Snejnoye	80,5	189	37 000
9	Torez	93,1	105	43 000
	Total	**457,8**	**3 319**	**191 000**
10	Avdeyevka	36,9	29	13 000
10	Donetsk 1/2	513,0	285	185 000
10	Yasinovtskiy Rayon	29,8	809	15 000
	Total	**579,7**	**1 123**	**213 000**

Table 12 Proposition of zones for new sanitary landfills



Map 8 Proposition of zones for new sanitary landfills

5.2.5.2 Variants and transition

The implementation of such a Plan will be spread on a ten years. On the other hand, the increase of the collected tonnage will be also progressive and spread in time.

The first sanitary landfill of big capacity, aimed to absorb quickly a maximum of production, situated on the rail and road axle Slaviansk – Kramatorsk – Gorlovka – Donetsk could absorb the production of the big cities, then be progressively relayed with the construction of other sanitary landfills.

It is also possible to make the transfer of the waste by railways:

- A quantity of 1 Mtons per year, so 3000 tons/day, can be carried on dedicated trains (ore wagons : loading by top help with specific quays, fast unloading by bottom in a pit);
- Average speed = 25 km/h: possibility to run 450 km/day, so more than Slaviansk – Gorlovka – Donetsk – Torez – Donetsk – Marioupol go and back;
- An assessment of the transportation cost (it's necessary to ask a quotation from the railway company) and of the necessary infrastructure investments should be done.

5.2.6 Organisation of the landfilling at the maturity of 2014

A full transfer to SHW disposal at regional landfills is planned to be implemented by 2014. 8 potential sites proposed at the map for construction of regional landfills selected with consideration of geological and hydrogeological peculiarities of the Oblast are preliminary and will require additional studies and agreements by the relevant local self-government and specially authorised bodies in case the location of landfills should be finalised.

5.2.7 First regional landfill

The priority is to equip the conurbation of Donetsk-Makeyevka which is around 1,5 mln. inhabitants. The site must be enough large (100 ha). It's possible that this site receive during a period tonnage up to 600 000 t/y as some sanitary landfills in Europe.

The sanitary landfills will be linked to transfer stations which will be simultaneously implemented.

5.2.8 Inert waste landfill

The conurbation of Donetsk-Makeyevka is also the place where a lot of constructions and civil works are done. It is necessary to create an inert waste landfill in aim to dispose in the best conditions the construction waste.

These waste may be useful (in particular conditions) for the operations of a SHW sanitary landfill. So the site of this inert waste landfill should be close the SHW sanitary landfill.

5.2.9 Incineration

The programmes carried out in the Oblast foresee the construction of facilities for thermal recycling of SDW, including the one for incineration of SHW in the cities of Dimitrovo, Makeyevka, the Kramatorsk cement plant, etc. Such facilities must apply the European regulation concerning the incineration of household waste. It supposes that the emissions in atmosphere could be metered and could respect the limits of this regulation. It should be noted that these are high-cost facilities both in terms of construction and operation.

5.3 Action priorities

The priority actions by years have been defined in accordance with the objectives set for 2009 such as 100% collection of SHW and 100% collection of payments from the population at the whole territory of the Oblast as well as the tasks related to construction of regional landfills, introduction of SHW selective collection, sorting and recycling of secondary raw materials.

As the level of mechanised collection of SHW for the Oblast as a whole is low (especially in the private sector and rural areas) resulting in a low ratio of payments received for the services delivered it is proposed to gradually increase the level of SHW collection year by year (this level will be different for the private sector and collective housing) increasing as a result the ratio of payments collected. At the same time there should be created similar conditions for payments for similar services so that the amount of a payment doesn't depend on a place of residence and will gradually become the same for each person per year (both for the inhabitants of the private sector and collective housing), not exceeding during 5 years the average amount of payment per year, i.e. **UAH 12 per person.**

Action priorities are described below year by year.

5.3.1 2005

5.3.1.1 To implement the toolboxes

- Computerization of the fees
    - Creation of a regional leasing company for the financing of collection and transfer vehicles;
    - Negotiation with the IFIs of a regional investment plan of waste disposal facilities (landfills, transfer stations, sorting plants);
    - Creation of a regional guarantee fund for the loans of the municipalities and rayons in waste management.
- Systematisation of the weighbridges
    - Implementation of a weighbridge on each new waste disposal and sorting facility and on each landfill whose exploitation is maintained for the transition period of the next 5 years.

5.3.1.2 Waste collection

For the year 2005 the task for the **Oblast as a whole** is to ensure **40%** waste collected in the private sector and **60%** waste collected in the collective housing.

For this purpose it is necessary to buy trucks and tractors with trailers in aim to renew 1/5 of the existing park of vehicles and containers.

5.3.1.3 Fees

City and rayon authorities are asked to develop measures aiming at achievement of the ratio of payments in accordance with the planned level of SHW collection, i.e. not lower than the following (in some cities this level is already much higher).

Private Sector	Recovery rate	40	%
	Average fee	12,00	UAH/inh/y
Collective Housing	Recovery rate	60	%
	Average fee	6,00	UAH/inh/y

5.3.1.4 Recycling

Development of the selective collection bound to the sorting facilities of Kramatorsk, Donetsk, Khartsizsk.

5.3.2 2006

5.3.2.1 First sanitary landfill

Construction of the 1st sanitary landfill for the city of Donetsk

Construction of 6 transfer stations

Purchase of the necessary waste transfer semi-trailers

5.3.2.2 Collection

Renewing of 1/5 of the existing park of trucks and tractors + trailers

Equipment with trucks, tractors + trailers, and containers for 60% waste collected in the private sector and 70% waste collected in the collective housing

5.3.2.3 Fees

City and rayon authorities are asked to develop measures aiming at achievement of the ratio of payments in accordance with the planned level of SHW collection, i.e. not lower than the following:

Private Sector	Recovery rate	60	%
	Average fee	12,00	UAH/inh/y
Collective Housing	Recovery rate	70	%
	Average fee	7,00	UAH/inh/y

5.3.2.4 Recycling

Implementation of the selective collection and a sorting facility in Marioupol

5.3.3 2007

5.3.3.1 Second sanitary landfill

Construction of the 2nd sanitary landfill for the cities of Kramatorsk, Slaviansk, Drujkovka and the rayon of Slaviansk

Construction of 6 transfer stations

Purchase of the necessary waste transfer semi-trailers

5.3.3.2 Collection

Renewing of 1/5 of the existing park of trucks and tractors + trailers

Equipment with trucks, tractors + trailers, and containers for **80%** waste collected in the private sector and **80%** waste collected in the collective housing

5.3.3.3 Fees

It is asked to each municipality and rayon to establish a local programme aiming at the following objectives:

Private Sector	Recovery rate	80	%
	Average fee	12,00	UAH/inh/y
Collective Housing	Recovery rate	80	%
	Average fee	8,50	UAH/inh/y

5.3.3.4 Recycling

Implementation of the selective collection and a sorting facility in Makeyevka

5.3.4 2008

5.3.4.1 Third sanitary landfill

Construction of the 3rd sanitary landfill for the city of Marioupol

Construction of 4 transfer stations

Purchase of the necessary waste transfer semi-trailers

5.3.4.2 Collection

Renewing of 1/5 of the existing park of trucks and tractors + trailers

Equipment with trucks, tractors + trailers, and containers for **90%** waste collected in the private sector and **90%** waste collected in the collective housing.

5.3.4.3 Fees

It is asked to each municipality and rayon to establish a local programme aiming at the following objectives:

Private Sector	Recovery rate	90	%
	Average fee	12,00	UAH/inh/y
Collective Housing	Recovery rate	90	%
	Average fee	10,00	UAH/inh/y

5.3.4.4 Recycling

Development of the existing selective collection

5.3.5 2009

5.3.5.1 Fourth sanitary landfill

Construction of the 4th sanitary landfill for the city of Makeyevka

Construction of 6 transfer stations

Purchase of the necessary waste transfer semi-trailers

5.3.5.2 Collection

Renewing of 1/5 of the existing park of trucks and tractors + trailers

Equipment with trucks, tractors + trailers, and containers for **100%** waste collected in the private sector and **100%** waste collected in the collective housing

5.3.5.3 Fees

It is asked to each municipality and rayon to establish a local programme aiming at the following objectives:

Private Sector	Recovery rate	100	%
	Average fee	12,00	UAH/inh/y
Collective Housing	Recovery rate	100	%
	Average fee	12,00	UAH/inh/y

5.3.5.4 Recycling

Development of the existing selective collection

6 Financing, realization and follow-up of the plan

6.1 Financing of the plan

The financing system of the SHW Management must be improved in the next 5 years. It aims the objective of a self-sufficient SHWM system and the truth of costs. This objective covers 2 domains: exploitation costs and investments. To pass form the on going situation to the wished situation supposes also to manage a transition period.

6.1.1 To base the system on sound principles

6.1.1.1 Principles

The European system leans on several basic principles.

1. **Universal Service**: the picking up of the waste must be done at 100% because it's a question of public hygiene. Territorial communities should be responsible for provision of 100% of overall services (and not only for organisation of SHW collection)
2. **Solidarity at municipal size**: each one must pay the same price for the same service wherever is the place of his home. It is necessary to refuse from privileged tariffs of private sector users and from payments based on the quantity of waste collected.
3. **Equalization**: the tariff is adjusted by some "socio-economical indicators" to the situation of each home (for example: surface of the housing, level of comfort, rental value, level of incomes).
4. **Take in charge of low-income groups**: a system of subsidies (to the organization) or of allocation (to the person) compensates for the gap between the means of the person and the tariff applied to him.
5. **Separation of the functions**: the local authority establishes and recovers the fee (or the tax) of disposal of household waste; it contracts the operation with a public (local utility but with a separate accounting) or private entity.

It is what allows the local authority to assume the responsibility of the application of the previous principles.

These principles have proven, even in liberal economy, in Europe as in USA.

At least, it must be done as simple as possible. All complication entails administrative over costs and darkens the relationship between the user, the service and the authority.

6.1.1.2 Organization of the payment of the service

6.1.1.2.1 Calculation of the fees

The existing system of calculation of the fees obeys to these principles. The Ukrainian standards define the norm of production of waste of the inhabitants according to 6 categories of housing (see Table 2 Average norms of solid

domestic waste generation for residential buildings). Each self-governing body has to fix the rate by m^3 and the fees are calculated by this unit price and the norms of production of waste. It must be noticed that these norms of waste production are only recommendations for the calculation of the fees.

6.1.1.2.2 Payment of the fees

The existing system is shared between the local utilities for the private sector of housing, via direct contracts, and the JEKs which perceive the fees among the rent and other maintenance charges.

The management of the payment of the fees will be computerized with a standard software. It will allow to simplify the production and the transmission of statistics.

For the private sector, the collection of the fees will be entrusted to the Service for Communal Payments Collection. This task can go on to be entrusted to the JEKs for collective housing, and the money transferred to the Service for Communal Payments Collection.

6.1.1.2.3 Operation contracts

The Service for Communal Payments Collection will pass contracts with the operator(s) of the collection and the operator(s) of disposal. These operators can be public (as existing local utilities) or private. They may be several as for example the rough waste collection in different areas, the selective collection, the sorting of waste, the disposal in landfills, …

These contracts fix clearly the tasks to be done, the objectives of performance and the way to control that, and the price to be paid.

The operators are paid by the Service for Communal Payments Collection.

6.1.1.2.4 Subsidies

The Service for Communal Payments Collection will receive the subsidies from the state for the low income people.

Remark: the establishment of the subsidies files toward the social services must be simplified in aim to allow each one having right to benefit of it. Particularly, once registered, the beneficiary should not have to renew his file each year but to fill a simple form about the modified elements. The existing process consists in to make difficult the delivery of the right in aim do discourage the cheating. It will be to progressively pass to a system of mutual trust, guaranteed by a raising of the penalties for fraud.

6.1.2 Funding the investments

6.1.2.1 Objectives

Until now the investments have been financed only by the state and regional subsidies and the local budgets. The means are the property of the self-government bodies. They are put at disposal of the local utilities which themselves are the property of the self-government bodies.

The objective is a self sufficient system. That means that the local utilities should be managed as commercial companies, owning their means and paying them with their capital, their spared resources, or loans. It is also a condition for a fair competition with private companies providing the same services.

But it is also necessary to break the vicious circle and to reboot the investment. The SHWM projects are now (or near to be) economically viable. The funding of the first 5 year investment programme must associate grants and loans coming from the State budget, Ekofund, UkrEkoKomResurcy, IFIs.

6.1.2.2 Transition management

The prices of the contracts of the operators must cover all the costs, including direct exploitation costs, but also amortization of the investments, capital costs, provisions for remediation, margin.

The first condition is that the regular incomes of the system cover these complete costs. In this case, the investment projects should become “bankable”.

It’s necessary to make so many investments that the allocation of subsidies by the State cannot be sufficient in the term wished to apply the improvement of the SHW management.

For the big projects as the sanitary landfills and their network of transfer stations, the sorting plants, the financing can be, partially or totally, provided by International Financing Institutions as the World Bank or the EBRD. The condition is that such projects should be “bankable”. That means that the incomes should be enough to cover the reimbursements of the loans, that a first demonstration project should prove the feasibility, and that a system of warranty of the reimbursements should be set up.

6.1.2.3 Setting up a regional equalization

The finances of the local self-government bodies are not sufficient to constitute a reliable warranty for the needed loans. This problem will be solved by the creation of a Regional SHWM Warranty Fund, itself guaranteed by the State.

6.1.2.4 Management of the Ekofund

A part of the funds of Ekofund will be allocated to the Regional SHWM Warranty Fund to constitute the reserves of this fund.

6.1.2.5 Creation of a regional leasing company

The objective to collect 100% SHW supposes a quick investment in collection trucks and containers. On the other hand, the existing park of trucks and containers is exhausted.

A regional leasing company will be created whose the purpose will be to buy trucks and containers and to rent them to the local utilities.

The project of the creation of such a company will require loans from banks and IFIs, so this project must prove it’s “bankable”.

6.1.3 Legal aspects

The payment for the household waste collection and disposal is an obligation (Law on waste, Article 15, §b). The system of free contracts for the private sector will be abolished.

A particular attention will be paid to prosecute the bad payers in front he Court.

The case of the destitute will be treated between the Service for Communal Payments Collection and the social services of the municipality.

6.1.4 Financing projection

6.1.4.1 Investments

The needed investments corresponding to the described Strategic Plan are today estimated as following (see *Table 13):*

Action	Equipment	N inh. concerned	N	Unit Cost (UAH)	Amount (M UAH)	2005		2006		2007		2008		2009	
						N	(M UAH)	N	(M UAH)	N	(M UAH)	N	(M UAH)	N	(M UAH)
Weighbridges			25	150000	3,750	25	3,750								
Computerization		4 800 000	100	10000	1,000	100	1,000		0,000		0,000		0,000		0,000
Put at level of collection	Trucks	2 000 000	400	96000	38,400	80	7,680	80	7,680	80	7,680	80	7,680	80	7,680
	Tractor + trailer	200 000	180	78000	14,040	36	2,808	36	2,808	36	2,808	36	2,808	36	2,808
	Containers	2 000 000	20 000	250	5,000	4000	1,000	4000	1,000	4000	1,000	4000	1,000	4000	1,000
Development of collection	Trucks	2 200 000	450	96000	43,200	100	9,600	100	9,600	100	9,600	75	7,200	75	7,200
	Tractor + trailer	400 000	350	78000	27,300	80	6,240	80	6,240	80	6,240	60	4,680	50	3,900
	Containers	2 200 000	22 000	250	5,500	5500	1,375	5500	1,375	5500	1,375	3000	0,750	2500	0,625
Selective collection	Containers	900 000	1800	6000	10,800	300	1,800	300	1,800	400	2,400	400	2,400	400	2,400
	Trucks	900 000	10	1000000	10,000	2	2,000	2	2,000	2	2,000	2	2,000	2	2,000
	Sorting plants	900 000	2	15000000	30,000		0,000	1	15,000	1	15,000		0,000		0,000
Transfer	Semi-trailers	2 000 000	80	500 000	40,000		0,000	20	10,000	20	10,000	20	10,000	20	10,000
	Transfer station	2 000 000	22	1600000	35,200		0,000	6	9,600	6	9,600	4	6,400	6	9,600
Landfills	New	2 000 000	4	30000000	120,000		0,000	1	30,000	1	30,000	1	30,000	1	30,000
	Remediation		15	1000000	15,000	1	1	2	2	3	3	4	4	5	5
TOTAL					**399,190**		**38,253**		**99,103**		**100,703**		**78,918**		**82,213**
Funding	Loans			71,7%	286,207	50	19,127	60	59,462	70	70,492	80	63,134	90	73,992
	Grants			28,3%	112,984	50	19,127	40	39,641	30	30,211	20	15,784	10	8,221

Table 13 Investments of the Plan

As it is shown by the Table, the Plan envisages changes in the structure of the sources of financing toward the growing share of loans - up to 90% by 2009.

6.1.4.2 Resources

Out of the budget and of the grants and loans described elsewhere, the Plan can also account on the following resources (Table 14):

/thous. UAH/

Name of sources	Period when the money will be received				
	2005	2006	2007	2008	2009
Part of payments for import and production of goods in containers and packages (Resolution of the CMU as of 26.07.2001 N° 915).	6000	7000	8000	9000	10000
Part of payments for import and production of car tyres, oils, accumulators of CMU as of 17.03.2004 N° 324).	5000	10000	12000	15000	18000
Part of profit of companies engaged in collection and recycling of waste for re-investments	3000	4000	4500	5000	8000
TOTAL	14000	21000	24500	29000	36000

Table 14 Sources of financing for implementation of the Regional Plan of Solid Domestic Waste Management in the Donetsk Oblast for 2004-2009

6.1.4.3 Estimation of the average cost per inhabitant and per year within 5 and 10 years

According to the data of § *2.5.2*, the actual fees are around **12 UAH/inh/year** in private sector and **4 UAH/inh/year** in collective housing.

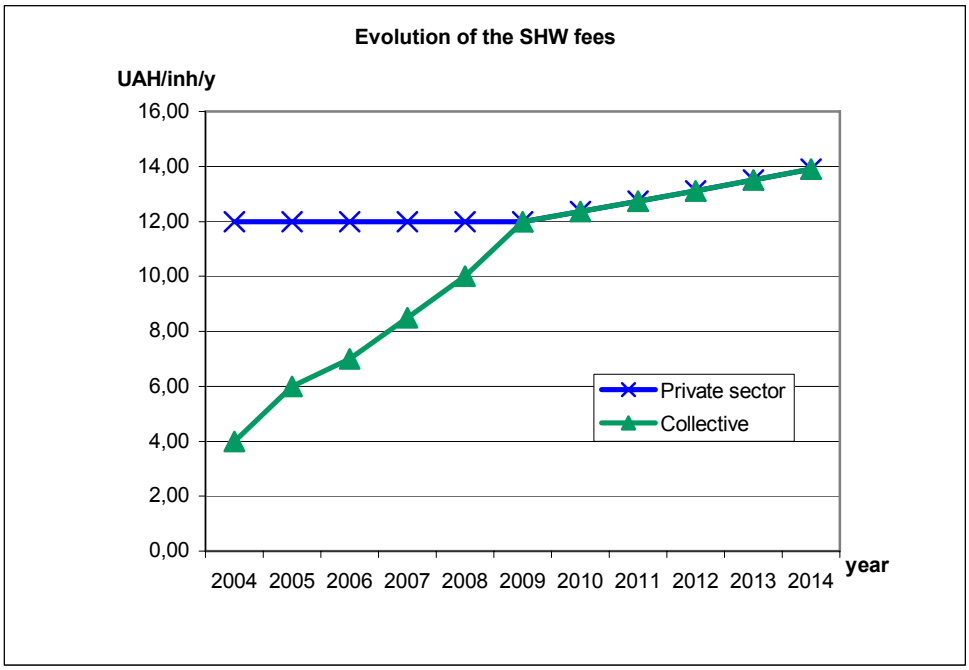
The strategy of the Plan is on both axles:

- to create during the first 5 years similar conditions for payments for similar services provided that would not depend on the place a person lives. In such a way the amount of a payment/year/person for inhabitants of the private sector and collective housing will become the same and should not exceed the average payment per year calculated on the basis of 5 years, i.e. 12 UAH/inh/year, then to increase the unique fee by 3% a year;
- within 5 years to collect 100% of the fees.

On this base, the figures should be as on Table 15 and on *Graph 8*.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Private sector											
Population M inh	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375
% paid	20	40	60	80	90	100	100	100	100	100	100
Fee UAH/inh/y	12,00	12,00	12,00	12,00	12,00	12,00	12,36	12,73	13,11	13,50	13,91
Amount M UAH	3,300	6,600	9,900	13,200	14,850	16,500	16,995	17,504	18,026	18,563	19,126
Collective H.											
Population M inh	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400
% paid	50	60	70	80	90	100	100	100	100	100	100
Fee UAH/inh/y	4,00	6,00	7,00	8,50	10,00	12,00	12,36	12,73	13,11	13,50	13,91
Amount M UAH	6,800	12,240	16,660	23,120	30,600	40,800	42,024	43,282	44,574	45,900	47,294
TOTAL M UAH	10,100	18,840	26,560	36,320	45,450	57,300	59,019	60,786	62,600	64,463	66,420

Table 15 Evolution of the fees



Graph 8 Evolution of the fees

It must be noted what represents such an effort in % of the incomes. If we take into account a progression of the wages of 10% a year, the weight of the SHW fee in proportion of the incomes should evolve as:

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Fee/incomes	0,07%	0,10%	0,11%	0,12%	0,13%	0,14%	0,13%	0,12%	0,11%	0,11%	0,10%

For comparison, the fee/incomes rate in western Europe is around 0,5%.

Thus, thanks to rationalisation of the tariff policy and the system of payments the amount of payments collected might increase by 47 mln. UAH thus increasing the incomes of companies.

6.2 Implementation of the plan

6.2.1 Status of the plan

The implementation of the Regional Plan of SHW Management is one of the ways of implementation of the national "Programme of SHW Management" where it is stated that:

"The problems existing in the field of household management require immediate solutions which should be financed both at the national and local levels. The questions concerning investments in this sector should be solved in a comprehensive manner through employment of all possibles sources of financing (national and local budgets, funds of enterprises (upon agreement) in charge of sanitary cleaning of populated areas). For this ***purpose it is necessary to develop and approve in the established order local programmes of solid household waste management*** *as well as schemes of sanitary cleaning of populated areas".*

6.2.2 Monitoring

Creation of a Waste Monitoring Centre ("Observatory of Waste") is important for assessment of the existing situation, forecasts, planning and improvement of the SHW management system.

During the first stage of the SHW management programme (2005-2006) implementation it is planned to "ensure monitoring of solid household waste".

The main role of the Waste Monitoring Centre is to collect all data about waste, to actualise them, to provide to the services all data and figures about SHW. The Centre publishes an annual report about the situation of SHW management within the Oblast.

The Tacis Programme has created the basements of the household waste monitoring for the Donetsk Oblast: waste production inquiry (Questionnaire), SHW composition study, implementation of a geodatabase, audit of the biggest SHW landfills and dumps and even an opinion poll.

According to the Article 23, Competence of the Ministry of Environment Protection and Nuclear Safety of Ukraine in the Field of Waste Treatment and its local offices, of the Law of Ukraine "On Waste", the Department of Ecology of Donetsk is in charge of the *"f) creation of information and analytical systems and data bases about volumes of waste generation and waste treatment*". So the Domestic Waste Observatory should be placed under the authority of the Department of Ecology of Donetsk.

The SHW Monitoring Centre is the permanent structure aimed to produce annual data about the household waste management. With the tools the Tacis Programme provided, it's now only necessary to allocate the budget for 3 permanent people (1 economist, 1 ecology engineer, 1 computer worker) and the necessary equipment. This SHW Monitoring Centre will be created as a department of an existing structure as the Hazardous Waste Centre or Department of Housing and Public Utility Services, etc.

6.2.3 Role of the administration

6.2.3.1 Figures and statistics

The Inspection of Environment will provide any information about the used landfills as: remaining capacity, decisions of (temporary of definitive) closure, decisions of extension, construction of new facilities…

The Regional Department of Housing and Public Utility Services and the department of waste of the State Department of Ecology will provide the monthly figures of the SHW received by each landfill.

The local self-government bodies, cities, rayons and associations of them, in charge of the SHW management, will provide the monthly figures of the collected SHW and of the fees.

The different administrations (regional level of state, regional, local) will provide any information or figures required for the updating of the data of the Plan.

6.2.3.2 Means

The Department of Housing and Public Utility Services will develop a software for the establishment of the fee statements and their recovery and the provision of the statistics asked by the different administrations. This software will be implemented in the self-government administrations and the JEKs.

The Department of Housing and Public Utility Services will equip the self-government administrations with the necessary hardware.

6.2.3.3 Financing

The Regional Administration will gather the finances necessary for the implementation of the Plan, in co-ordination with the Regional State Administration, State Department of Ecology and regional department "DonetskEkoKomResurcy".

The Regional State Administration will negotiate with the IFIs (World Bank, EBRD, EBI) the financing of an investment programme for the implementation of the Plan.

6.2.4 Role of the elected persons

6.2.4.1 Implementation of the Plan at the local level

The local self-government bodies, cities, rayons and associations of them, in charge of the SHW management, have to dress a local programme detailing how they will implement the decisions of the Plan and the relevant yearly objectives.

The same will publish a yearly report on the SHW management on their territory.

6.2.4.2 Reform

Following the reforms initiated in the Oblast in the sector of housing and public utility services and the transition to a new model of functioning local self-government bodies introduce new forms of housing maintenance through creation of associations of co-owners of multi-storied buildings and transfer residential

buildings for the maintenance by private companies. They improve the tariff policy, create Services for Communal Payments Collection, implement computerization.

6.2.5 Role of the second Tacis project

It is expected, at the date of the present document, a favourable decision for a second Tacis project in Donetsk (the tender has already been announced) aiming at the implementation of the recommendations of the first Tacis Programme for SHW management improvement.

The contractor of the Tacis 2 Programme will establish with the beneficiaries (the State Department of Ecology and the Department of Housing and Public Utility Services) an action programme sustaining the implementation of the Regional Strategic Plan.

6.2.6 Role of the Steering Committee

In order to ensure the implementation of the Regional Strategic Plan of SHW Management it is necessary to create a special permanent structure that will be responsible for organisation of co-operation and co-ordination of work of regional and local authorities, companies and organisations.

The National Programme of SHW Management (section 5) previews the following mechanism of the Programme implementation:

"In accordance with the relevant competences the implementation of the programme is to be ensured by:

- *At the national level – central body of executive power responsible for the issues of housing and public utility services*

- *At the local level – Republican Committee for Public Utility Services of the Autonomous Republic of Crimea,* ***Departments (Central Departments) of housing and public utility services of local state administrations.***

There ***can be created a Steering Committee for organisation of cooperation and coordination of activities of central and local bodies of executive power, local self-government bodies,*** *companies, institutions and organisations, not depending on their forms of ownership, which are involved into the Programme implementation as well as for correction of the measures defined by the programme by the Cabinet of Ministers of Ukraine in accordance with the available financial, material and organisational means".*

Considering the mentioned above as well as the fact that there has been created a Working Group in the oblast for development the Regional Strategic SHW Management Plan it would be advisable **to create a Steering Committee on its basis at the regional level.** It would be appropriate to study the possibility for the Steering Committee to be in charge of the Waste Monitoring Centre with permanent employees.

The Steering Committee is consulted about each project of investment (public or private) in the field of the household waste disposal facilities as sanitary landfills,

sorting plants, transfer stations, incineration plant, (non limited list). It has to verify the conformity of the project with the Regional Strategic Plan. It votes an advice which is transmitted to the Authority in charge of the permitting of the projected facility.

The Steering Committee votes each year the adoption of the annual report about SHW Management in the Oblast of Donetsk.The Steering Committee actualises the on going Strategic Plan if necessary and prepares the next Strategic Plan.

6.2.7 Update of the plan

At the end of the period of the on going Plan (2009), a report will be made and published about the execution of the Plan. This report will expose the comparison between the forecast and what has happened.

In parallel, the next Plan will be prepared in 2009 in aim to be adopted before the end of the year.

7 Global action programme of the Regional Strategic SHW Management Plan

Activitiy	Organisation in charge	Approximate implemen-tation costs, thous. UAH	Years of imple-mentation	Expected results
1	2	3	4	5
Measures for improvement of the waste collection system and storage of secondary raw materials				
Purchase of specialised vehicles for SHW collection with an annual renewal of 1/5 of the existing vehicle fleet	City executive committees, district state administrations	91600	2005-2009	Assurance of 100% SHW collection
Purchase of tractors and trailers for SHW collection with an annual renewal of 1/5 of the existing vehicle fleet	City executive committees, district state administrations	41340	2005-2009	Assurance of 100% SHW collection
Purchase of containers for SHW selective collection and replacement of old containers	City executive committees, district state administrations	21300	2005-2009	Assurance of 100% SHW collection
Purchase and installation of weighing equipment at SHW landfills/dumps which will be used during the transition period	City executive committees, district state administrations	3750	2005-2006	Improvement of the system of registration of SHW generation and transfer
Creation of an experimental site for collection and sorting of bulky and toxic waste	Donetsk city executive committee	50	2006	Introduction of the system of collection of bulky and toxic household waste
Construction of an experimental plan for SHW recycling (1st stage – a waste sorting facility)	Regional council, city executive committees of Kramatorsk, Slaviansk, Drujkovka	13175 (12 000 spent)	2002-2005	Recycling of 100 thous. tons of SHW/ year with retrieval of 15 thous. tons of secondary raw materials

1	2	3	4	5
Construction of waste sorting facilities	City executive council of Donetsk, scientific and production company "Istok" Ltd.	15000	2005	Recycling of 500 thous. tons of SHW with retrieval of 90 thous. tons of secondary raw materials
	Makeyevka city executive council	15000	2007	
	Mariupol city executive council	15000	2006	
	Khartsizsk city executive council, «Ukrecology» Ltd.	15000	2004-2005	
Extension of the network for collection and storage of secondary raw materials in the cities of Avdeyevka, Gorlovka, Donetsk, Yenakievo, Mariupol, Makeyevka, Slaviansk, Torez, Snejnoye, Schakhtersk	City executive committees, Donetsk Regional Directorate "Donetskecocom-resursu"	200	2005-2009	Storage of 10,5 thous. tons of secondary raw materials
Development and commissioning of the pilot plant for composting of SHW with the help of the Californian worms	Svetlodarsk city executive council	500	2005	Utilisation of 5 thous. tons of waste

1	2	3	4	5
Development and step-by-step implementation of individual compost technologies for organic waste in the pilot zones of the private sector	Department of Housing and Public Utility Services of the Regional State Administration, Regional Centre of Hazardous Waste Management, city executive committees, district state administrations	20	2005-2009	Utilisation of 50 000 tons of organic waste
Development and commissioning of the pilot unit for biogas collection and utilisation at SHW dumps	Donetsk city executive council	Grant	2005-2006	Utilisation of the biogas
Measures for improvement of waste disposal				
Reconstruction of existing landfills	City executive committees, district state administrations	10000	2005-2009	Disposal of 1080 thous. tons of SHW
Construction of regional landfills	Donetsk city executive council	30000	2006	Ecologically safe disposal of 640 thous. tons of SHW
	Kramatorsk city executive council	30000	2007	
	Mariupol city executive council	30000	2008	
	Makeyevka city executive council	30000	2009	
Construction of transfer stations and purchase of semi-trailers for waste transfer	Donetsk city executive council	19600	2006	Improvement of SHW collection
	Slaviansk city executive council	9600	2007	
	Mariupol city executive council	16400	2008	
	Makeyevka city executive council	19600	2009	
Closure of official dumps of increased hazard	City executive councils, district state administrations	5000	2005-2009	Improvement of the ecological situation in the region

1	2	3	4	5
Liquidation of illegal dumps	City executive councils, district state administrations		2005-2009	Improvement of the ecological situation in the region
Measures for recycling of secondary raw materials				
Construction of a unit for utilisation of SHW and waste generated by human activities during the production of clinker	Kramatorsk city executive council, open joint-stock company «KTSHK-PUSHKA»	10615	2005	Utilisation of up to 50 thous. tons/year of fuel SHW briquettes and up to 20 thous. tons/year of waste generated as a result of human activities
Construction of an experimental plant for SHW recycling (2nd stage – recycling plant)	Regional Council, city executive committees of Kramatorsk, Slaviansk, Drujkovka	3000	2006-2007	Production of goods from secondary raw materials
Construction of a unit for recycling of used-up tyres	Donetsk city executive committee, "Donbasskhim-resursu"	1290	2006-2007	Recycling of 3000 tyres per year
Construction of a unit for recycling accumulator batteries with an electrolyte	Gorlovka city executive council, Donetsk regional directorate "Donetskecocom-resursu"	4700	2006	Prevention of environment pollution by lead compounds and sulphuric acid in the amount of 5 thous. tons
Строительство комплекса по термической переработке твердых органических отходов, в т.ч. изношенных шин	Debaltsevo city executive council, Donetsk regional directorate "Donetskecocom-resursu", public utility "Pyrolysis"	4300	2005	Recycling of 12000 tons of solid organic waste
Construction of a plant for recycling used-up PET bottles	Slaviansk city executive council, Donetsk regional directorate "Donetskecocom-resursu"	17500	2005-2006	Utilisation of 5000 tons/year of used PET bottles

1	2	3	4	5
Construction of a unit for production of a foam glass from cullet	Slaviansk city executive committee, Donetsk regional directorate «Donetskecocom-resursu»	1800	2005-2006	Utilisation of 5 thous. tons of cullet
Measures for ensuring the implementation of the Plan				
Study of the question and establishment of a Steering Committee for implementation of the regional plans of SHW management in order to organise co-operation and co-ordination of the work	Regional Council, Regional State Administration		2005	Efficient implementation of the Regional Strategic Plan
Creation of the permanet structure – the centre of waste monitoring for collection and creation of SHW management database	Regional State Administration, Department of Housing and Public Utility Services	15	2005	Creation of the SHW management database
Computerisation of the system of registration of SHW collection as well as of payment collection, introduction of a uniform software	Department of Housing and Public Utility Services, district state administrations	1000	2005	Assurance of a reliable registration of SHW flows and payments for the services delivered
Development of programmes for optimisation of the tariff policy in the field of SHW management, withdrawal of the tariff for SHW collection from the apartment fee	City executive committees, district state administrations	10	2005	Optimisation of the system of payments for SHW removal

1	2	3	4	5
Организация и реализация пилотного проекта по внедрению налога на мусор в г. Димитрово	Dimitrovo city executive committee	10		Оптимизация системы оплаты за оказанные услуги по удалению ТБО
Development of general schemes of sanitary cleaning of cities and districts	City executive committees, district state administrations, regional sanitary and epidemiological services	300	2005-2008	
Study of a question about the creation of a leasing company in order to finance purchases of waste collection trucks and other vehicles	Regional State Administration, city executive committees, district state administrations		2005	Creation of conditions for companies to purchase specialised vehicles by reasonable terms
Preparation of proposals for creation of a Regional Guarantee Fund for loans provided for the field of waste management	Regional State Administration, Department of Housing and Public Utility Services, State Department of Ecology		2005	
Training (re-training) of specialists in the field of SHW management	Centre of Human Resources Professional Development of the Regional State Administration, Donetsk Subsidiary of GIPK of the Ministry of Environment and Natural Resources, Department of Housing and Public Utility Services, State Department of Ecology		Each year	Professional development of specialists in the field of SHW management

1	2	3	4	5
Development of training programmes for teachers and schoolchildren and their implementation	Central directorate of science and education of the regional state administration, Institute of post-graduate education	15	2005-2006	Raising public awareness about the problem of SHW
Development of the programme of ecological culture for the population, teaching the basics of the communal sanitary rules and propaganda of the cultural SHW management and its implementation	Regional State Administration, State Department of Ecology in the Donetsk oblast, Regional sanitary and epidemiological service	15	2005-2008	Raising public awareness about the problem of SHW
Development of the methodology of organisation of selective collection of solid domestic waste in the residential sector and at companies	Department of the Housing and Public Utility Services of the Regional State Administration, Department of Ecology, Regional Centre of Hazardous Waste Management CSD «Wind Rose»	15	2005	Implementation of SHW selective collection and making SHW management profitable
Development and implementation of measures aimed at raising the efficiency of state and public control as regards illegal SHW removal, strenghtening of functions	Regional State Administration, State Department of Ecology, Regional Epidemiological and Sanitary Service, city executive committees, district state administrations		2005-2006	
Inventarisation of illegal dumps, creation of the relevant database, cartography	City executive committees, district state administrations	20	2005	

1	2	3	4	5
Creation of the inventory of official SHW dumps with indication of their hazard	State Department of Ecology	10	2005	
To consider the question of creation of a leasing company for construction of regional SHW landfills	Regional State Administration		2005	

8 GLOSSARY

IFI	International Financing Institutions
Municipal waste	Waste in charge to the municipalities, of the same nature than household waste, but resulting of specific activities as the street cleansing, the parks and garden maintenance, the open air markets
NGO	Non-Governmental Organizations
Private sector	This denomination is used to name the sub-districts made of individual houses, generally equipped with a private garden
Remediation of landfill	Treatment of hazardous landfill, generally including operations as moving of hazardous waste, waterproofing of the bottom, treatment of leachates, treatment of biogas, etc
Sanitary Landfill	Landfill designed and built in aim to protect the environment, according to international standards and regulations
SHW	Solid Household Waste
SHWM	Solid Household Waste Management
Wastery	Facility where the inhabitants can bring all their exceptional (as which has not to be put or which cannot be put in the bin) waste (construction waste, old furniture, scrap metals, toxic waste,…) and where they are separately collected