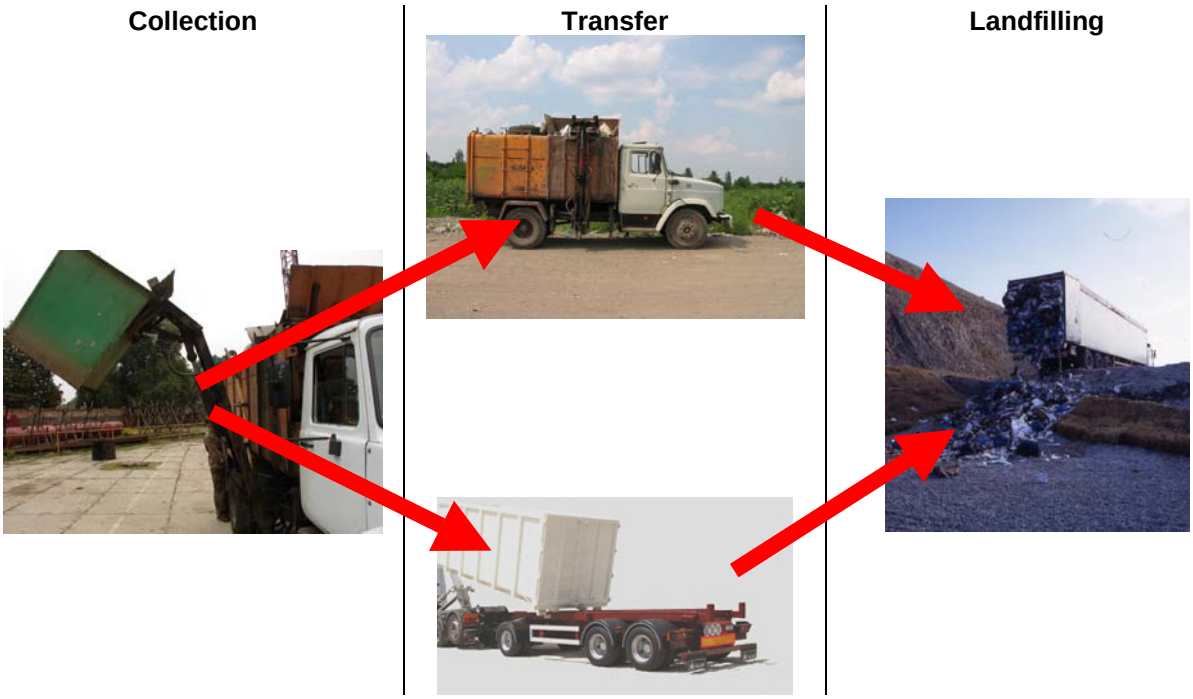
Title	Transfer Scheme for Kramatorsk Regional Landfill		
Code	080813 Kramatorsk Transfer Scheme E.doc	Date Redaction	13/08/2008
Index of Revision		Emitter	Philippe FICHAUX

Transfer Scheme for Kramatorsk Regional Landfill

1. Preamble

1.1. Principles

A regional landfill is receiving the waste from a large area. SHW may be brought by the collection trucks but a collection truck can only carry a small quantity of waste and the time spent for the transfer is not used for collection. So in EU it's usual to distinguish:



Scheme 1

Transfer is an independent function. The SHW are collected and then they must be carried to the landfill.

The transfer may be done either:

- Directly by the collection trucks
- By transfer stations and transfer trucks:
    - Normal transfer station
    - Simplified transfer station

The decision of implementation or not of transfer stations is economical: what is the cheapest? But this decision is taken for a lot of years as the economical amortization of such investments: 7-10 years for trucks, 15-20 years for constructions. So the comparison between several solutions is done on 15 years.

1.2. Scenarios

1.2.1. Parameters

Of course, nobody can say what will happen on the next 15 years if not that the prices will increase! So it's usual to assess the evolution of general inflation, energy and wages. For this study, we took:

Rate %/y	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Energy	8	8	8	8	8	8	5	5	5	5	5	5	5	5	5
Wages	20	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Inflation	10	9	8	7	6	5	4	3	2	2	2	2	2	2	2
Coefficient /2007															
Energy	1,0800	1,1664	1,2597	1,3605	1,4693	1,5869	1,6662	1,7495	1,8370	1,9289	2,0253	2,1266	2,2329	2,3445	2,4618
Wages	1,2000	1,3200	1,4520	1,5972	1,7569	1,9326	2,1259	2,3385	2,5723	2,8295	3,1125	3,4237	3,7661	4,1427	4,5570
Inflation	1,1000	1,1990	1,2949	1,3856	1,4687	1,5421	1,6038	1,6519	1,6850	1,7187	1,7530	1,7881	1,8239	1,8603	1,8976

Table 1 Forecast of inflation

1.2.2. First step

The purpose is to compare the cost of the transfer between a collection truck and a transfer system. So the first step is to determine the “collection truck”. The most spread is the KO-413. An other popular one is the KO-435. A lot of municipalities are dreaming of EU 26 tonnes standard collection truck. At least, we know that new trucks will soon appear on the market, based on a EU chassis of 10-12 tonnes capacity and with a lateral handling arm for non movables 750 litres containers. So we compare the collection cost for these 4 models: KO-413, KO-435, EU 26T, SL10T.

1.2.3. Second step

Then, it’s is supposed that the less costly truck is chosen and we compare the cost of direct transport to the landfill and throughout a transfer system.

This exercise is done for each city and settlement that will be linked to the Kramatorsk landfill for the SHWM.

1.3. Extent of the area

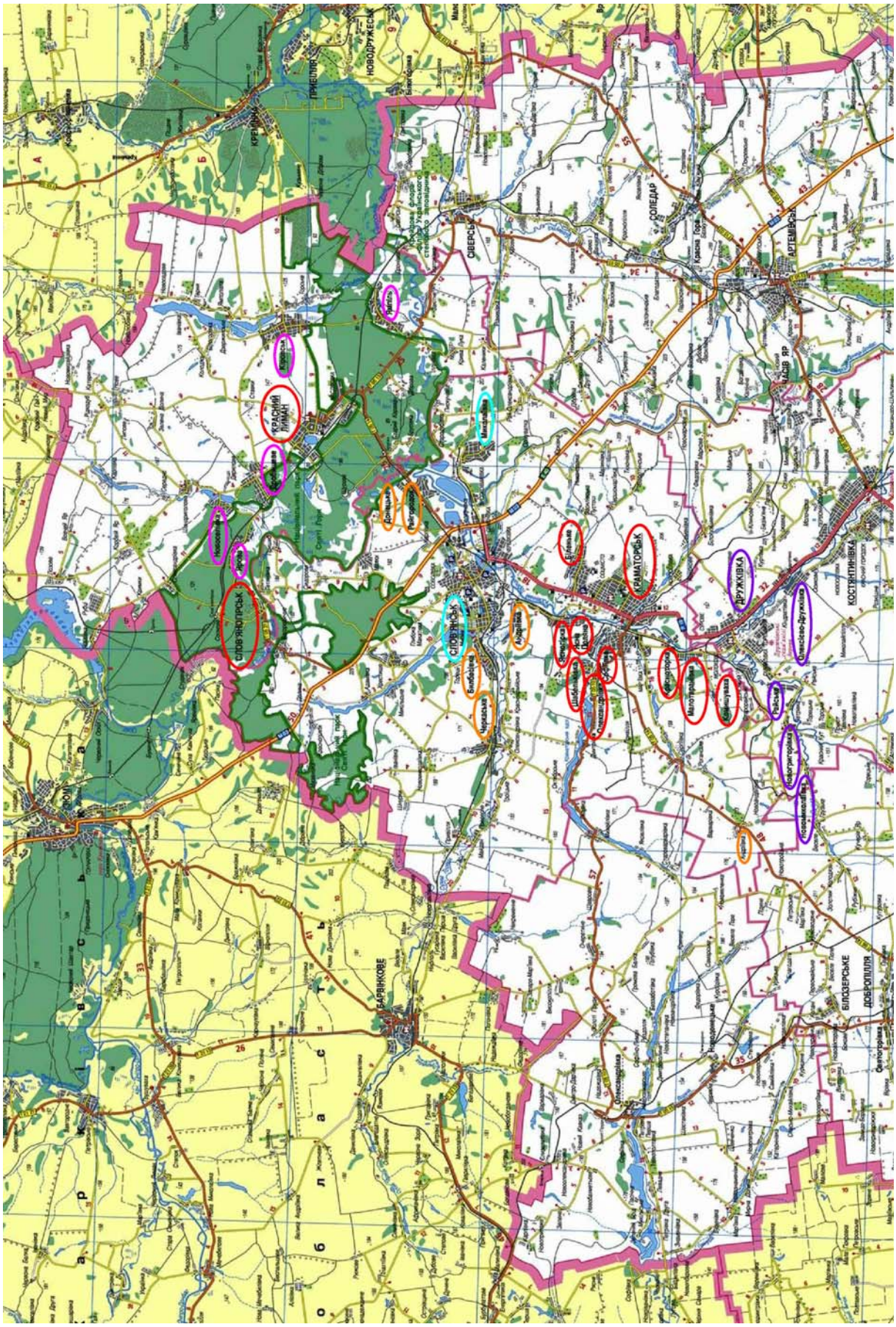
1.3.1. Population

The given figures are the following:

City/Rayon	Population	Theoretical Volume	Theoretical Mass	Tonnes /day	Tonnes /week	Volume collected 2007	Mass collected 2007
Kramatorsk	**204 106**	**295 954**	**107 283**	**289**	**47**	**360 000**	**130 500**
Kramatorsk	170 142	246 706	89 431	245			
Aleksandrovka	411	596	216		4		
Belen`koe	9 659	14 006	5 077	14			
Kamischuvaha	504	731	265		5		
Krasnotorka	3 044	4 414	1 600	4			
Malotaranovka	3 765	5 459	1 979	5			
Sofievka	861	1 248	453		9		
Schabel`kovka	4 388	6 363	2 306	6			
Yasnaya Poliyana	2 123	3 078	1 116	3	21		
Yasnogorka	8 425	12 216	4 428	12			
Miscellaneous	784	1 137	412		8		
Drujkovka	**71 945**	**104 320**	**37 816**	**100**	**23**	**76 000**	**27 550**
Drujkovka	61 893	89 745	32 533	89			
Alekseevo-Drujkovka	7 827	11 349	4 114	11			
Novogrigor`evka	384	557	202		4		
Novonikolaevka	104	151	55		1		
Raiskoe	964	1 398	507		10		
Miscellaneous	773	1 121	406		8		

Slavyansk	**141 723**	**205 498**	**74 493**	**204**	**0**	**123 000**	**44 588**
Slavyansk	120 685	174 993	63 435	174			
Nikolaevka	16 149	23 416	8 488	23			
Svyatogorsk	4 889	7 089	2 570	7			
Krasnii Liman	**25 018**	**36 276**	**13 150**	**34**	**11**	**18 800**	**6 815**
Krasnii Liman	23 947	34 723	12 587	34			
Miscellaneous	1 071	1 553	563		11		
Slavyanskii Rayon	**35 688**	**51 748**	**18 759**	**70**	**17**	**8 500**	**3 081**
Villages:	15 333	22 233	8 059	22			
Andreevka	1 025	1 486	539		10		
Bilbasovka	6 366	9 231	3 346	9			
Donetskoe	682	989	358		7		
Raigorodok	3 654	5 298	1 921	5			
Cherkasskoe	3 606	5 229	1 895	5			
Miscellaneous	20 355	29 515	10 699	29			
Krasnolimanskii Rayon	**21 395**	**31 023**	**11 246**	**47**	**0**	**5 096**	**1 847**
Villages:	10 880	15 776	5 719	16			
Drobishevoe	2 996	4 344	1 575	4			
Kirovsk	2 675	3 879	1 406	4			
Novoselovka	1 263	1 831	664	2			
Yampol`	1 982	2 874	1 042	3			
Yarova	1 964	2 848	1 032	3			
Miscellaneous	10 515	15 247	5 527	15			
TOTAL	**499 875**	**724 819**	**262 747**	**744**	**98**	**591 396**	**214 381**

Table 2 Deserved population



Map 1 Deserved settlements

1.3.2. Distances

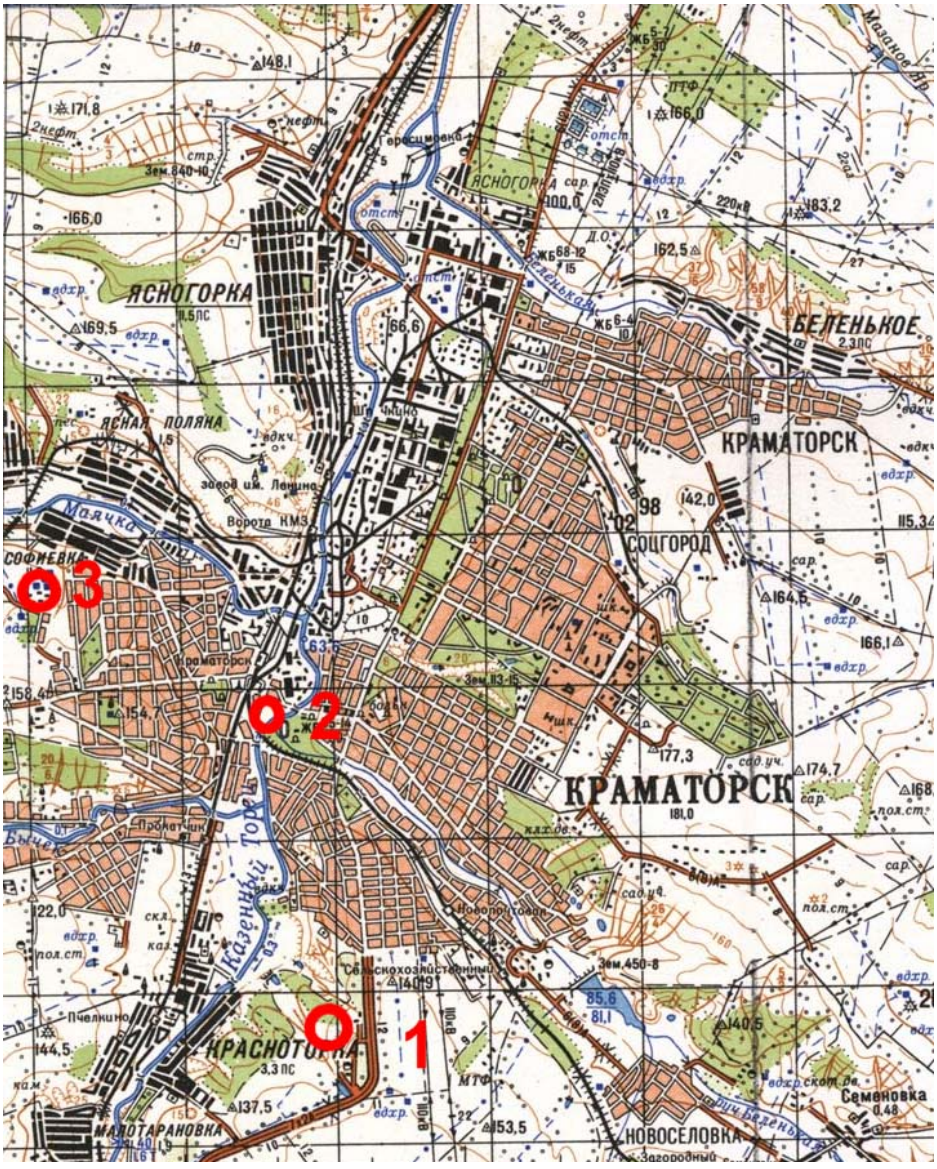
A collection truck runs an average distance for the collection, depending on the geographical extent of the territory of the city. This distance includes the trip for the collection itself, from platform to platform, and the distance between the district it works and the downloading point. The trip for collection is done under downtown circulation conditions. The trip to downloading includes a part downtown and, if, a part on the road, for instance if it downloads on the landfill.

So, for each city and each settlement, we have to assess:

- The average distance from the downloading point to the collection areas – done each time the truck is full; it may include a part downtown and a part of road;
- Eventually, the average distance from the garage (**3**) to the collection areas – done on morning for the first round;
- Eventually the distance from the downloading point to the garage – done on evening after the last round; it may include a part downtown and a part of road.

The downloading point may be either the landfill (**1**), either the transfer station (**2**).

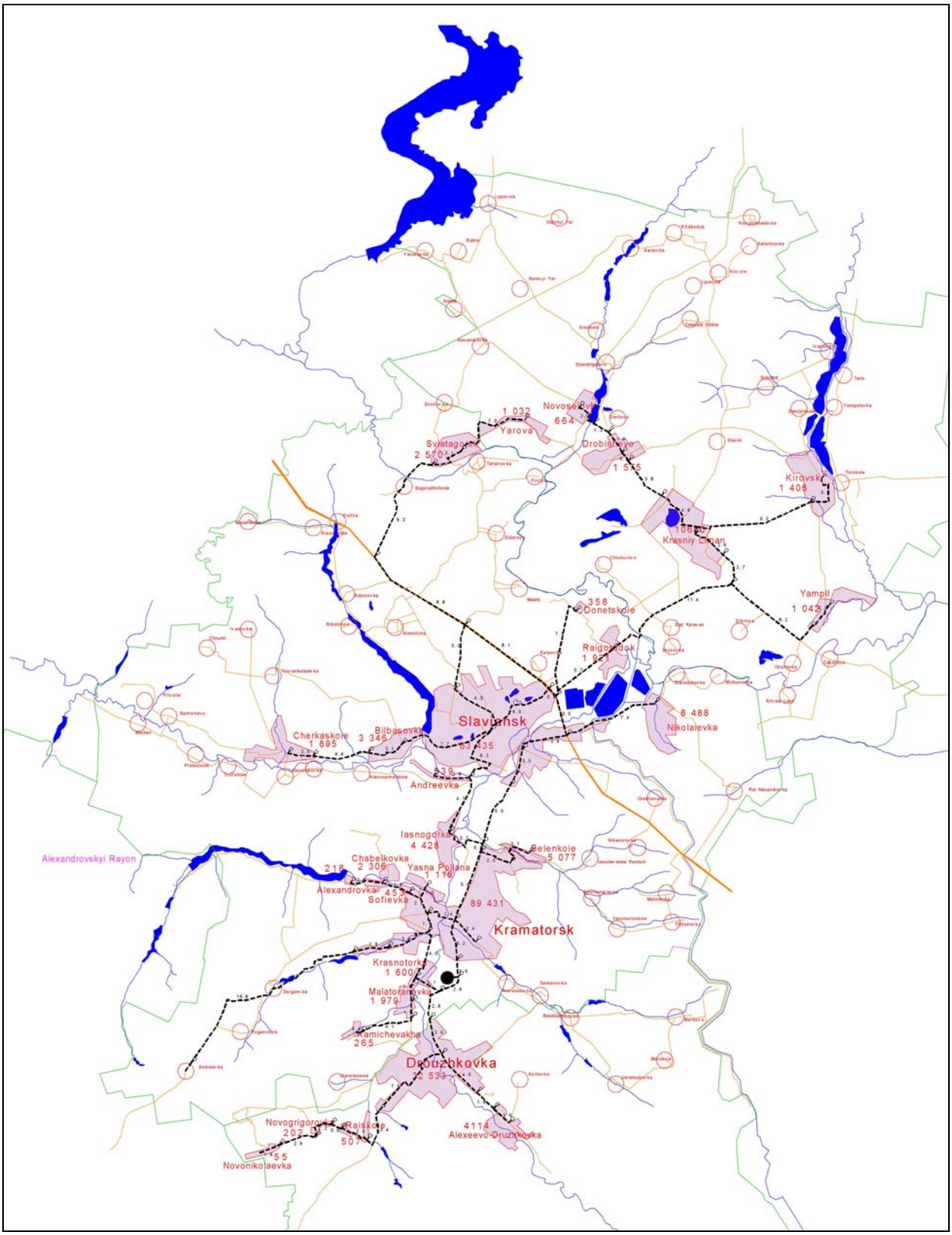
In case of transfer station, the distance to the landfill includes a part downtown and a part of road.



Map 2 Example for the calculation of distances

Peculiarities must be taken into account as railways, rivers and bridges.

2. Calculation of the average distances



Map 3 Itineraries for the calculation of distances

City/Rayon	Garage to collection		Collection to landfill		Collection to transfer station		Transfer station to landfill		Landfill to garage		Transfer station to garage	
	Road	Down-town	Road	Down-town	Road	Down-town	Road	Down-town	Road	Down-town	Road	Down-town
Kramatorsk												
Kramatorsk	0	6	2	7	0	3	4	6	2	8	0	5
Aleksandrovka	0	6	2	12					2	8		
Belen`koe	0	16	2	15	0	4	4	6	2	8	0	5
Kamischuvaha	4	12	7	8					2	8		
Krasnotorka	0	8	3	3					2	8		
Malotaranovka	0	10	3	6					2	8		
Sofievka	0	2	2	8					2	8		
Schabel`kovka	0	4	2	10					2	8		
Yasnaya Poliyana	0	2	2	8					2	8		
Yasnogorka	2	12	4	11	0	6	4	6	2	8	0	5
Miscellaneous	25	5	25	5					2	8		
Drujkovka												
Drujkovka	0	4	6	7	0	4	6	3	6	8	0	0
Alekseevo-Drujkovka	2	10	7	10					6	8		
Novogrigor`evka	4	9	10	14					6	8		
Novonikolaevka	7	10	13	17					6	8		
Raiskoe	3	7	9	13					6	8		
Miscellaneous	25	5	25	5					6	8		
Slavyansk												
Slavyansk	0	6	10	23	0	6	10	18	10	27	0	0
Nikolaevka	6	15	10	20	0	2	10	18	10	27	0	0
Svyatogorsk	23	3	36	19	23	3	10	18	10	27	0	0
Krasnii Liman												
Krasnii Liman	0	5	24	30	0	5	19	30	19	30	0	0
Miscellaneous	5	5	35	24	5	5	19	30	19	30	0	0
Slavyanskii Rayon												
Villages:												
Andreevka	1	13	7	16	1	13	10	18	10	27	0	0
Bilbasovka	0	15	8	28	0	15	10	18	10	27	0	0
Donetskoe	8	11	7	24	8	11	10	18	10	27	0	0
Raigorodok	7	11	7	23	7	11	10	18	10	27	0	0
Cherkasskoe	4	19	12	33	4	19	10	18	10	27	0	0
Miscellaneous	40	10	50	15	40	10	10	18	10	27	0	0
Krasnolimanskii Rayon												
Villages:												
Drobishevoe	4	8	25	30	4	8	30	19	30	19	0	0
Kirovsk	9	6	30	23	9	6	30	19	30	19	0	0
Novoselovka	6	11	27	32	6	11	30	19	30	19	0	0
Yampol`	11	6	27	23	11	6	30	19	30	19	0	0
Yarova	23	10	36	26	23	10	10	18	10	27	0	0
Miscellaneous	50	10	80	25	50	10	30	19	30	19	0	0

Table 3 Distances

3. Results

3.1. Group of Kramatorsk

It is supposed that the operator for the waste collection in this area is the KATP of Kramatorsk.

3.1.1. City of Kramatorsk

3.1.1.1. Organisation of the collection

The theoretical yearly tonnage is 89 431 t, so it's 245 t/day to collect.

3.1.1.2. Garage to collection

The average distance is assessed to 6 km downtown.

3.1.1.3. Collection to landfill

The average distance between the collection area and the landfill is 7 km downtown and 2 km of road.

3.1.1.4. Collection to transfer station

A scenario is to implement 3 transfer stations in the 3 main parts of the city. It should reduce the average distance between the transfer station and the collection areas to an average 3 km downtown.

3.1.1.5. Transfer station to landfill

The average distance between the transfer station and the landfill is 6 km downtown and 4 km of road.

3.1.1.6. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 2 km of road.

3.1.1.7. Transfer station to garage

In the scenario of 3 transfer stations, the average distance transfer station and garage should be 5 km downtown.

3.1.2. Aleksandrovka

3.1.2.1. Organisation of the collection

The theoretical yearly tonnage is 216 t. It doesn't justify a daily collection. It's 4 t/week to collect, so 2 rounds per week. For a so low quantity, a transfer station has no meaning. Eventually, if it is decided to implement a transfer station on this side of de City, the trucks should download there and not at the landfill.

3.1.2.2. Garage to collection

It is supposed it's collected by the KATP of Kramatorsk. So the distance from garage to collection area is assessed as 6 km downtown.

3.1.2.3. Collection to landfill

The trip crosses the territory of the city of Kramatorsk. The average distance between the collection area and the landfill is 12 km downtown and 2 km of road.

3.1.2.4. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 2 km of road.

3.1.3. Belen`koe

3.1.3.1. Organisation of the collection

The theoretical yearly tonnage is 5 077 t, so it's 14 t/day to collect.

3.1.3.2. Garage to collection

It is supposed it's collected by the KATP of Kramatorsk. So the distance from garage to collection area is assessed as 16 km downtown.

3.1.3.3. Collection to landfill

The trip crosses the territory of the city of Kramatorsk. The average distance between the collection area and the landfill is 15 km downtown and 2 km of road.

3.1.3.4. Collection to transfer station

A scenario is to implement 3 transfer stations in the 3 main parts of the city. It should reduce the average distance between the transfer station and the collection areas. Eventually, if it is decided to implement a transfer station on this side of de City, the trucks should download there and not at the landfill and the distance is assessed as an average 4 km downtown

3.1.3.5. Transfer station to landfill

The average distance between the transfer station and the landfill is 6 km downtown and 4 km of road.

3.1.3.6. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 2 km of road.

3.1.3.7. Transfer station to garage

In the scenario of 3 transfer stations, the average distance transfer station and garage should be 5 km downtown.

3.1.4. Kamischuvaha

3.1.4.1. Organisation of the collection

The theoretical yearly tonnage is 265 t. It doesn't justify a daily collection. It's 5 t/week to collect, so 2 rounds per week.

3.1.4.2. Garage to collection

It is supposed it's collected by the KATP of Kramatorsk. So the distance from garage to collection area is assessed as 12 km downtown and 4 km of road.

3.1.4.3. Collection to landfill

This settlement is close to the landfill. The average distance between the collection area and the landfill is 8 km downtown and 7 km of road.

3.1.4.4. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 2 km of road.

3.1.5. Krasnotorka

3.1.5.1. Organisation of the collection

The theoretical yearly tonnage is 1 600 t, so it's 4 t/day to collect.

3.1.5.2. Garage to collection

It is supposed it's collected by the KATP of Kramatorsk. So the distance from garage to collection area is assessed as 8 km downtown.

3.1.5.3. Collection to landfill

This settlement is close to the landfill. The average distance between the collection area and the landfill is 3 km downtown and 3 km of road.

3.1.5.4. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 2 km of road.

3.1.6. Malotaranovka

3.1.6.1. Organisation of the collection

The theoretical yearly tonnage is 1 979 t, so it's 5 t/day to collect.

3.1.6.2. Garage to collection

It is supposed it's collected by the KATP of Kramatorsk. So the distance from garage to collection area is assessed as 10 km downtown.

3.1.6.3. Collection to landfill

This settlement is close to the landfill. The average distance between the collection area and the landfill is 6 km downtown and 3 km of road.

3.1.6.4. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 2 km of road.

3.1.7. Sofievka

3.1.7.1. Organisation of the collection

The theoretical yearly tonnage is 453 t. It doesn't justify a daily collection. It's 9 t/week to collect, so 4 rounds per week. For a so low quantity, a transfer station has no meaning. Eventually, if it is decided to implement a transfer station on this side of de City, the trucks should download there and not at the landfill.

3.1.7.2. Garage to collection

It is supposed it's collected by the KATP of Kramatorsk. So the distance from garage to collection area is assessed as 2 km downtown.

3.1.7.3. Collection to landfill

The trip crosses the territory of the city of Kramatorsk. The average distance between the collection area and the landfill is 8 km downtown and 2 km of road.

3.1.7.4. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 2 km of road.

3.1.8. Schabel`kovka

3.1.8.1. Organisation of the collection

The theoretical yearly tonnage is 2 306 t, so it's 6 t/day to collect. For a so low quantity, a transfer station has no meaning. Eventually, if it is decided to implement a transfer station on this side of de City, the trucks should download there and not at the landfill.

3.1.8.2. Garage to collection

It is supposed it's collected by the KATP of Kramatorsk. So the distance from garage to collection area is assessed as 4 km downtown.

3.1.8.3. Collection to landfill

The trip crosses the territory of the city of Kramatorsk. The average distance between the collection area and the landfill is 10 km downtown and 2 km of road.

3.1.8.4. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 2 km of road.

3.1.9. Yasnaya Poliyana

3.1.9.1. Organisation of the collection

The theoretical yearly tonnage is 1 116 t, so it's 3 t/day to collect. It may be wondered if it's not better to collect 21 t/week, so 10 rounds per week. For a so low quantity, a transfer station has no meaning. Eventually, if it is decided to implement a transfer station on this side of de City, the trucks should download there and not at the landfill.

3.1.9.2. Garage to collection

It is supposed it's collected by the KATP of Kramatorsk. So the distance from garage to collection area is assessed as 2 km downtown.

3.1.9.3. Collection to landfill

The trip crosses the territory of the city of Kramatorsk. The average distance between the collection area and the landfill is 8 km downtown and 2 km of road.

3.1.9.4. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 2 km of road.

3.1.10. Yasnogorka

3.1.10.1. Organisation of the collection

The theoretical yearly tonnage is 4 428 t, so it's 12 t/day to collect.

3.1.10.2. Garage to collection

It is supposed it's collected by the KATP of Kramatorsk. So the distance from garage to collection area is assessed as 2 km downtown and 12 km of road.

3.1.10.3. Collection to landfill

The trip crosses the territory of the city of Kramatorsk. The average distance between the collection area and the landfill is 11 km downtown and 4 km of road.

3.1.10.4. Collection to transfer station

A scenario is to implement 3 transfer stations in the 3 main parts of the city. It should reduce the average distance between the transfer station and the collection areas. Eventually, if it is decided to implement a transfer station on this side of de City, the trucks should download there and not at the landfill and the distance is assessed as an average 6 km downtown

3.1.10.5. Transfer station to landfill

The average distance between the transfer station and the landfill is 6 km downtown and 4 km of road.

3.1.10.6. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 2 km of road.

3.1.10.7. Transfer station to garage

In the scenario of 3 transfer stations, the average distance transfer station and garage should be 5 km downtown.

3.1.11. Miscellaneous

3.1.11.1. Organisation of the collection

The theoretical yearly tonnage is 412 t. It doesn't justify a daily collection. It's 8 t/week to collect, so 4 rounds per week.

3.1.11.2. Garage to collection

On this extent, the average distance is assessed as 5 km downtown and 25 km of road.

3.1.11.3. Collection to landfill

On this extent, the average distance is assessed as 5 km downtown and 25 km of road.

3.1.11.4. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 2 km of road.

3.2. Group of Drujkovka

It is supposed that the operator for the waste collection in this area is the KATP of Drujkovka.

3.2.1. Drujkovka

3.2.1.1. Organisation of the collection

The theoretical yearly tonnage is 37 816 t, so it's 100 t/day to collect.

A scenario is to implement a transfer station at the garage of the KATP.

3.2.1.2. Garage to collection

The average distance from garage to collection area is assessed as 4 km downtown.

3.2.1.3. Collection to landfill

The average distance between the collection area and the landfill is 7 km downtown and 6 km of road.

3.2.1.4. Collection to transfer station

The average distance from collection to transfer station area is assessed as 4 km downtown.

3.2.1.5. Transfer station to landfill

The distance between the transfer station and the landfill is 3 km downtown and 6 km of road.

3.2.1.6. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 6 km of road.

3.2.1.7. Transfer station to garage

Null.

3.2.2. Alekseevo-Drujkovka

3.2.2.1. Organisation of the collection

The theoretical yearly tonnage is 4 114 t, so it's 11 t/day to collect. The quantity doesn't justify a specific transfer station (minimum 20 t/day). If a scenario schedules a transfer station relatively close to the trip to the landfill, the trucks should obviously use it.

3.2.2.2. Garage to collection

It is supposed it's collected by the KATP of Drujkovka. So the distance from garage to collection area is assessed as 10 km downtown and 2 km of road.

3.2.2.3. Collection to landfill

The average distance between the collection area and the landfill is 10 km downtown and 7 km of road.

3.2.2.4. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 6 km of road.

3.2.3. Novogrigor`evka

3.2.3.1. Organisation of the collection

The theoretical yearly tonnage is 202 t. It doesn't justify a daily collection. It's 4 t/week to collect, so 2 rounds per week. If a scenario schedules a transfer station relatively close to the trip to the landfill, the trucks should obviously use it.

3.2.3.2. Garage to collection

It is supposed it's collected by the KATP of Drujkovka. So the distance from garage to collection area is assessed as 9 km downtown and 4 km of road.

3.2.3.3. Collection to landfill

It is supposed it's collected by the KATP of Drujkovka. So the distance from garage to collection area is assessed as 14 km downtown and 10 km of road.

3.2.3.4. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 6 km of road.

3.2.4. Novonikolaevka

3.2.4.1. Organisation of the collection

The theoretical yearly tonnage is 55 t. It doesn't justify a daily collection. It's 1 t/week to collect, so 1 rounds per week. If a scenario schedules a transfer station relatively close to the trip to the landfill, the trucks should obviously use it.

3.2.4.2. Garage to collection

It is supposed it's collected by the KATP of Drujkovka. So the distance from garage to collection area is assessed as 10 km downtown and 7 km of road.

3.2.4.3. Collection to landfill

It is supposed it's collected by the KATP of Drujkovka. So the distance from garage to collection area is assessed as 17 km downtown and 13 km of road.

3.2.4.4. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 6 km of road.

3.2.5. Raiskoe

3.2.5.1. Organisation of the collection

The theoretical yearly tonnage is 507 t. It doesn't justify a daily collection. It's 10 t/week to collect, so 5 rounds per week. If a scenario schedules a transfer station relatively close to the trip to the landfill, the trucks should obviously use it.

3.2.5.2. Garage to collection

It is supposed it's collected by the KATP of Drujkovka. So the distance from garage to collection area is assessed as 7 km downtown and 3 km of road.

3.2.5.3. Collection to landfill

It is supposed it's collected by the KATP of Drujkovka. So the distance from garage to collection area is assessed as 13 km downtown and 9 km of road.

3.2.5.4. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 6 km of road.

3.2.6. Miscellaneous

3.2.6.1. Organisation of the collection

The theoretical yearly tonnage is 406 t. It doesn't justify a daily collection. It's 8 t/week to collect, so 4 rounds per week.

3.2.6.2. Garage to collection

On this extent, the average distance is assessed as 5 km downtown and 25 km of road.

3.2.6.3. Collection to landfill

On this extent, the average distance is assessed as 5 km downtown and 25 km of road.

3.2.6.4. Landfill to garage

The distance between the landfill and the garage is assessed to 8 km downtown and 6 km of road.

3.3. Group of Slavyansk

3.3.1. Slavyansk

3.3.1.1. Organisation of the collection

The theoretical yearly tonnage is 63 435 t, so it's 174 t/day to collect. A transfer station must be implemented. The first scenario is to implement it at the garage of the KATP.

3.3.1.2. Garage to collection

The average distance from garage to collection area is assessed as 6 km downtown.

3.3.1.3. Collection to landfill

The average distance between the collection area and the landfill is 23 km downtown and 10 km of road.

3.3.1.4. Collection to transfer station

The average distance from collection to transfer station area is assessed as 6 km downtown.

3.3.1.5. Transfer station to landfill

The distance between the transfer station and the landfill is 18 km downtown and 10 km of road.

3.3.1.6. Landfill to garage

The distance between the landfill and the garage is assessed to 27 km downtown and 10 km of road.

3.3.1.7. Transfer station to garage

Null.

3.3.2. Nikolaevka

3.3.2.1. Organisation of the collection

The theoretical yearly tonnage is 8 488 t, so it's 23 t/day to collect.

3.3.2.2. Garage to collection

The average distance from garage to collection area is assessed as 15 km downtown and 6 km of road.

3.3.2.3. Collection to landfill

The average distance between the collection area and the landfill is 18 km downtown and 10 km of road.

3.3.2.4. Collection to transfer station

It may be interesting to implement a simplified transfer station. So in that case, the average distance from collection area to transfer station is assessed as 2 km downtown.

3.3.2.5. Transfer station to landfill

The distance between the transfer station and the landfill is 20 km downtown and 10 km of road.

3.3.2.6. Landfill to garage

The distance between the landfill and the garage is assessed to 27 km downtown and 10 km of road.

3.3.2.7. Transfer station to garage

The distance between the transfer station and the garage is 13 km downtown and 6 km of road.

3.3.3. Svyatogorsk

3.3.3.1. Organisation of the collection

The theoretical yearly tonnage is 2 570 t, so it's 7 t/day to collect. By its geographical position at the North of Slavyansk, the best is to download at the transfer station of Slavyansk.

3.3.3.2. Garage to collection

It is supposed it's collected by the KATP of Slavyansk. So the distance from garage to collection area is assessed as 3 km downtown and 23 km of road.

3.3.3.3. Collection to landfill

The average distance between the collection area and the landfill is 19 km downtown and 36 km of road.

3.3.3.4. Collection to transfer station

The average distance between the collection area and the transfer station is 3 km downtown and 23 km of road.

3.3.3.5. Transfer station to landfill

The distance between the transfer station and the landfill is 18 km downtown and 10 km of road.

3.3.3.6. Landfill to garage

The distance between the landfill and the garage is assessed to 27 km downtown and 10 km of road.

3.3.3.7. Transfer station to garage

Null.

3.4. Group of Krasnyi-Liman

3.4.1. Krasnyi-Liman

3.4.1.1. Organisation of the collection

The theoretical yearly tonnage is 12 587 t, so it's 34 t/day to collect. A transfer station must be implemented. The first scenario is to implement it at the garage of the KATP.

3.4.1.2. Garage to collection

The average distance from garage to collection area is assessed as 5 km downtown.

3.4.1.3. Collection to landfill

The average distance between the collection area and the landfill is 24 km downtown and 30 km of road.

3.4.1.4. Collection to transfer station

The average distance from collection to transfer station area is assessed as 5 km downtown.

3.4.1.5. Transfer station to landfill

The distance between the transfer station and the landfill is 19 km downtown and 30 km of road.

3.4.1.6. Landfill to garage

The distance between the landfill and the garage is assessed to 19 km downtown and 30 km of road.

3.4.1.7. Transfer station to garage

Null.

3.4.2. Miscellaneous

3.4.2.1. Organisation of the collection

The theoretical yearly tonnage is 563 t. It doesn't justify a daily collection. It's 11 t/week to collect, so 5 rounds per week. The best is to download at the transfer station of the city.

3.4.2.2. Garage to collection

The average distance from garage to collection area is assessed as 5 km downtown and 5 km of road.

3.4.2.3. Collection to landfill

The average distance between the collection area and the landfill is 24 km downtown and 35 km of road.

3.4.2.4. Collection to transfer station

The average distance from collection to transfer station area is assessed as 5 km downtown and 5 km of road.

3.4.2.5. Transfer station to landfill

The distance between the transfer station and the landfill is 19 km downtown and 30 km of road.

3.4.2.6. Landfill to garage

The distance between the landfill and the garage is assessed to 19 km downtown and 30 km of road.

3.4.2.7. Transfer station to garage

Null.

3.5. Group of Slavyanskyi Rayon

3.5.1. Andreevka

3.5.1.1. Organisation of the collection

The theoretical yearly tonnage is 539 t. It doesn't justify a daily collection. It's 10 t/week to collect, so 5 rounds per week. The best is to download at the transfer station of the city.

3.5.1.2. Garage to collection

It is supposed it's collected by the KATP of Slavyansk. So the distance from garage to collection area is assessed as 13 km downtown and 1 km of road.

3.5.1.3. Collection to landfill

The average distance between the collection area and the landfill is 16 km downtown and 7 km of road.

3.5.1.4. Collection to transfer station

The average distance from collection to transfer station area is assessed as 13 km downtown and 1 km of road.

3.5.1.5. Transfer station to landfill

The distance between the transfer station and the landfill is 18 km downtown and 10 km of road.

3.5.1.6. Landfill to garage

The distance between the landfill and the garage is assessed to 27 km downtown and 10 km of road.

3.5.1.7. Transfer station to garage

3.5.2. Bilbasovka

3.5.2.1. Organisation of the collection

The theoretical yearly tonnage is 3 346 t, so it's 9 t/day to collect. By its geographical position at the North of Slavyansk, the best is to download at the transfer station of Slavyansk.

3.5.2.2. Garage to collection

It is supposed it's collected by the KATP of Slavyansk. So the distance from garage to collection area is assessed as 15 km downtown.

3.5.2.3. Collection to landfill

The average distance between the collection area and the landfill is 28 km downtown and 8 km of road.

3.5.2.4. Collection to transfer station

The average distance from collection to transfer station area is assessed as 15 km downtown.

3.5.2.5. Transfer station to landfill

The distance between the transfer station and the landfill is 18 km downtown and 10 km of road.

3.5.2.6. Landfill to garage

The distance between the landfill and the garage is assessed to 27 km downtown and 10 km of road.

3.5.2.7. Transfer station to garage

3.5.3. Donetskoe

3.5.3.1. Organisation of the collection

The theoretical yearly tonnage is 358 t. It doesn't justify a daily collection. It's 7 t/week to collect, so 3 rounds per week. The best is to download at the transfer station of the city.

3.5.3.2. Garage to collection

It is supposed it's collected by the KATP of Slavyansk. The average distance from garage to collection area is assessed as 11 km downtown and 8 km of road.

3.5.3.3. Collection to landfill

The average distance between the collection area and the landfill is 24 km downtown and 7 km of road.

3.5.3.4. Collection to transfer station

The average distance from collection to transfer station area is assessed as 11 km downtown and 8 km of road.

3.5.3.5. Transfer station to landfill

The distance between the transfer station and the landfill is 18 km downtown and 10 km of road.

3.5.3.6. Landfill to garage

The distance between the landfill and the garage is assessed to 27 km downtown and 10 km of road.

3.5.3.7. Transfer station to garage

Null.

3.5.4. Raigorodok

3.5.4.1. Organisation of the collection

The theoretical yearly tonnage is 1 921 t, so it's 5 t/day to collect. By its geographical position at the North of Slavyansk, the best is to download at the transfer station of Slavyansk.

3.5.4.2. Garage to collection

It is supposed it's collected by the KATP of Slavyansk. The average distance from garage to collection area is assessed as 11 km downtown and 7 km of road.

3.5.4.3. Collection to landfill

The average distance between the collection area and the landfill is 23 km downtown and 7 km of road.

3.5.4.4. Collection to transfer station

The average distance from collection to transfer station area is assessed as 11 km downtown and 7 km of road.

3.5.4.5. Transfer station to landfill

The distance between the transfer station and the landfill is 18 km downtown and 10 km of road.

3.5.4.6. Landfill to garage

The distance between the landfill and the garage is assessed to 27 km downtown and 10 km of road.

3.5.4.7. Transfer station to garage

Null.

3.5.5. Cherkasskoe

3.5.5.1. Organisation of the collection

The theoretical yearly tonnage is 1 895 t, so it's 5 t/day to collect. By its geographical position at the North of Slavyansk, the best is to download at the transfer station of Slavyansk.

3.5.5.2. Garage to collection

It is supposed it's collected by the KATP of Slavyansk. So the distance from garage to collection area is assessed as 19 km downtown and 4 km of road.

3.5.5.3. Collection to landfill

The average distance between the collection area and the landfill is 33 km downtown and 12 km of road.

3.5.5.4. Collection to transfer station

The average distance from collection to transfer station area is assessed as 19 km downtown and 4 km of road.

3.5.5.5. Transfer station to landfill

The distance between the transfer station and the landfill is 18 km downtown and 10 km of road.

3.5.5.6. Landfill to garage

The distance between the landfill and the garage is assessed to 27 km downtown and 10 km of road.

3.5.5.7. Transfer station to garage

Null.

3.5.6. Miscellaneous

3.5.6.1. Organisation of the collection

The theoretical yearly tonnage is 10 699 t. It's 29 t/day to collect and a peculiar programme of daily collection must be dressed with villages collected 1/day or 3/week, or 2/week or 1/week.

3.5.6.2. Garage to collection

It is supposed it's collected by the KATP of Slavyansk. So the average distance from garage to collection area is assessed as 10 km downtown and 40 km of road.

3.5.6.3. Collection to landfill

The average distance between the collection area and the landfill is 15 km downtown and 50 km of road.

3.5.6.4. Collection to transfer station

The average distance from collection to transfer station area is assessed as 10 km downtown and 40 km of road.

3.5.6.5. Transfer station to landfill

The distance between the transfer station and the landfill is 18 km downtown and 10 km of road.

3.5.6.6. Landfill to garage

The distance between the landfill and the garage is assessed to 27 km downtown and 10 km of road.

3.5.6.7. Transfer station to garage

Null.

3.6. Groups of Krasnolimanskii Rayon

3.6.1. Drobishevoe

3.6.1.1. Organisation of the collection

The theoretical yearly tonnage is 1 575 t, so it's 4 t/day to collect. By its geographical position at the North of Slavyansk, the best is to download at the transfer station of Slavyansk.

3.6.1.2. Garage to collection

It is supposed it's collected by the KATP of Krasnyi Liman. So the distance from garage to collection area is assessed as 8 km downtown and 4 km of road.

3.6.1.3. Collection to landfill

The average distance between the collection area and the landfill is 30 km downtown and 25 km of road.

3.6.1.4. Collection to transfer station

The average distance between the collection area and the transfer station is 8 km downtown and 4 km of road.

3.6.1.5. Transfer station to landfill

The distance between the transfer station and the landfill is 19 km downtown and 30 km of road.

3.6.1.6. Landfill to garage

The distance between the landfill and the garage is assessed to 19 km downtown and 30 km of road.

3.6.1.7. Transfer station to garage

Null.

3.6.2. Kirovsk

3.6.2.1. Organisation of the collection

The theoretical yearly tonnage is 1 406 t, so it's 4 t/day to collect. By its geographical position at the North of Slavyansk, the best is to download at the transfer station of Slavyansk.

3.6.2.2. Garage to collection

It is supposed it's collected by the KATP of Krasnyi Liman. So the distance from garage to collection area is assessed as 6 km downtown and 9 km of road.

3.6.2.3. Collection to landfill

The average distance between the collection area and the landfill is 23 km downtown and 30 km of road.

3.6.2.4. Collection to transfer station

The average distance between the collection area and the transfer station is 6 km downtown and 9 km of road.

3.6.2.5. Transfer station to landfill

The distance between the transfer station and the landfill is 19 km downtown and 30 km of road.

3.6.2.6. Landfill to garage

The distance between the landfill and the garage is assessed to 19 km downtown and 30 km of road.

3.6.2.7. Transfer station to garage

Null.

3.6.3. Novoselovka

3.6.3.1. Organisation of the collection

The theoretical yearly tonnage is 664 t, so it's 2 t/day to collect. By its geographical position at the North of Slavyansk, the best is to download at the transfer station of Slavyansk.

3.6.3.2. Garage to collection

It is supposed it's collected by the KATP of Krasnyi Liman. So the distance from garage to collection area is assessed as 11 km downtown and 6 km of road.

3.6.3.3. Collection to landfill

The average distance between the collection area and the landfill is 32 km downtown and 27 km of road.

3.6.3.4. Collection to transfer station

The average distance between the collection area and the transfer station is 11 km downtown and 6 km of road.

3.6.3.5. Transfer station to landfill

The distance between the transfer station and the landfill is 19 km downtown and 30 km of road.

3.6.3.6. Landfill to garage

The distance between the landfill and the garage is assessed to 19 km downtown and 30 km of road.

3.6.3.7. Transfer station to garage

Null.

3.6.4. Yampol`

3.6.4.1. Organisation of the collection

The theoretical yearly tonnage is 1 042 t, so it's 3 t/day to collect. By its geographical position at the North of Slavyansk, the best is to download at the transfer station of Slavyansk.

3.6.4.2. Garage to collection

It is supposed it's collected by the KATP of Krasnyi Liman. So the distance from garage to collection area is assessed as 6 km downtown and 11 km of road.

3.6.4.3. Collection to landfill

The average distance between the collection area and the landfill is 23 km downtown and 27 km of road.

3.6.4.4. Collection to transfer station

The average distance between the collection area and the transfer station is 6 km downtown and 11 km of road.

3.6.4.5. Transfer station to landfill

The distance between the transfer station and the landfill is 19 km downtown and 30 km of road.

3.6.4.6. Landfill to garage

The distance between the landfill and the garage is assessed to 19 km downtown and 30 km of road.

3.6.4.7. Transfer station to garage

Null.

3.6.5. Yarova

3.6.5.1. Organisation of the collection

The theoretical yearly tonnage is 1 032 t, so it's 3 t/day to collect. By its geographical position at the North of Slavyansk, the best is to download at the transfer station of Slavyansk.

3.6.5.2. Garage to collection

It is supposed it's collected by the KATP of Slavyansk. So the distance from garage to collection area is assessed as 10 km downtown and 23 km of road.

3.6.5.3. Collection to landfill

The average distance between the collection area and the landfill is 26 km downtown and 36 km of road.

3.6.5.4. Collection to transfer station

The average distance between the collection area and the transfer station is 10 km downtown and 23 km of road.

3.6.5.5. Transfer station to landfill

The distance between the transfer station and the landfill is 18 km downtown and 10 km of road.

3.6.5.6. Landfill to garage

The distance between the landfill and the garage is assessed to 27 km downtown and 10 km of road.

3.6.5.7. Transfer station to garage

Null.

3.6.6. Miscellaneous

3.6.6.1. Organisation of the collection

The theoretical yearly tonnage is 5 527 t. It's 15 t/day to collect and a peculiar programme of daily collection must be dressed with villages collected 1/day or 3/week, or 2/week or 1/week. The best is to download at the transfer station of Krasnyi Liman.

3.6.6.2. Garage to collection

It is supposed it's collected by the KATP of Krasnyi Liman. So the distance from garage to collection area is assessed as 6 km downtown and 11 km of road.

3.6.6.3. Collection to landfill

The average distance between the collection area and the landfill is 25 km downtown and 80 km of road.

3.6.6.4. Collection to transfer station

The average distance between the collection area and the transfer station is 10 km downtown and 50 km of road.

3.6.6.5. Transfer station to landfill

The distance between the transfer station and the landfill is 19 km downtown and 30 km of road.

3.6.6.6. Landfill to garage

The distance between the landfill and the garage is assessed to 19 km downtown and 30 km of road.

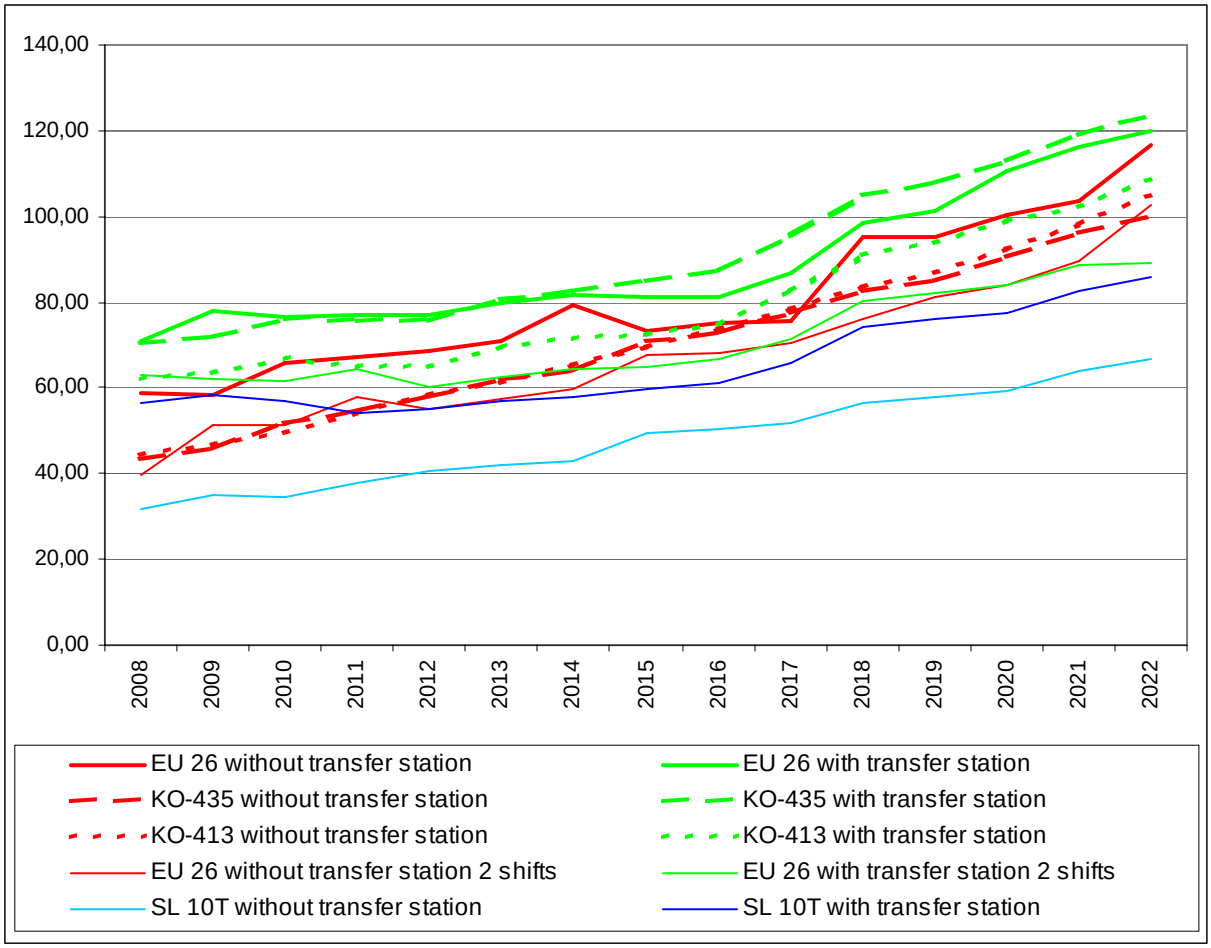
3.6.6.7. Transfer station to garage

Null.

4. Collection

4.1. Group of Kramatorsk

4.1.1. Kramatorsk



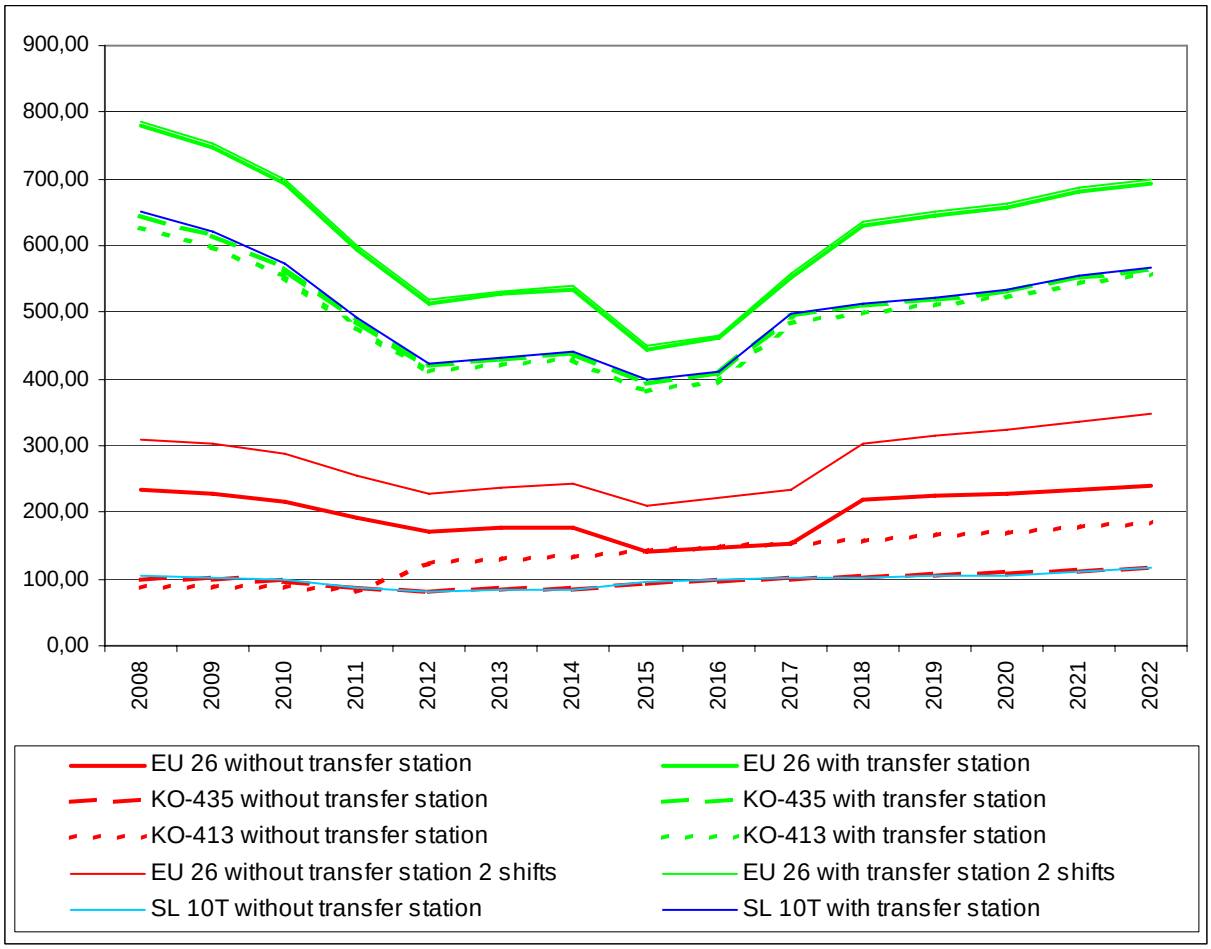
Graph 1 Global cost per tonne of collection + transfer

On the long term, the less costly is the solution of SL10T without transfer station and the second one is SL10T with 3 transfer stations in the 3 parts of the city.

4.1.2. Aleksandrovka

The calculation is not significant for 411 inhabitants.

4.1.3. Belen`koe



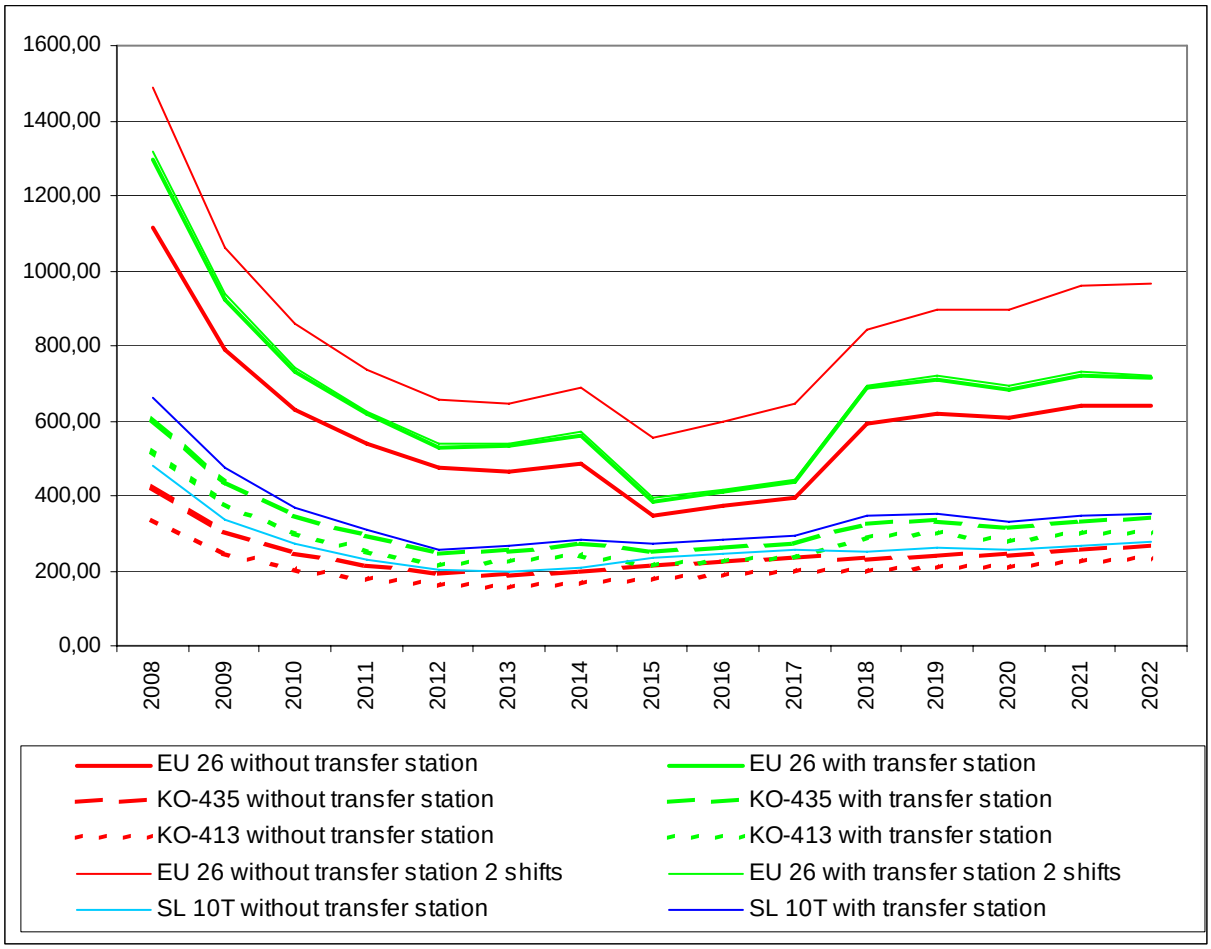
Graph 2 Global cost per tonne of collection + transfer

On the long term, the less costly is the solution of SL10T without transfer station and the second one is KO-435 without transfer station.

4.1.4. Kamischuvaha

The calculation is not significant for 504 inhabitants.

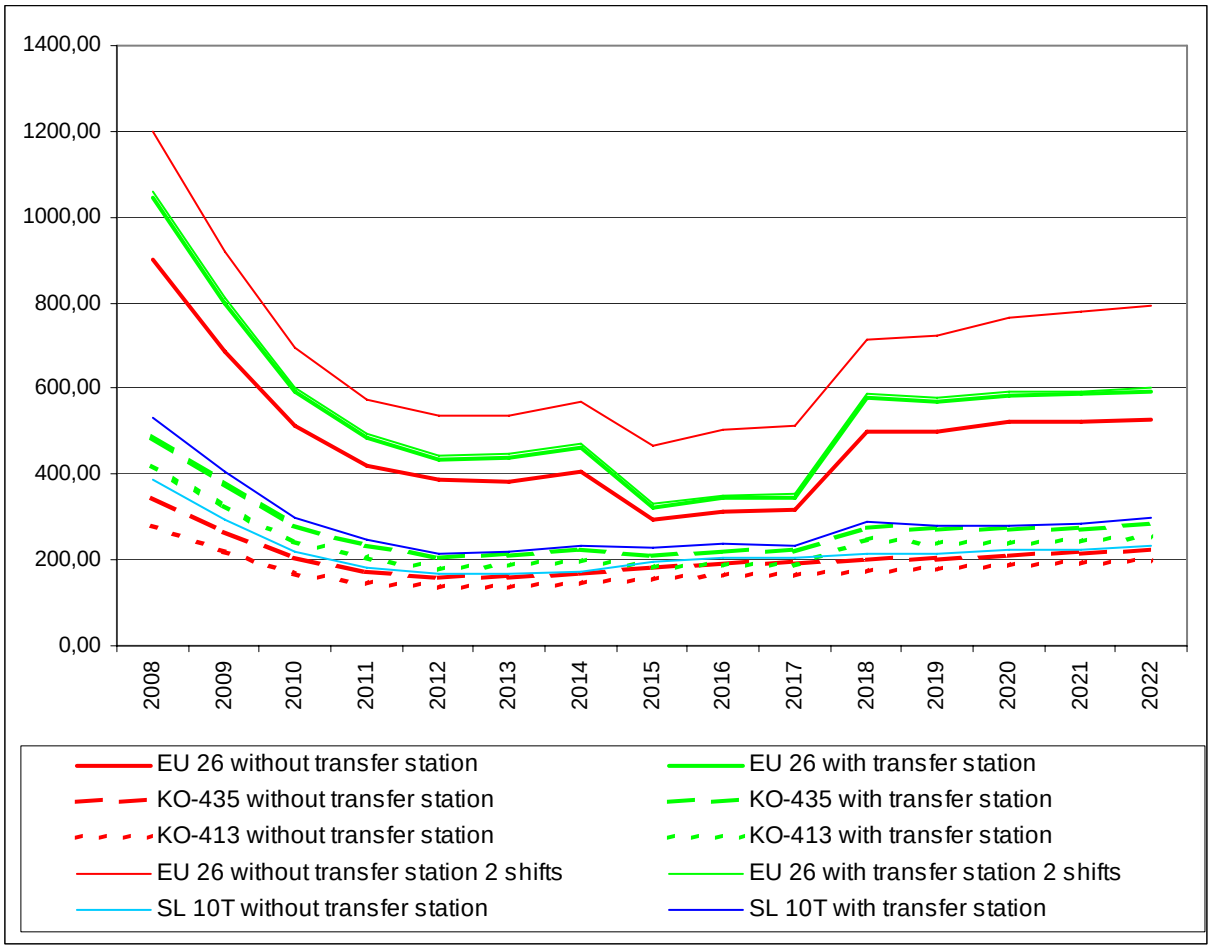
4.1.5. Krasnotorka



Graph 3 Global cost per tonne of collection + transfer

On the long term, the less costly are the solutions of KO-413, KO-435 and SL10T without transfer station.

4.1.6. Malotaranovka



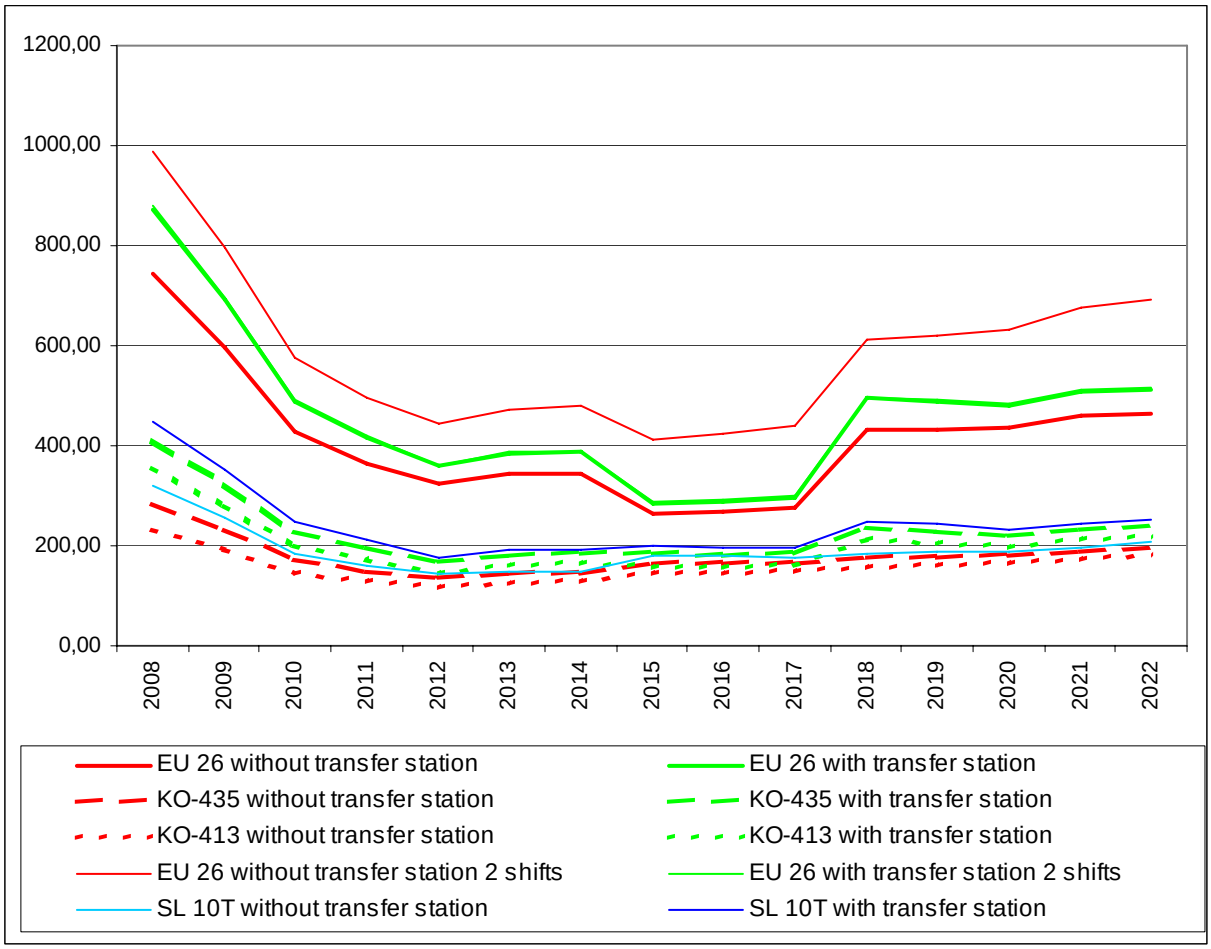
Graph 4 Global cost per tonne of collection + transfer

On the long term, the less costly are the solutions of KO-413, KO-435 and SL10T without transfer station.

4.1.7. Sofievka

The calculation is not significant for 861 inhabitants.

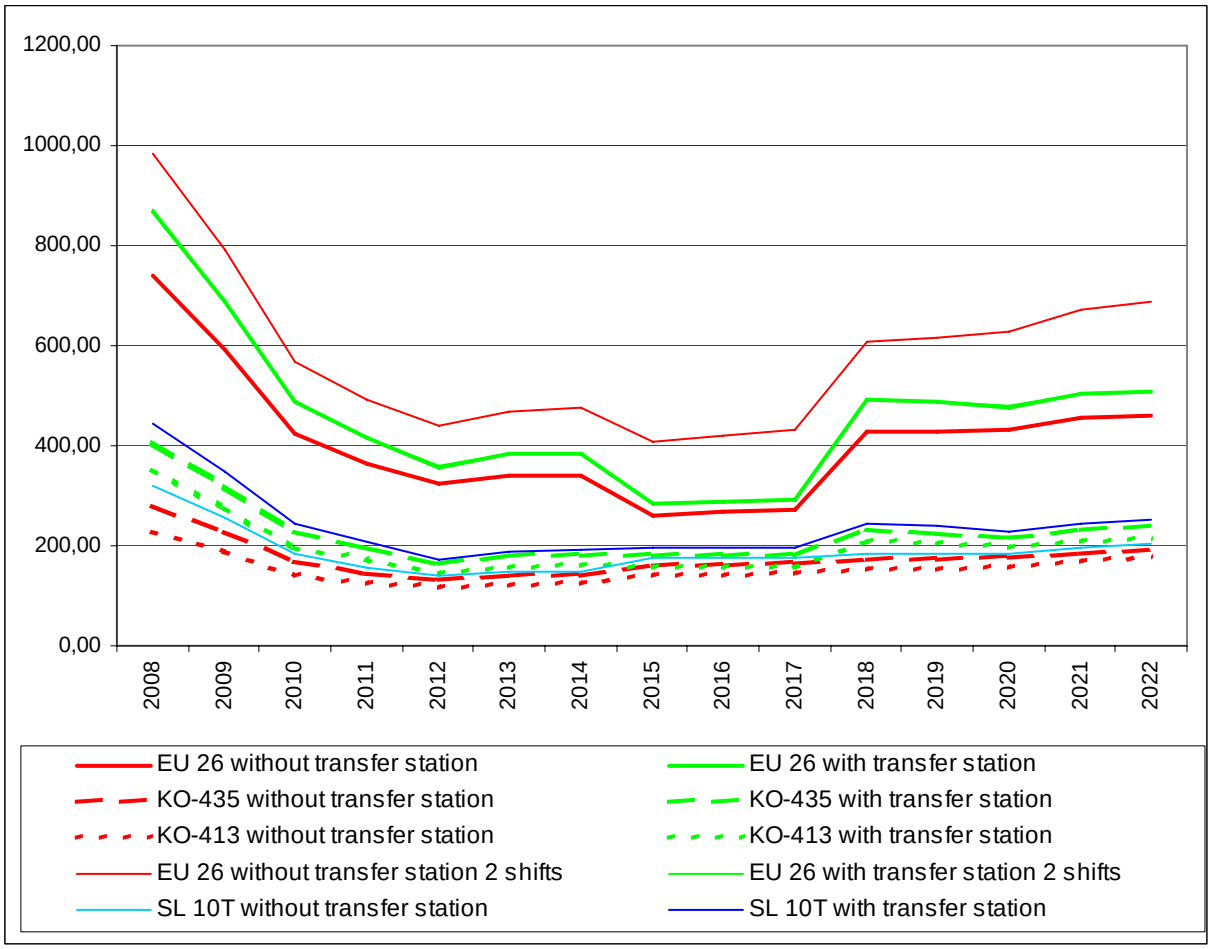
4.1.8. Schabel`kovka



Graph 5 Global cost per tonne of collection + transfer

On the long term, the less costly are the solutions of KO-413, KO-435 and SL10T without transfer station.

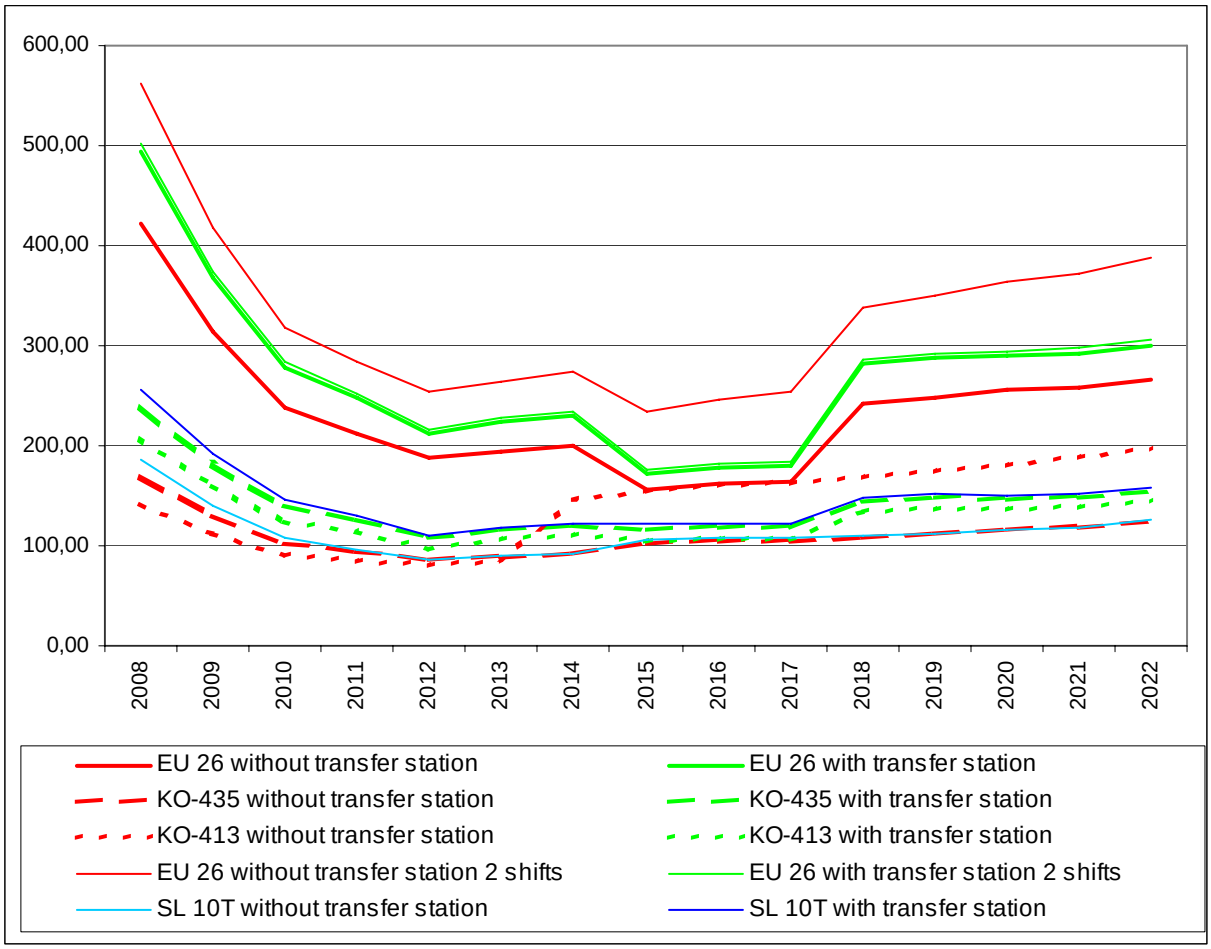
4.1.9. Yasnaya Poliyana



Graph 6 Global cost per tonne of collection + transfer

On the long term, the less costly are the solutions of KO-413, KO-435 and SL10T without transfer station.

4.1.10. Yasnogorka



Graph 7 Global cost per tonne of collection + transfer

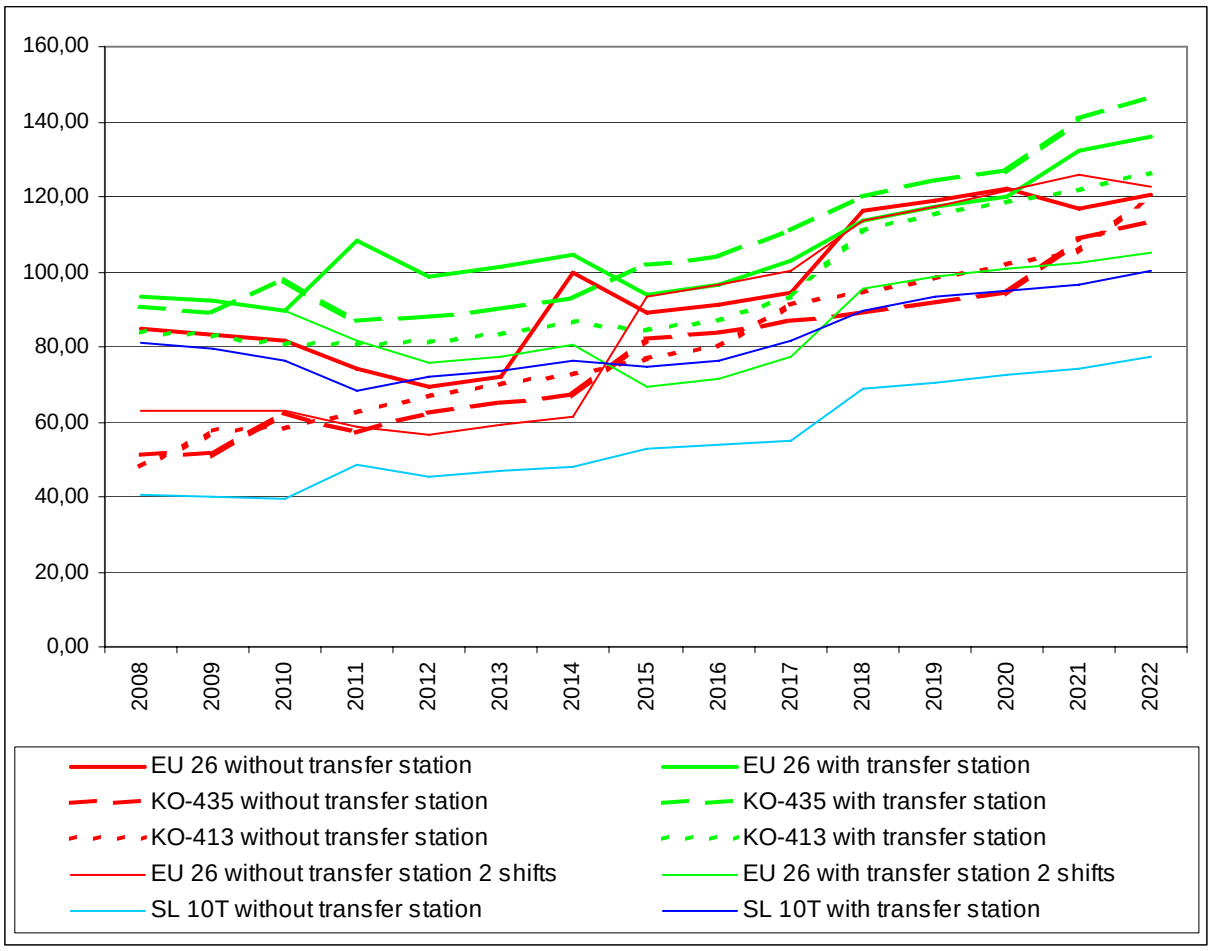
On the long term, the less costly are the solutions of KO-435 and SL10T without transfer station.

4.1.11. Miscellaneous

The calculation is not significant for 784 inhabitants.

4.2. Drujkovka

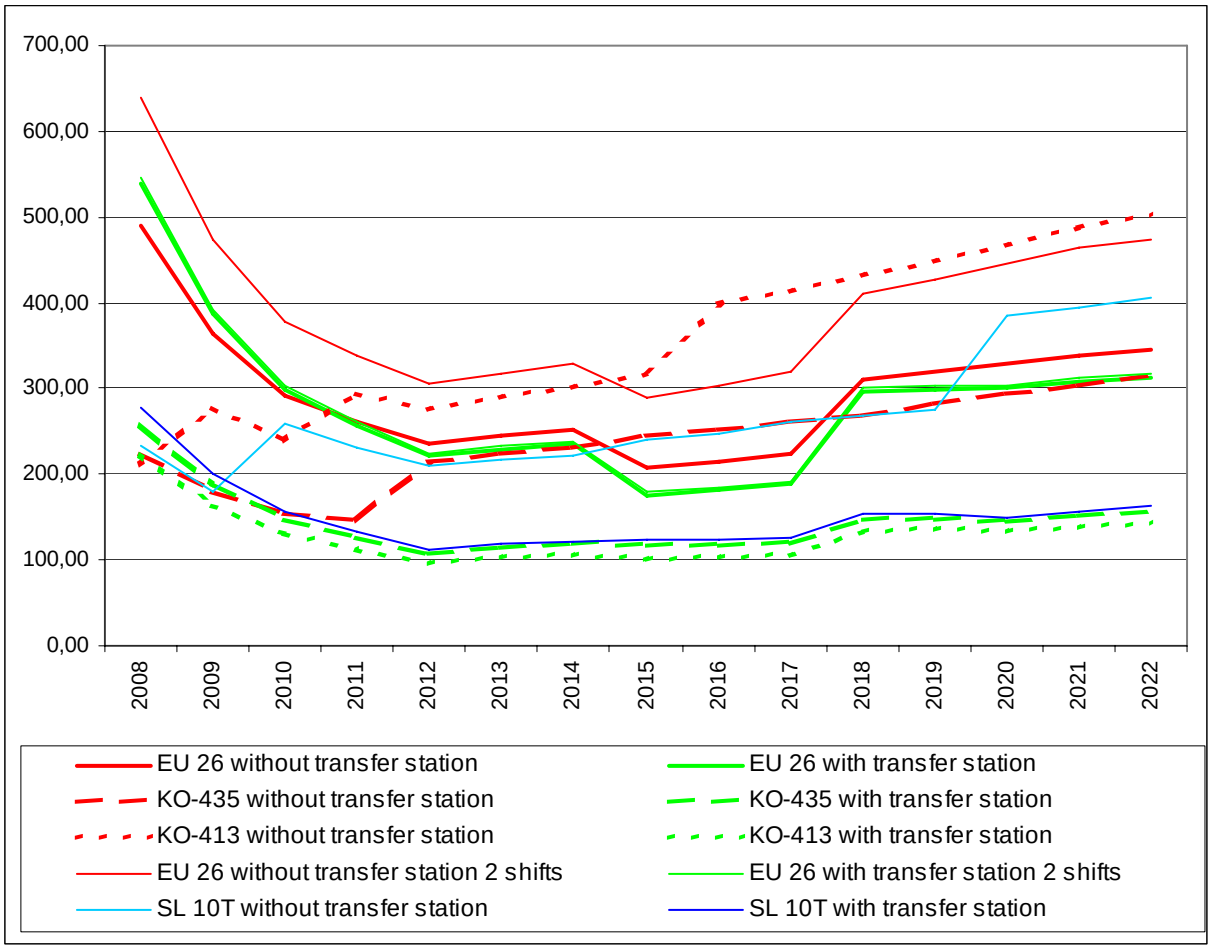
4.2.1. Drujkovka



Graph 8 Global cost per tonne of collection + transfer

On the long term, the less costly is the solution of SL10T without transfer station.

4.2.2. Alekseevo-Drujkovka



Graph 9 Global cost per tonne of collection + transfer

On the long term, the less costly is the solution of SL10T without transfer station.

4.2.3. Novogrigor`evka

The calculation is not significant for 384 inhabitants.

4.2.4. Novonikolaevka

The calculation is not significant for 104 inhabitants.

4.2.5. Raiskoe

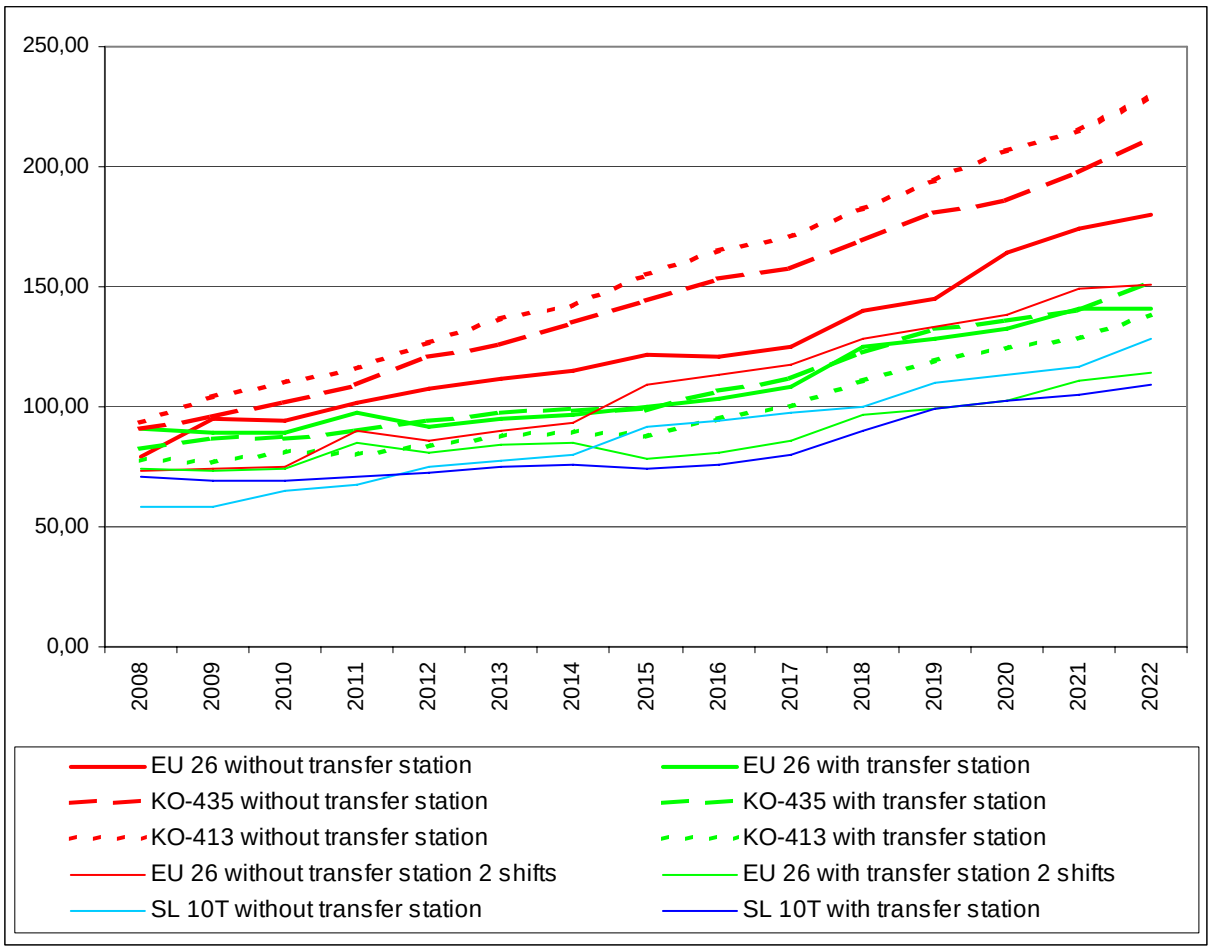
The calculation is not significant for 964 inhabitants.

4.2.6. Miscellaneous

The calculation is not significant for 773 inhabitants.

4.3. Slavyansk

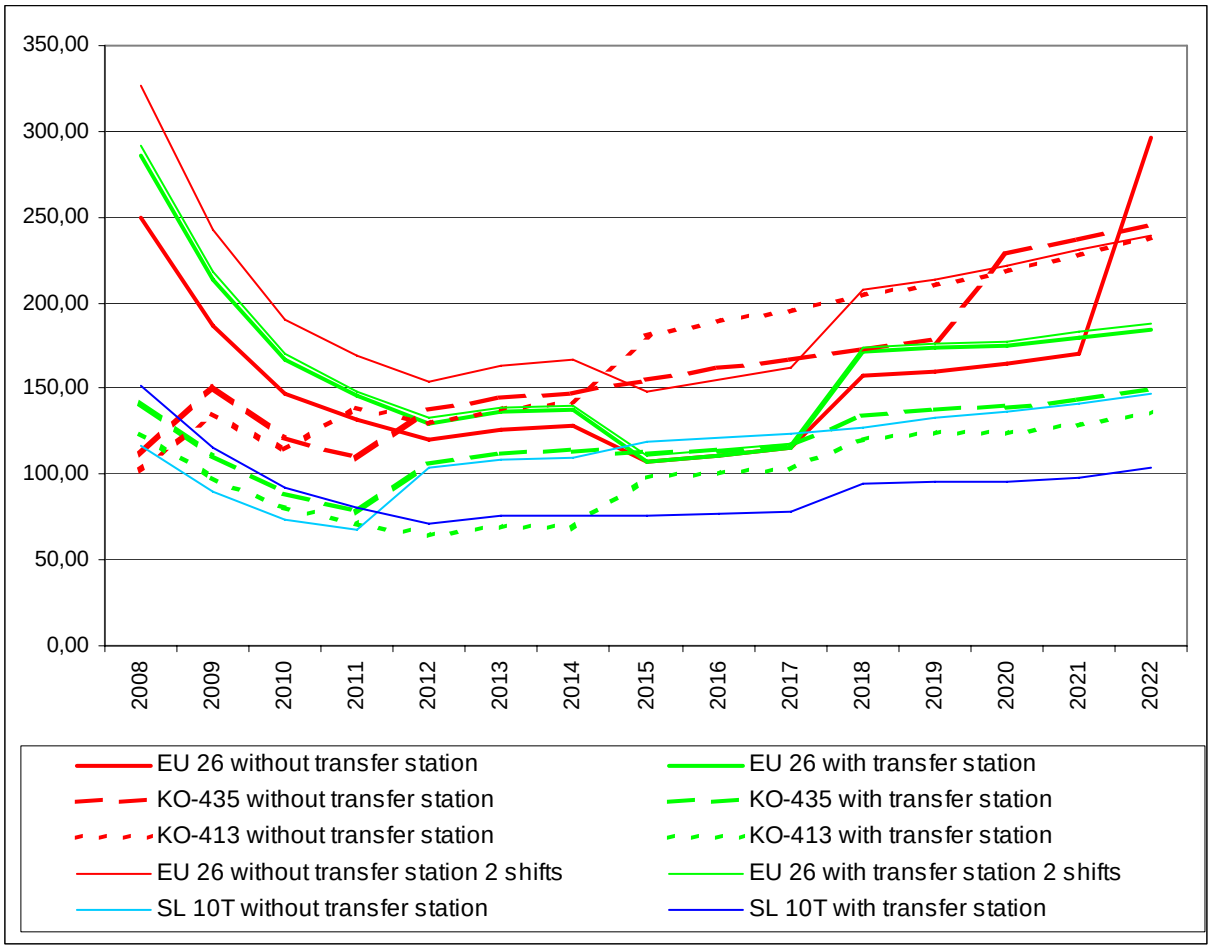
4.3.1. Slavyansk



Graph 10 Global cost per tonne of collection + transfer

On the long term, the less costly is the solution of SL10T with transfer station.

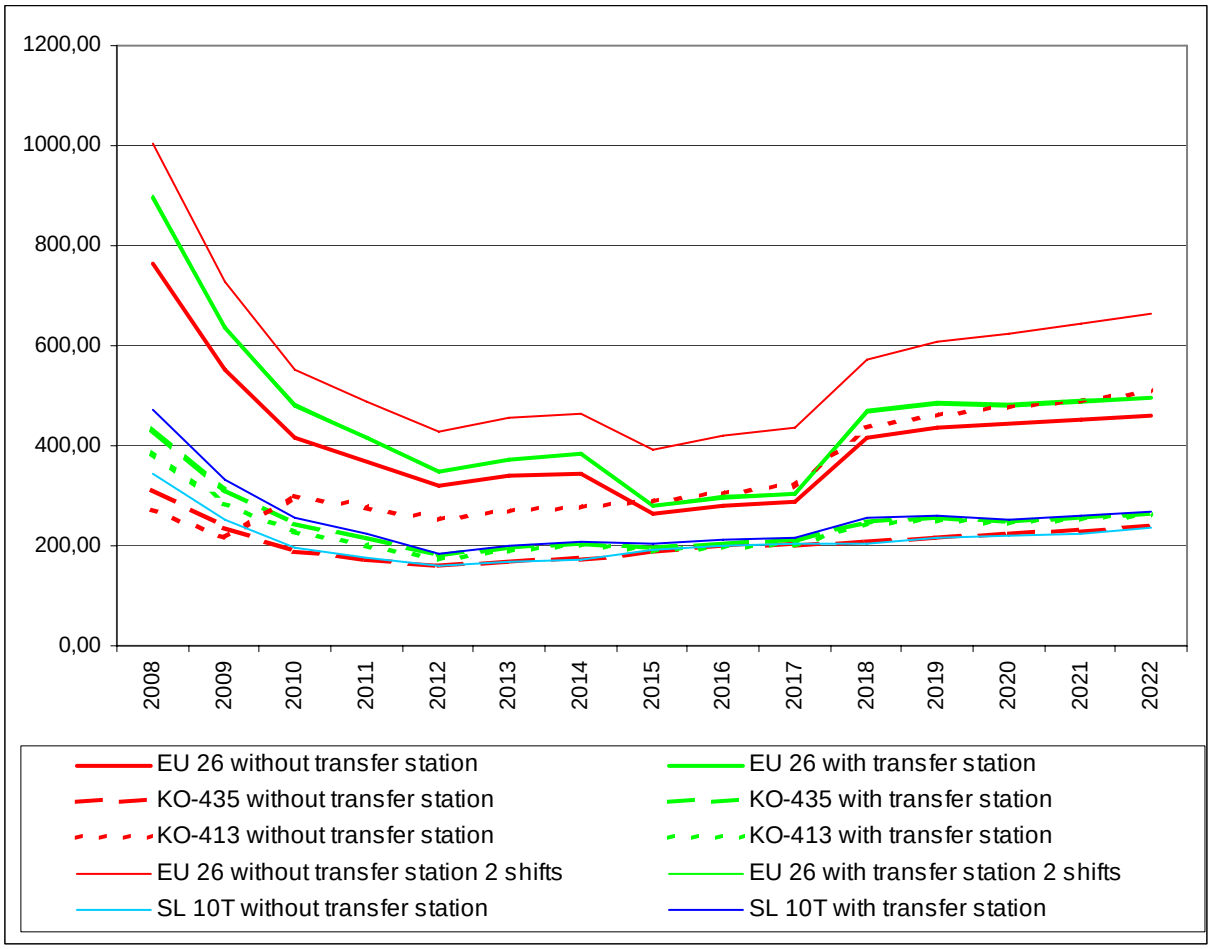
4.3.2. Nikolaevka



Graph 11 Global cost per tonne of collection + transfer

On the long term, the less costly is the solution of SL10T with transfer station.

4.3.3. Svyatogorsk

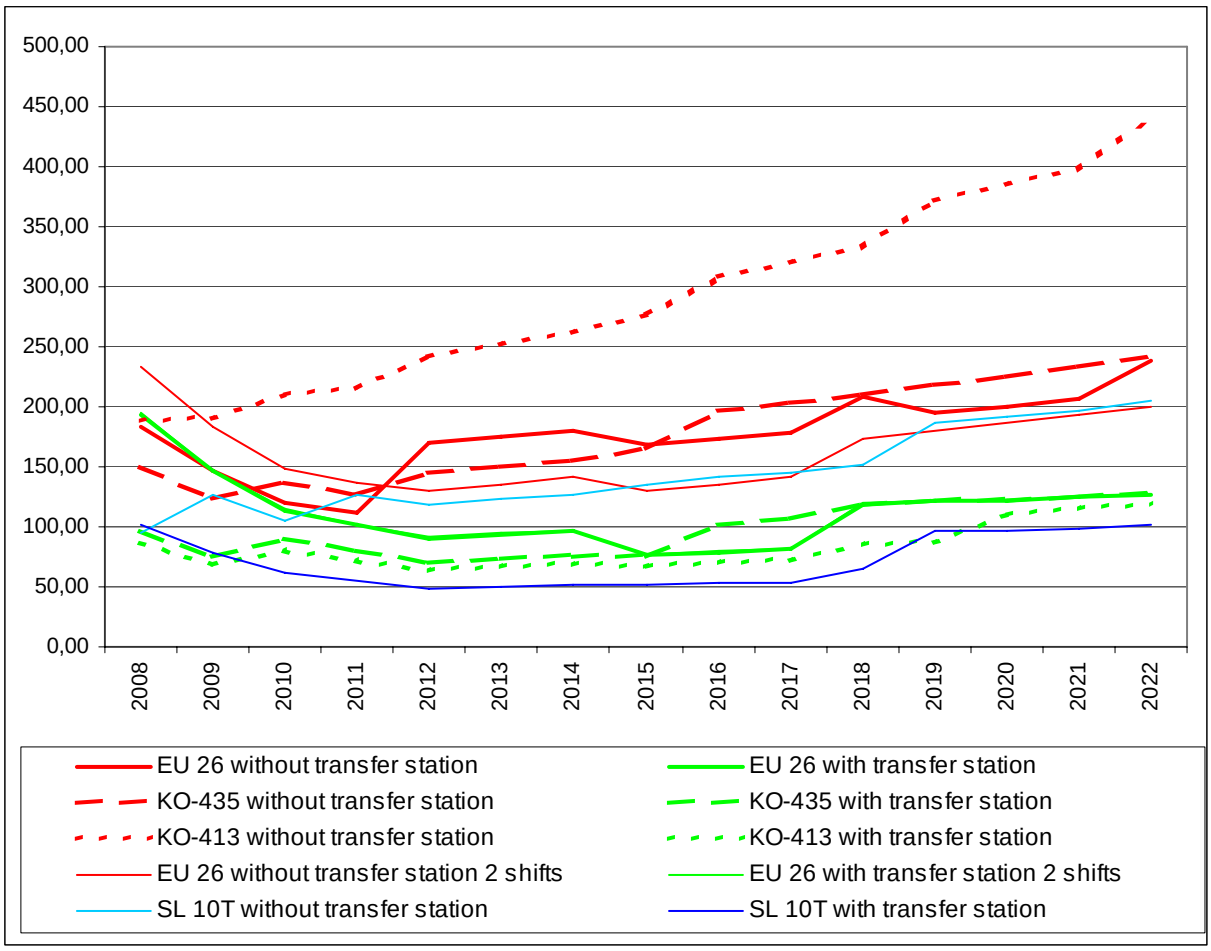


Graph 12 Global cost per tonne of collection + transfer

On the long term, the less costly are the solutions of SL10T with or without transfer station, KO-435 with or without transfer station, KO-413 with transfer station.

4.4. Krasnii Liman

4.4.1. Krasnii Liman



Graph 13 Global cost per tonne of collection + transfer

On the long term, the less costly is the solution of SL10T with transfer station.

4.4.2. Miscellaneous

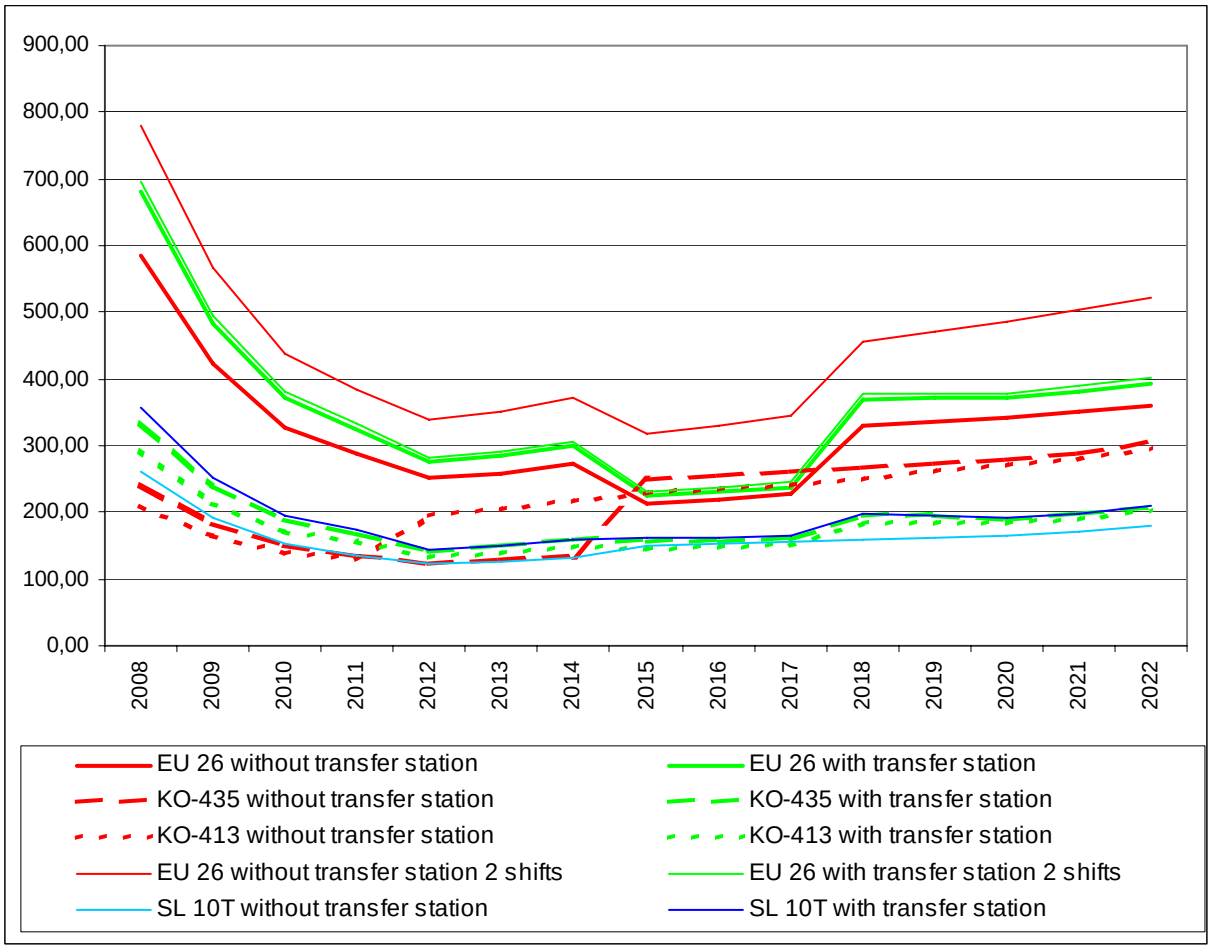
The calculation is not significant for 1071 inhabitants.

4.5. Slavyanskii Rayon

4.5.1. Andreevka

The calculation is not significant for 1025 inhabitants.

4.5.2. Bilbasovka



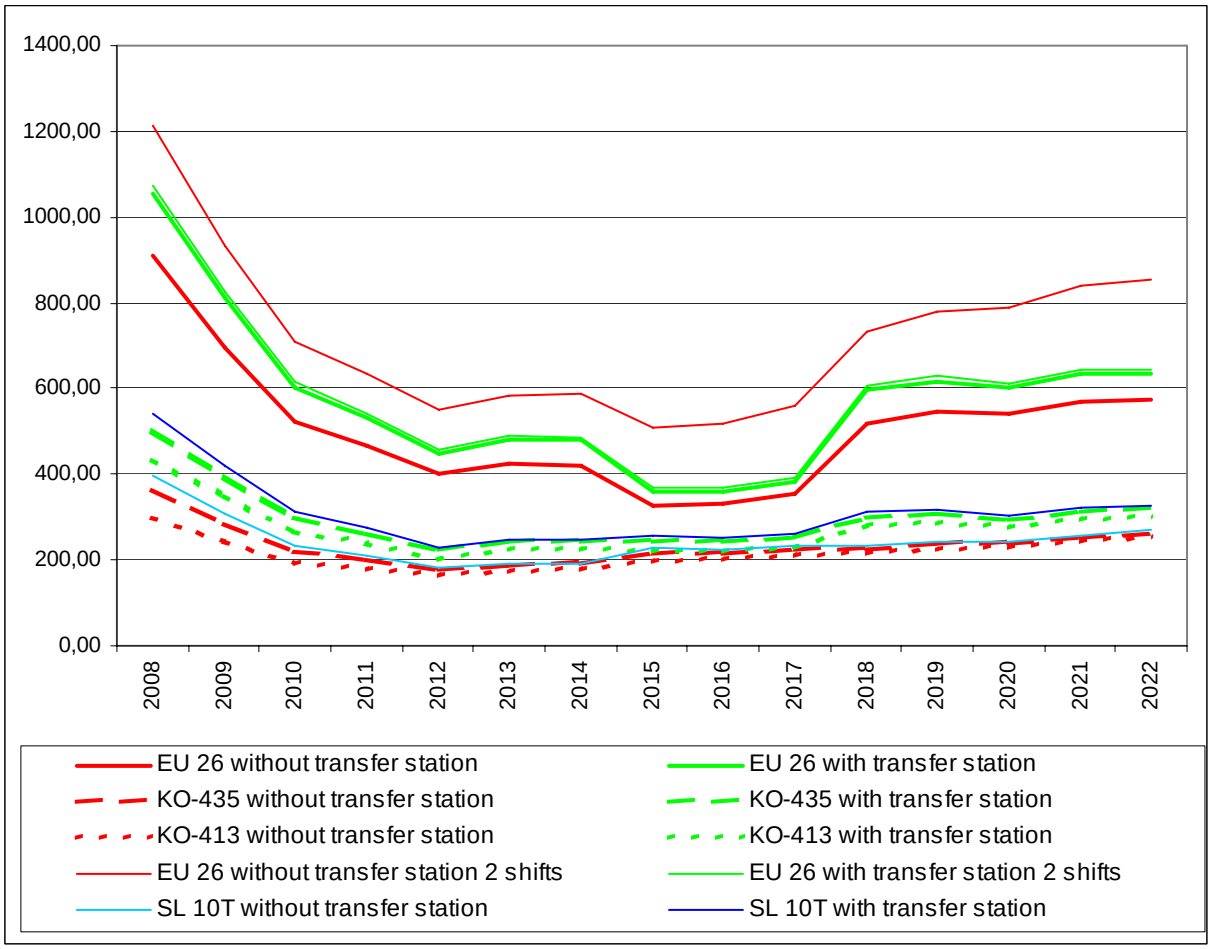
Graph 14 Global cost per tonne of collection + transfer

On the long term, the less costly is the solution of SL10T.

4.5.3. Donetskoe

The calculation is not significant for 682 inhabitants.

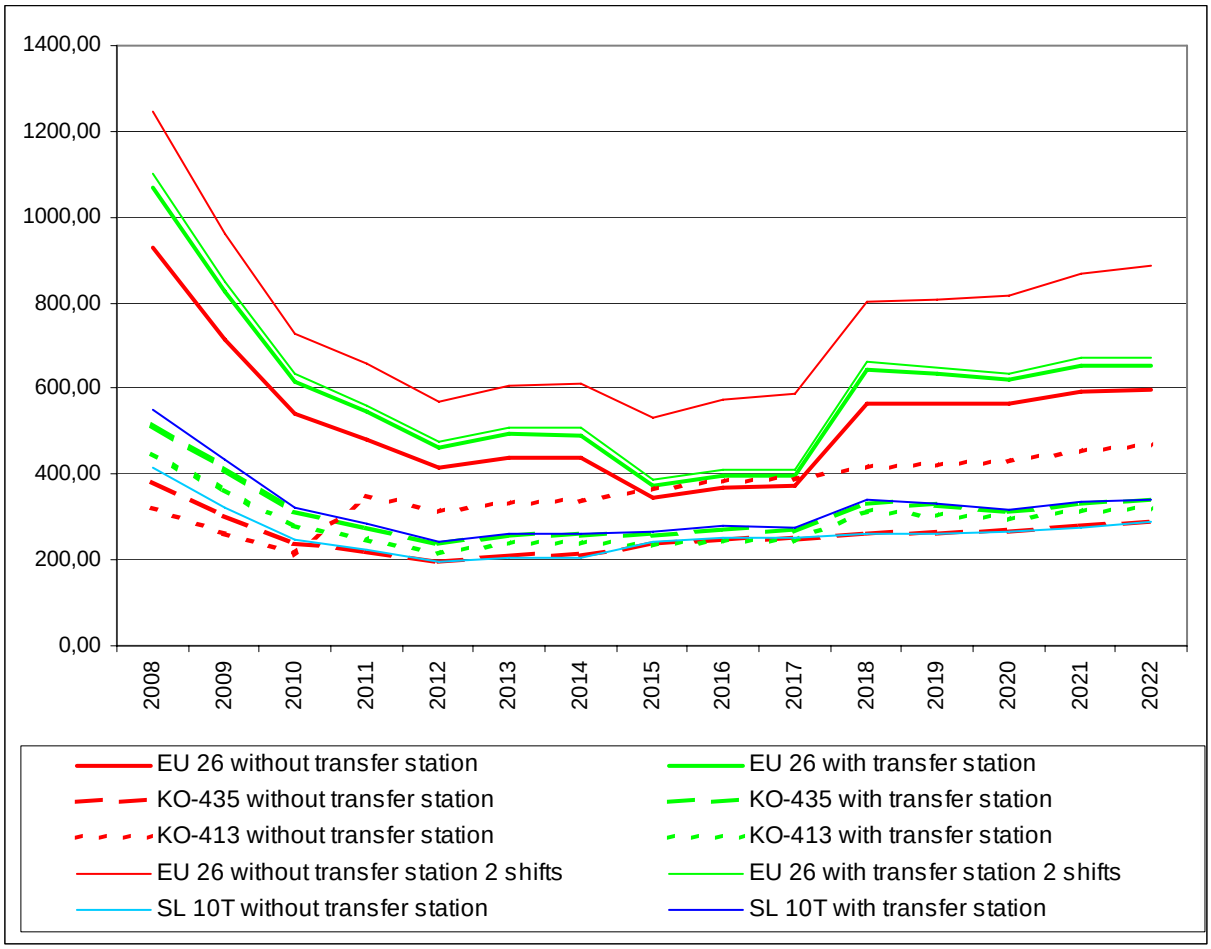
4.5.4. Raigorodok



Graph 15 Global cost per tonne of collection + transfer

On the long term, the less costly are the solutions of KO-413, KO-435 and SL10T without transfer station.

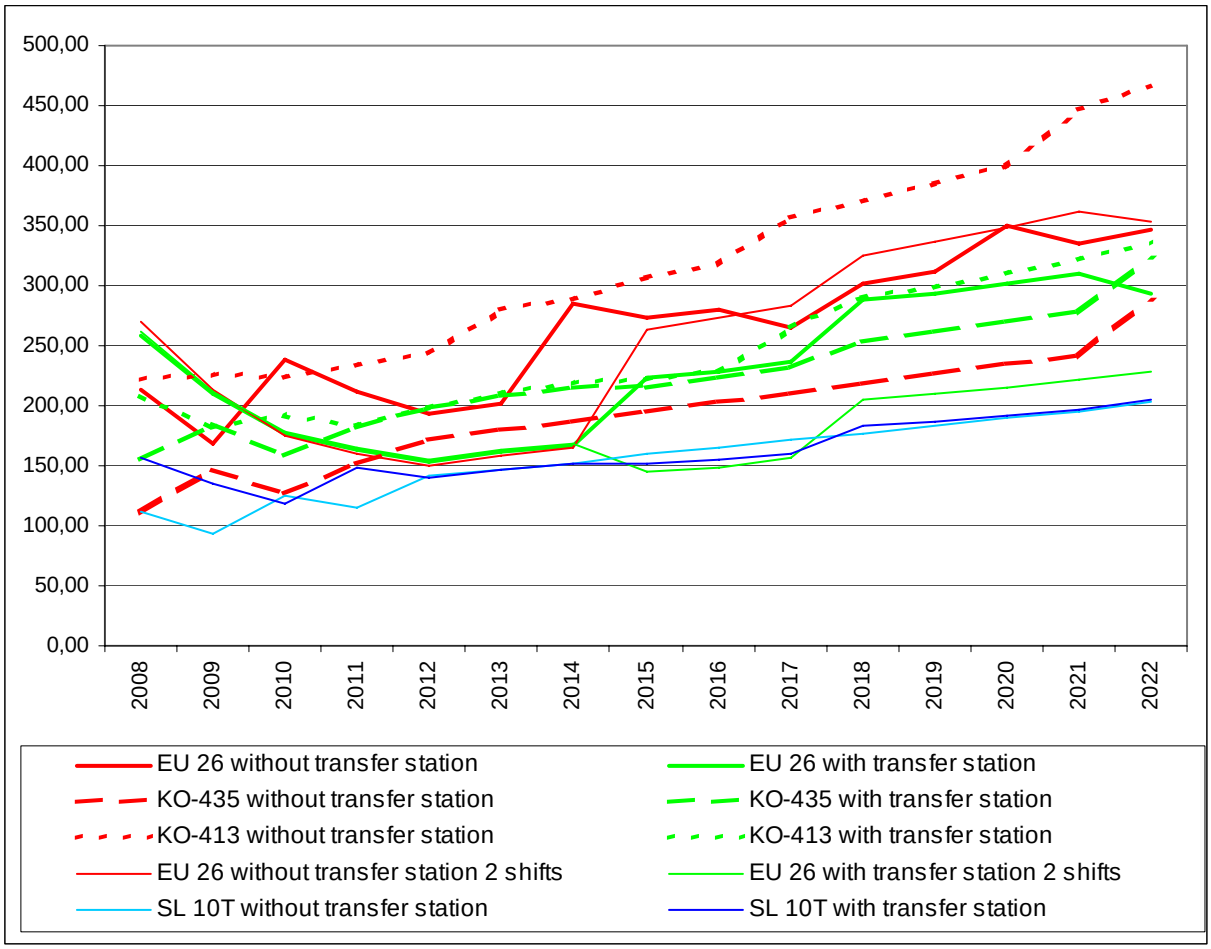
4.5.5. Cherkasskoe



Graph 16 Global cost per tonne of collection + transfer

On the long term, the less costly are the solutions of KO-435 and SL10T with or without transfer station.

4.5.6. Miscellaneous

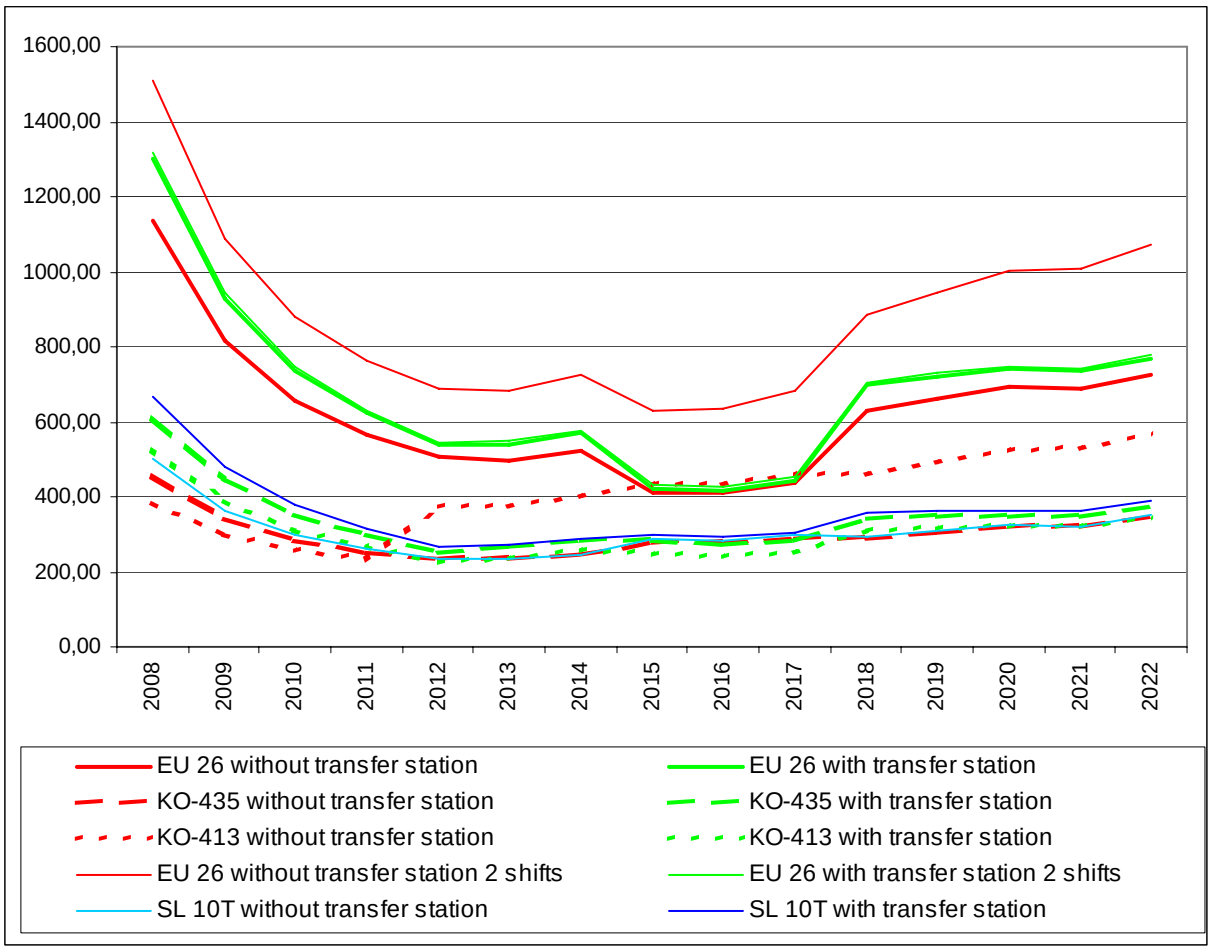


Graph 17 Global cost per tonne of collection + transfer

On the long term, the less costly is the solution of SL10T.

4.6. Krasnolimanskii Rayon

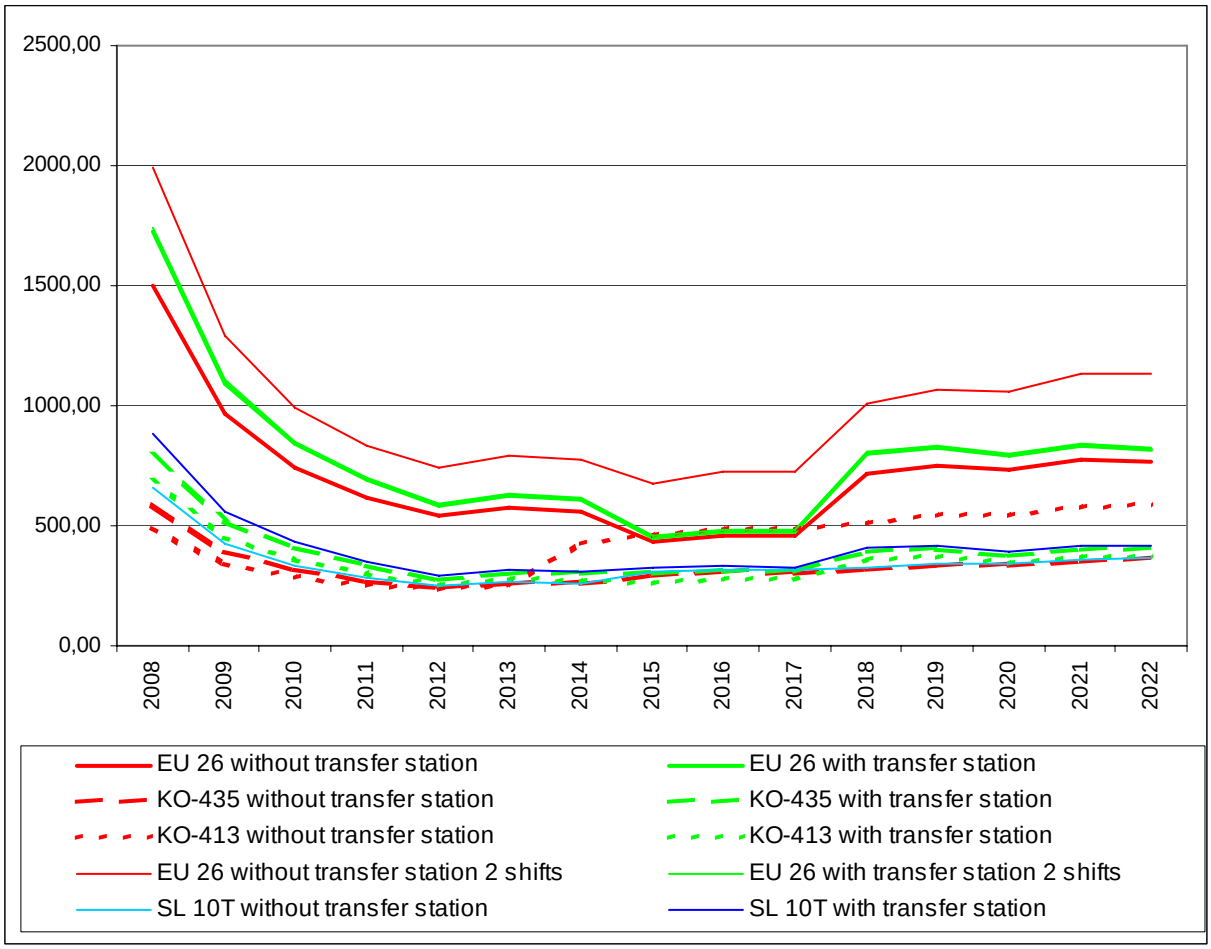
4.6.1. Drobishevoe



Graph 18 Global cost per tonne of collection + transfer

On the long term, the less costly are the solutions of KO-435 and SL10T.

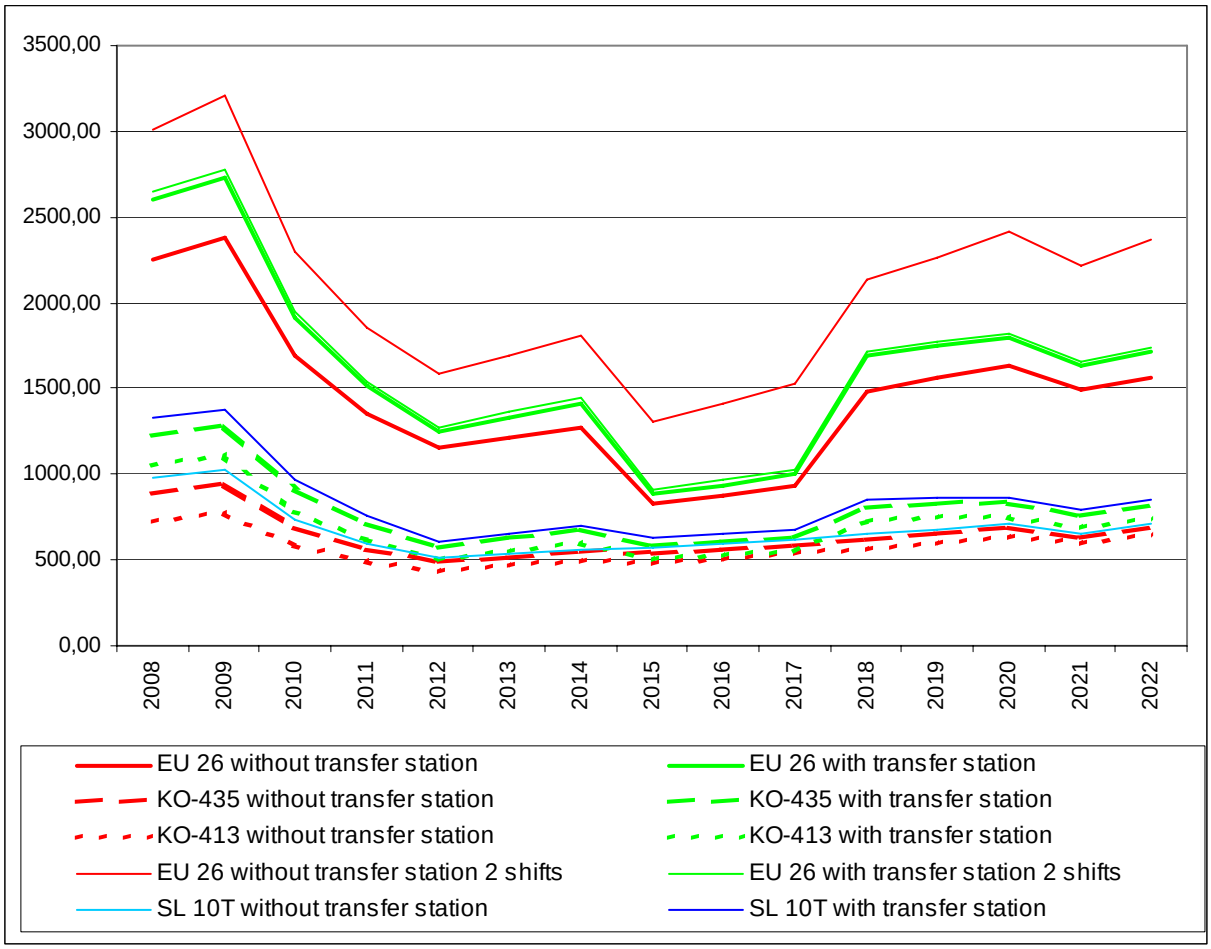
4.6.2. Kirovsk



Graph 19 Global cost per tonne of collection + transfer

On the long term, the less costly are the solutions of KO-435 and SL10T.

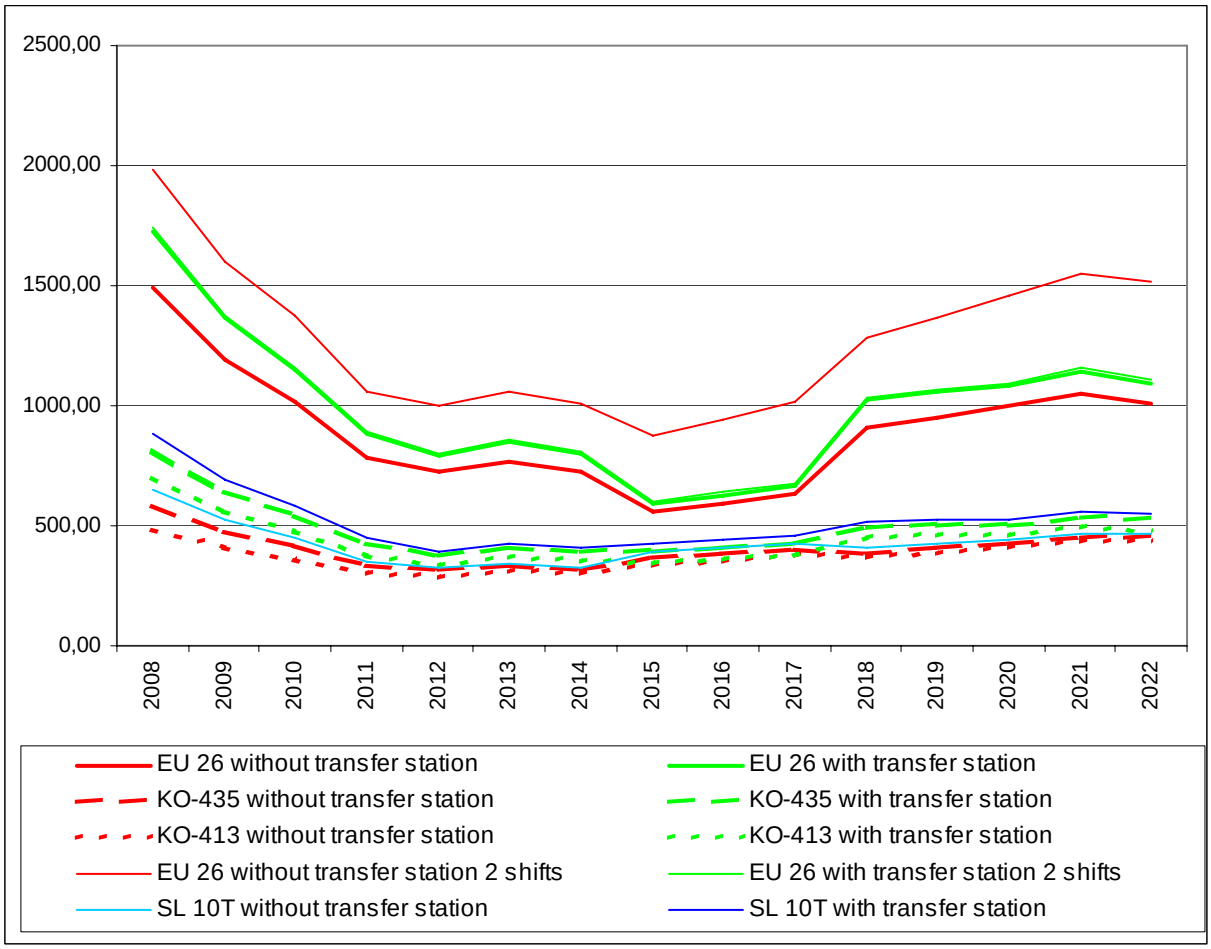
4.6.3. Novoselovka



Graph 20 Global cost per tonne of collection + transfer

On the long term, the less costly are the solutions of KO-413, KO-435 and SL10T.

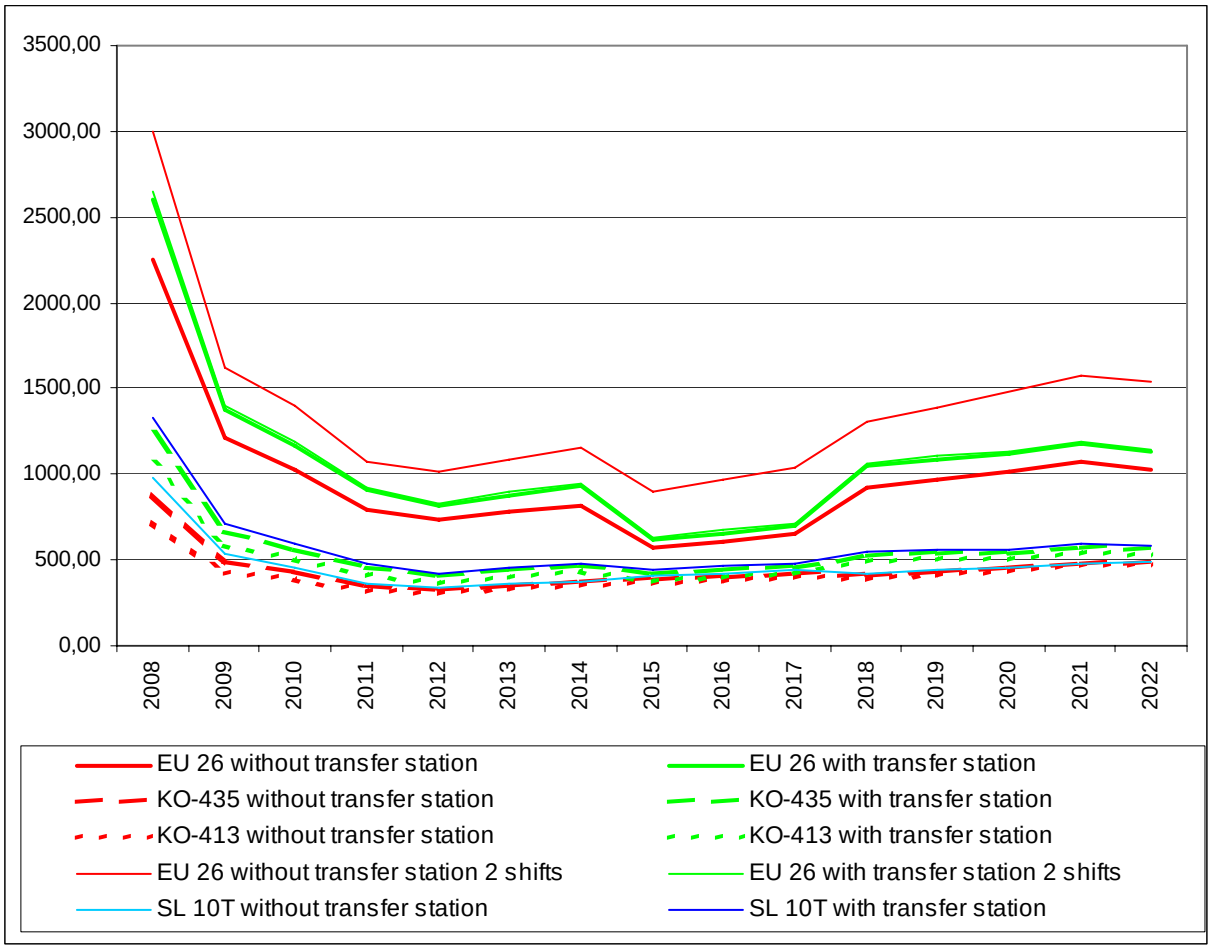
4.6.4. Yampol`



Graph 21 Global cost per tonne of collection + transfer

On the long term, the less costly are the solutions of KO-413, KO-435 and SL10T.

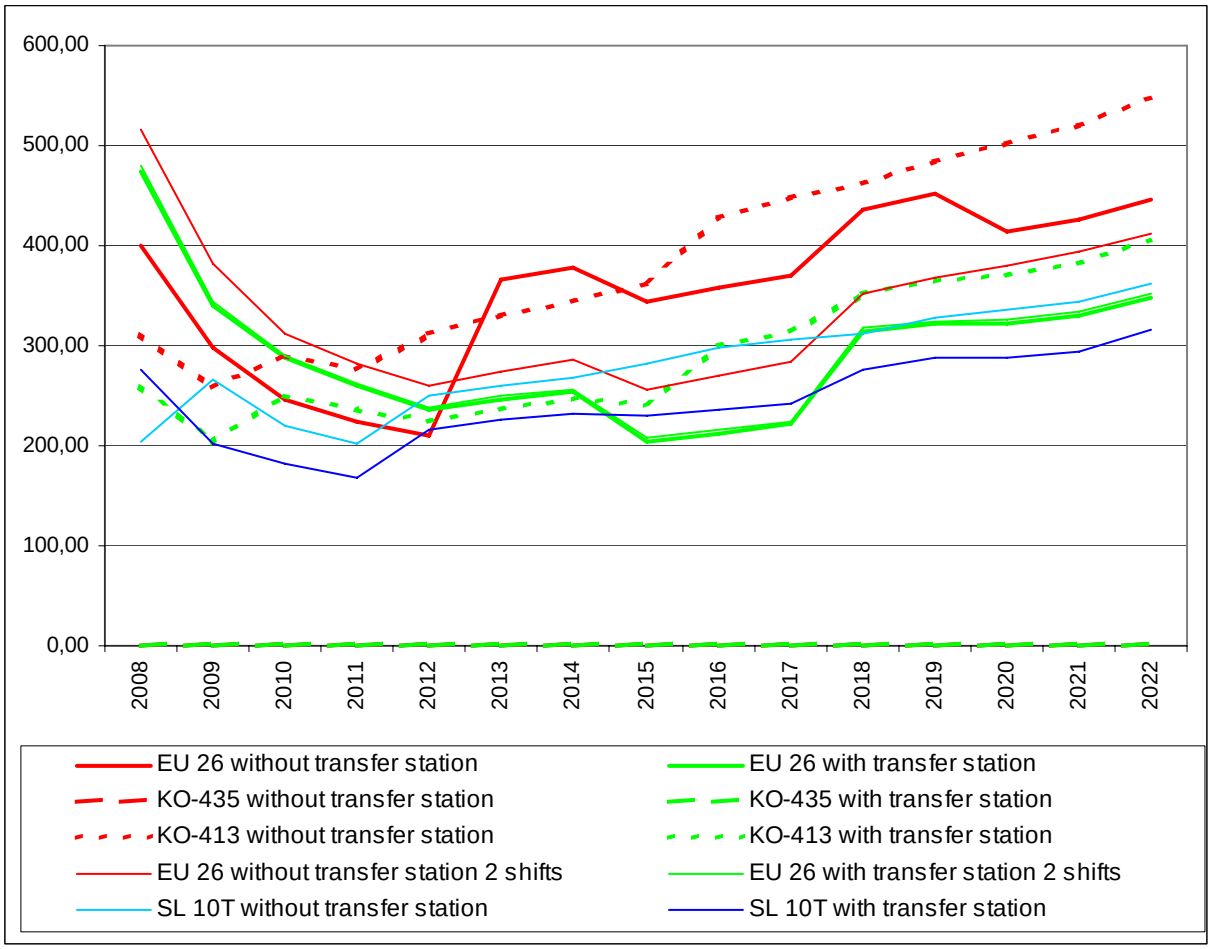
4.6.5. Yarova



Graph 22 Global cost per tonne of collection + transfer

On the long term, the less costly are the solutions of KO-413, KO-435 and SL10T.

4.6.6. Miscellaneous



Graph 23 Global cost per tonne of collection + transfer

On the long term, the less costly is the solution of SL10T.

5. Recommendations

5.1. Collection trucks

For almost all cases, a new model of collection truck of 10-12 tonnes associated with 750 litres non movable containers is the cheapest solution.

It's advisable to develop this solution as soon it will be available on the market.

The present study doesn't distinguish the collection of the "municipal sector" and the "private sector". But other studies demonstrate that the less costly for private sector is a 10-12 tonnes truck with rear loading and plastic bags. This kind of truck is already available.

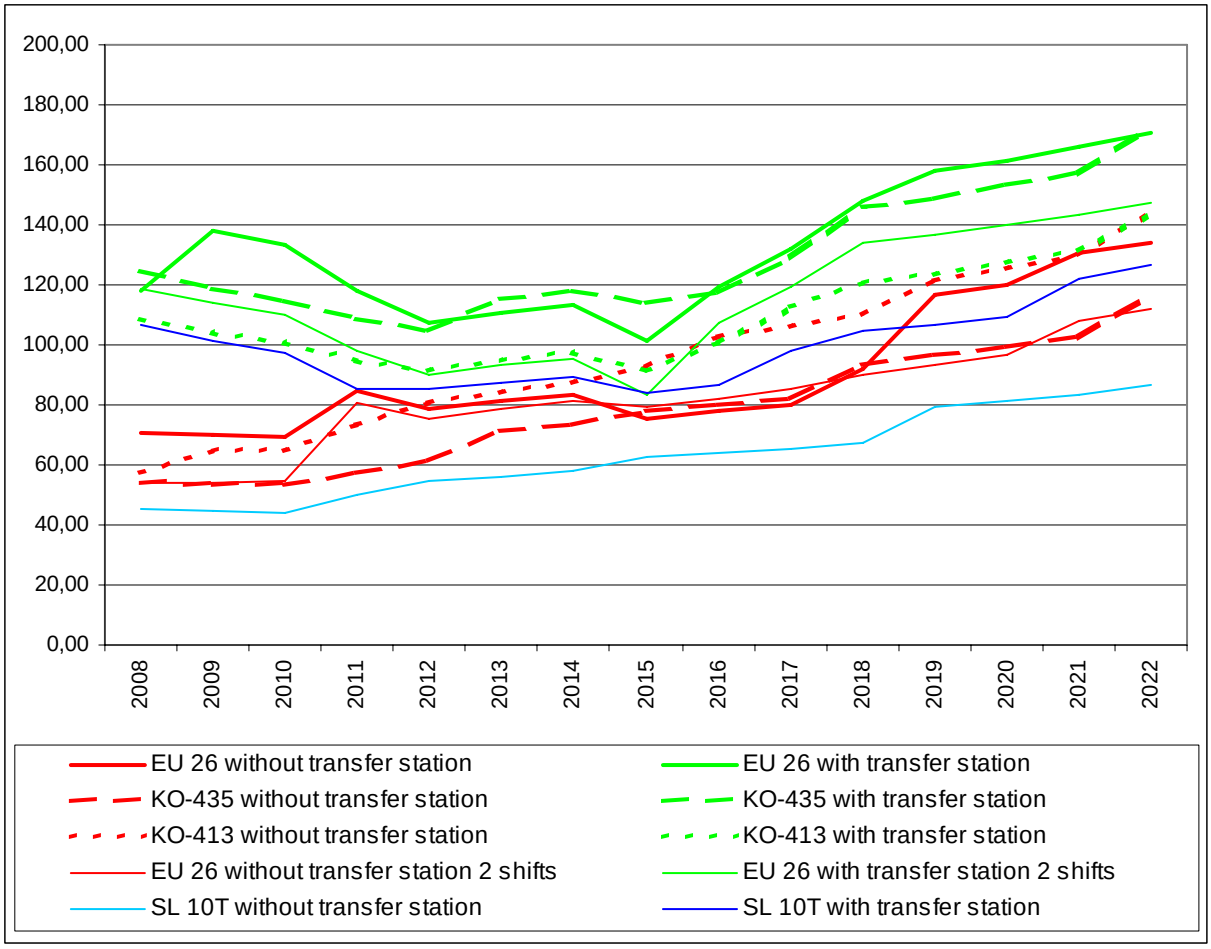
5.2. Transfer stations

For Drujkovka, it's cheaper to carry directly the SHW to the regional landfill without transfer station.

For Slavyansk, a transfer station is necessary and it will be also used for Nikolaevka, Svyatagorsk, Andreevka, Cherkasskoe, Bilbasovka, Donetskoe, Raigorodok, Yarova. For the villages of the Rayon, some will download at the transfer station and others directly to the landfill.

For Krasnyi Liman, a simplified transfer station is useful. It will be also used for Drobishevoe, Novoselovka, Kirovsk, Yampol, and the diverse villages of the Rayon.

For Kramatorsk, a transfer station at the North of the city and deserving around 1/3 of the population and Belenkoe and Yasnogorka is cost efficient as shows the following graph.



Graph 24 Global cost per tonne of collection + transfer

5.3. Transfer carriages

Within this scheme, the necessary park of trucks and tippings is calculated for the period as on the Table 4.

At the starting of the 3 transfer stations, it's necessary to acquire 5 carriages (trucks + trailer) and 10 30 m^3 tippings. It's not bad to have 1 reserve carriage and 5 reserve tippings.

Transfer station		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Kramatorsk		**30 700**	**34 800**	**39 500**	**49 300**	**59 700**	**61 600**	**63 300**	**65 300**	**67 300**	**69 300**	**71 300**	**73 500**	**75 800**	**78 000**	**80 300**
1/3 Kramatorsk	t/y	26 000	29 000	32 200	40 200	48 700	50 200	51 700	53 300	54 900	56 500	58 200	60 000	61 800	63 600	65 500
Belenkoe	t/y	3 100	3 500	3 900	4 900	5 900	6 100	6 200	6 400	6 600	6 800	7 000	7 200	7 500	7 700	7 900
Yasnogorka	t/y	1 600	2 300	3 400	4 200	5 100	5 300	5 400	5 600	5 800	6 000	6 100	6 300	6 500	6 700	6 900
Rounds/day		4,0	4,6	5,2	6,5	7,9	8,1	8,3	8,6	8,8	9,1	9,4	9,7	10,0	10,3	10,6
Time loading	minutes	480	552	624	780	948	972	996	1 032	1 056	1 092	1 128	1 164	1 200	1 236	1 272
Time transfer	minutes	117	134	152	190	231	237	243	251	257	266	275	283	292	301	310
Time downloading	minutes	60	69	78	98	119	122	125	129	132	137	141	146	150	155	159
TOTAL Time	minutes	657	755	854	1 068	1 298	1 331	1 364	1 412	1 445	1 495	1 544	1 593	1 642	1 692	1 741
N trucks		1,37	1,57	1,78	2,22	2,70	2,77	2,84	2,94	3,01	3,11	3,22	3,32	3,42	3,52	3,63
N tippings		2,74	3,14	3,56	4,44	5,40	5,54	5,68	5,88	6,02	6,22	6,44	6,64	6,84	7,04	7,26
Slavyansk		**48 450**	**57 250**	**68 100**	**85 000**	**103 100**	**106 200**	**109 400**	**112 700**	**116 100**	**119 700**	**123 200**	**126 850**	**130 650**	**134 700**	**138 550**
Slavyansk	t/y	39 200	43 700	48 500	60 700	73 500	75 700	78 000	80 400	82 800	85 300	87 800	90 400	93 200	96 000	98 800
Andreevka	t/y	3 100	4 500	6 500	8 100	9 800	10 100	10 400	10 800	11 100	11 400	11 800	12 100	12 500	12 800	13 200
Cherkasskoe	t/y	900	1 400	2 000	2 500	3 000	3 100	3 200	3 300	3 400	3 500	3 600	3 700	3 800	3 900	4 000
Bilbasova	t/y	200	300	400	500	700	700	700	700	700	800	800	800	800	900	900
Donetskoe	t/y	700	1 000	1 400	1 800	2 200	2 300	2 300	2 400	2 500	2 500	2 600	2 700	2 800	2 900	3 000
Raigorodok	t/y	1 200	1 800	2 600	3 200	3 900	4 000	4 100	4 200	4 400	4 500	4 600	4 800	4 900	5 100	5 200
Yarova	t/y	100	200	300	300	400	400	400	400	400	500	500	500	500	500	500
1/2 Misc. Rayon	t/y	700	1 000	1 500	1 800	2 200	2 300	2 400	2 400	2 500	2 600	2 700	2 700	2 800	2 900	3 000
Rounds/day		6,4	7,5	9	11,2	13,6	14	14,4	14,9	15,3	15,8	16,3	16,7	17,2	17,7	18,3
Time loading	minutes	768	900	1 080	1 344	1 632	1 680	1 728	1 788	1 836	1 896	1 956	2 004	2 064	2 124	2 196
Time transfer	minutes	367	430	516	642	780	802	825	854	877	906	934	957	986	1 015	1 049
Time downloading	minutes	96	113	135	168	204	210	216	224	230	237	245	251	258	266	275
TOTAL Time	minutes	1 231	1 443	1 731	2 154	2 616	2 692	2 769	2 866	2 943	3 039	3 135	3 212	3 308	3 405	3 520
N trucks		2,56	3,01	3,61	4,49	5,45	5,61	5,77	5,97	6,13	6,33	6,53	6,69	6,89	7,09	7,33
N tippings		5,12	6,02	7,22	8,98	10,90	11,22	11,54	11,94	12,26	12,66	13,06	13,38	13,78	14,18	14,66
Krasnyi Liman		**8 200**	**12 100**	**17 400**	**21 700**	**26 400**	**27 200**	**28 000**	**28 800**	**29 800**	**30 600**	**31 500**	**32 400**	**33 500**	**34 500**	**35 500**
Krasnyi Liman	t/y	4 500	6 700	9 600	12 000	14 600	15 000	15 500	15 900	16 400	16 900	17 400	17 900	18 500	19 000	19 600
Drobishevoe	t/y	600	800	1 200	1 500	1 800	1 900	1 900	2 000	2 100	2 100	2 200	2 200	2 300	2 400	2 500
Kirovsk	t/y	200	400	500	600	800	800	800	800	900	900	900	900	1 000	1 000	1 000
Novoselovka	t/y	500	700	1 100	1 300	1 600	1 700	1 700	1 800	1 800	1 900	1 900	2 000	2 100	2 100	2 200
Yampol	t/y	400	600	800	1 000	1 200	1 200	1 300	1 300	1 400	1 400	1 400	1 500	1 500	1 600	1 600

Transfer station		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Misc. Rayon	t/y	2 000	2 900	4 200	5 300	6 400	6 600	6 800	7 000	7 200	7 400	7 700	7 900	8 100	8 400	8 600
Rounds/day		1,1	1,6	2,3	2,8	3,5	3,6	3,7	3,8	3,9	4	4,1	4,3	4,4	4,6	4,7
Time loading	minutes	17	24	35	42	53	54	56	57	59	60	62	65	66	69	71
Time transfer	minutes	97	141	202	246	308	317	325	334	343	352	361	378	387	405	413
Time downloading	minutes	17	24	35	42	53	54	56	57	59	60	62	65	66	69	71
TOTAL Time	minutes	130	189	271	330	413	425	436	448	460	472	484	507	519	543	554
N trucks		0,20	0,29	0,42	0,51	0,64	0,66	0,68	0,70	0,71	0,73	0,75	0,79	0,81	0,84	0,86
N tippings		1,20	1,74	2,52	3,06	3,84	3,96	4,08	4,20	4,26	4,38	4,50	4,74	4,86	5,04	5,16
TOTAL																
Tonnage	t/y	87 350	104 150	125 000	156 000	189 200	195 000	200 700	206 800	213 200	219 600	226 000	232 750	239 950	247 200	254 350
Rounds/day		12	14	17	21	25	26	27	28	28	29	30	31	32	33	34
TOTAL Time	minutes	2 018	2 387	2 856	3 552	4 327	4 448	4 569	4 726	4 848	5 006	5 163	5 311	5 469	5 639	5 815
N trucks		5	5	6	8	9	10	10	10	10	11	11	11	12	12	12
N tippings		10	11	14	17	21	21	22	23	23	24	24	25	26	27	28

Table 4 Calculation of the park of trucks and tippings