

Investment in waste management in Dnepropetrovsk region

Prospects for Cooperation

April 2011

This presentation does not contain a complete exposition of the topic and is designed for general information of potential partners about possible areas of cooperation in waste management. Some provided materials contained evaluation data that needs further study in business planning and estimate of project efficiency. Opportunities for cooperation and legal aspects should be clarified for each individual investment proposal.





The volume of solid waste generation in Dnipropetrovsk region. Morphology of SDW (Solid Domestic Waste)

- ❑ There are 13 cities and 22 districts in Dnipropetrovsk region with population of 3.6 million people.
- ❑ Dnipropetrovsk region annually generates **more than 1.15 million tons** of solid waste taken into account.
- ❑ **67,1% of total SDW generation** goes to the 2 largest cities in the region: Dnepropetrovsk (41,5%) and Krivoy Rog (25,6%).
- ❑ Separate collection of municipal solid waste (separate containers for plastic and glass) is performed only in 2 Dnepropetrovsk districts, as a pilot draft. There is no waste morphology record. At the same time, expert assessment of the fractional composition of solid waste and a preliminary technology analysis allows us to expect the commercial attractiveness of the waste processing plants construction.

Waste management infrastructure and recycling rates.

- ❑ There are 41 enterprises (14 commercial - 34%, 27 public utility companies - 66%) involved in SDW collection and transportation. In addition, there is no service for collecting and transporting of solid waste in: Krivoy Rog, Solonyanskiy and Sinelnikovskoye areas. The tariff structure in the field of waste management (for example, Krivoy Rog) consists of 80% - tariff for collection and transportation of solid waste and 20% - is dumping at the landfills tariff.
- ❑ 96% of SDW utilized with the "landfill" method in Dnipropetrovsk region. 4% are recycled at an incineration plant in Dnepropetrovsk. The plant was built in 1992. and does not currently meet the required environmental standards.
- ❑ Total volume of SDW in Dnepropetrovsk oblast is **35 million m³** with general waste formation on polygons, operating without the necessary design and technical documentation. There is no sorting on polygons.
- ❑ Nowadays the polygon fullness in Dneprodzerzhinsk, Novomoskovsk, Krivoy Rog, Geltie Vodi cities is over 85%.

Harmful environmental impact

- ❑ According to the approximate review there is annual dispersion to the atmosphere :
 - **13,8 million m³** of landfill gas containing hazardous toxic organic compounds and greenhouse gases;
 - **296 m³** of filtrate containing hazardous substances that pollute land and water resources of the region.

Goals of regional authorities in waste management

- ❑ The purpose of regional authorities - is a complex problem solving in waste management.

Principles of partnership. Expectations of regional authorities

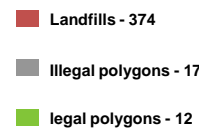
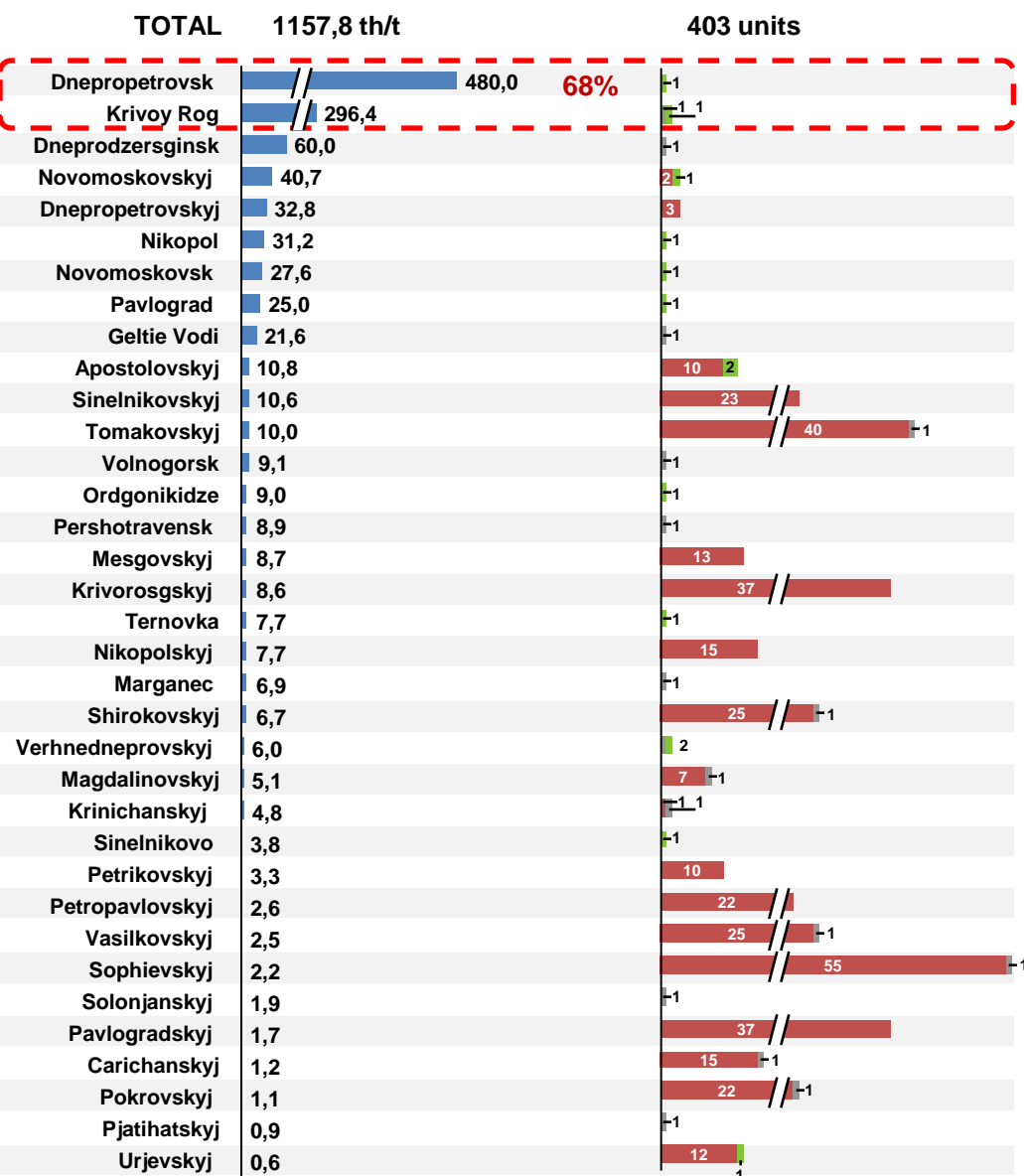
- ❑ We believe that the most effective solution of the waste problem is its commercialization:
 - production of secondary raw materials;
 - generation of heat and electricity from the biogas processing;
- ❑ Cooperation in this direction should be mutually beneficial. The regional authorities are committed to:
 - provide investors with all the necessary information for optimal decision making.
 - provide land on concessional terms. Assistance in service lines providing.
 - provide an effective assistance to the process of all necessary approvals of the project;
 - provide an additional benefits under their authority.
- ❑ Dnepropetrovsk regional investment agency **is studying actively** the proposals of potential partners who are interested in investing and effective business making in the waste management in Dnipropetrovsk region.
- ❑ For more detailed information, refer to the relevant sections of the presentation.

WASTE DENSITY



Annual SDW generation in the region

Density units



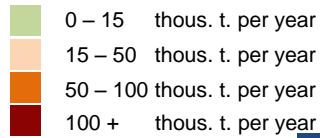
Comments

- ❑ 96% of SDW utilized with the "landfill" method in Dnipropetrovsk region. 4% are recycled at an incineration plant in Dnepropetrovsk.
- ❑ Incinerator was built in 1992. The combustion of 1 ton of SDW generates about 8.4 m3 of smoke fumes containing nitrogen oxides and sulfur oxides, heavy metals and **dioxin**. After burning, it is 25-40% of highly toxic ash and dust remains, that stored in the landfills.
- ❑ Only 3 of 11 legal polygons have the filtrate collection system and the barrier (screen) to protect groundwater and soil. The surfacewater drainage system, the polygons surface isolation, gas drainage and other nature-conservative measures are absent.
- ❑ It is 12 polygons (3.0%), operating with all the necessary design and technical documentation in Dnepropetrovsk region.
- ❑ 17 polygons (4.2%) operate without design and technical documentation.
- ❑ The remained 374 (92.8%) - are natural solid waste storage.

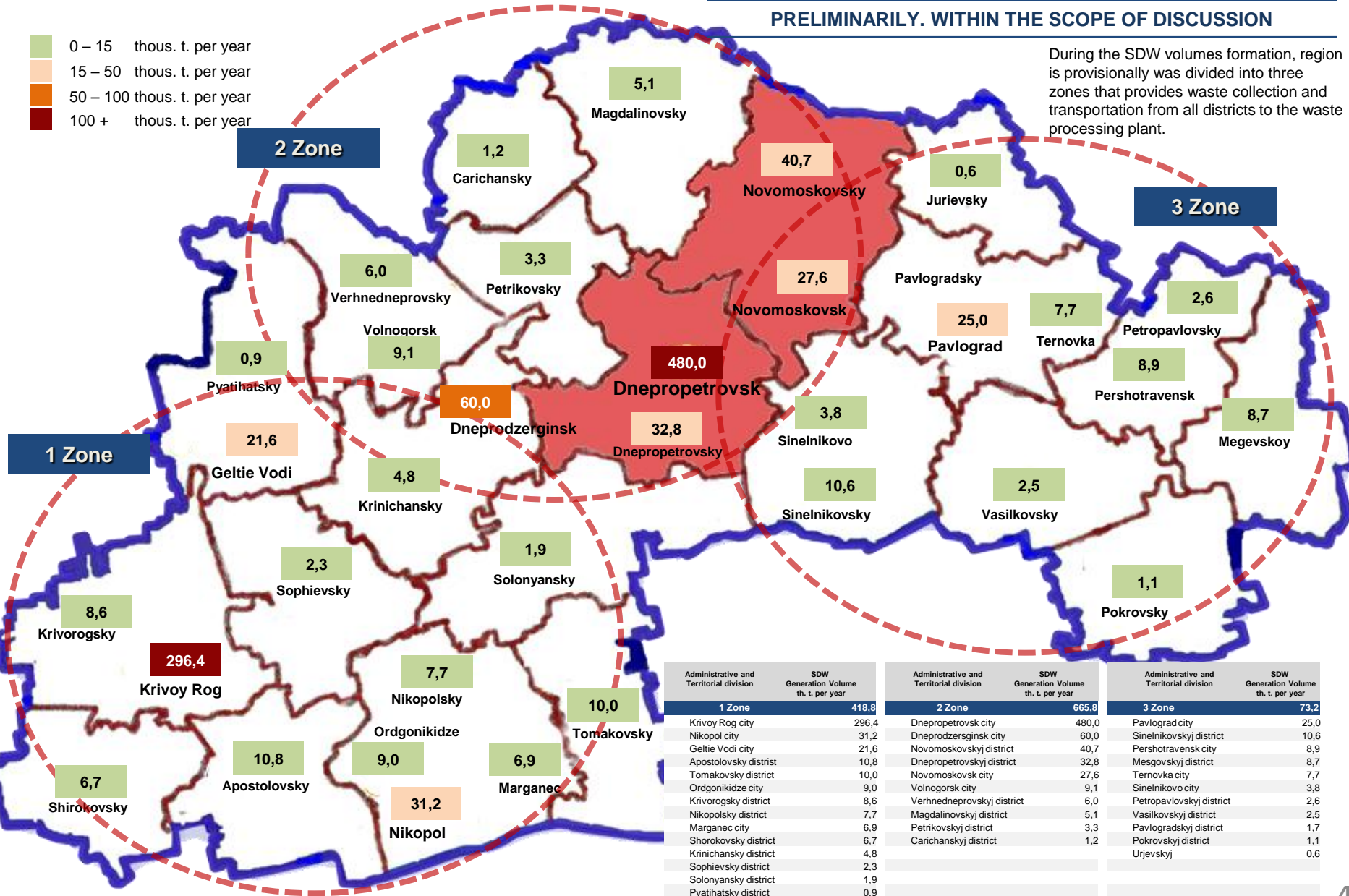
SDW GENERATION IN DNEPROPETROVSK REGION



PRELIMINARILY. WITHIN THE SCOPE OF DISCUSSION



During the SDW volumes formation, region is provisionally was divided into three zones that provides waste collection and transportation from all districts to the waste processing plant.



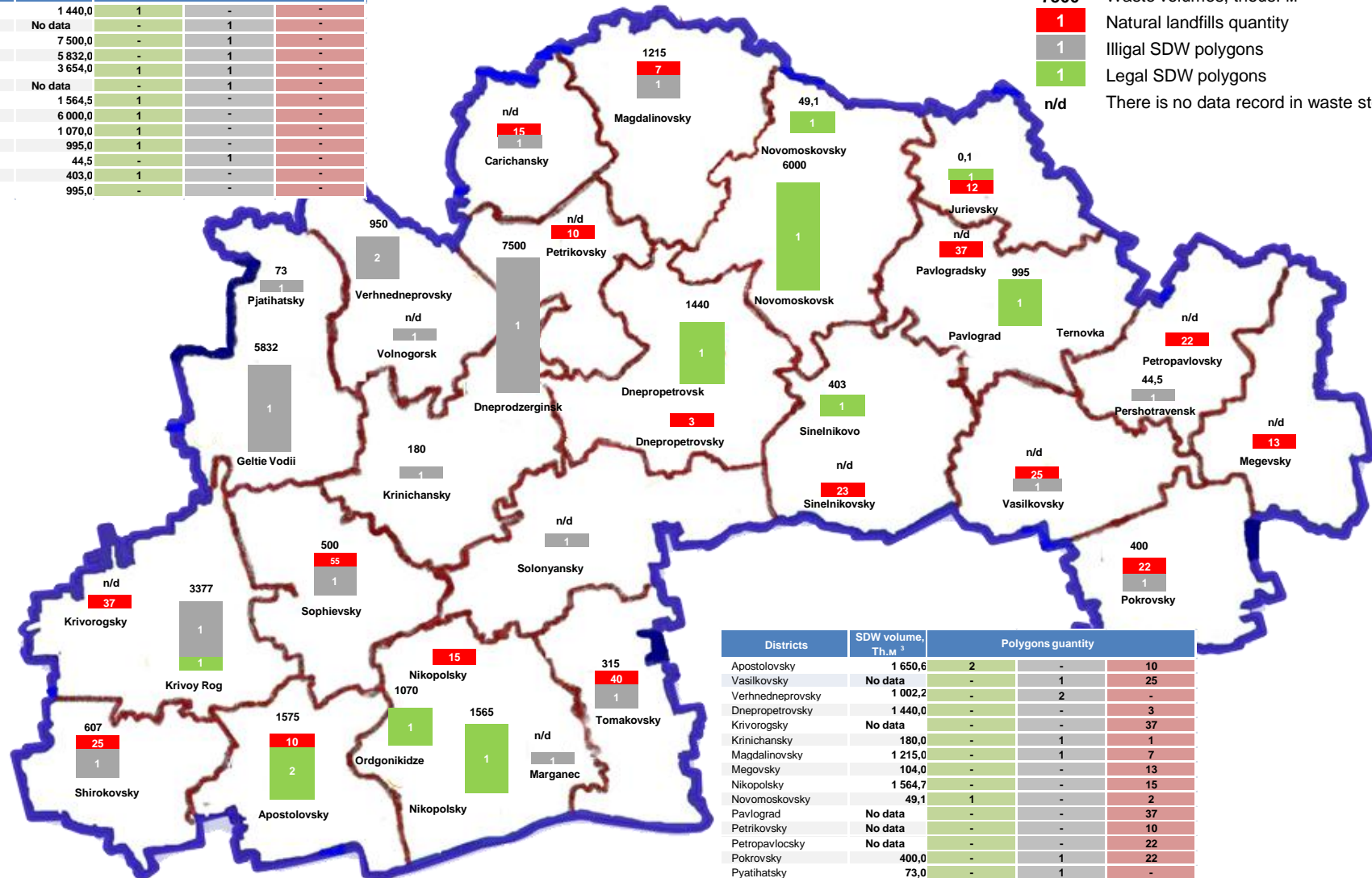
Administrative and Territorial division	SDW Generation Volume th. t. per year	Administrative and Territorial division	SDW Generation Volume th. t. per year	Administrative and Territorial division	SDW Generation Volume th. t. per year
1 Zone	418,8	2 Zone	665,8	3 Zone	73,2
Krivoy Rog city	296,4	Dnepropetrovsk city	480,0	Pavlograd city	25,0
Nikopol city	31,2	Dneprodzerginsk city	60,0	Sinelnikovskiy district	10,6
Geltie Vodi city	21,6	Novomoskovskiy district	40,7	Pershotravensk city	8,9
Apostolovskiy district	10,8	Dnepropetrovskiy district	32,8	Mesgovskiy district	8,7
Tomakovskiy district	10,0	Novomoskovsk city	27,6	Ternovka city	7,7
Ordgonikidze city	9,0	Volnogorsk city	9,1	Sinelnikovo city	3,8
Krivorogskiy district	8,6	Verhnedneprovskiy district	6,0	Petropavlovskiy district	2,6
Nikopolskiy district	7,7	Magdalinovskiy district	5,1	Vasilkovskiy district	2,5
Marganec city	6,9	Petrikovskiy district	3,3	Pavlogradskiy district	1,7
Shorokovskiy district	6,7	Carichanskij district	1,2	Pokrovskiy district	1,1
Krinnichanskij district	4,8			Urjevskiy	0,6
Sophievskiy district	2,3				
Solonyanskij district	1,9				
Pyatihatskiy district	0,9				

SDW STORING VOLUMES WITHIN CITIES AND DISTRICTS



Cities	SDW volume, Thous.m ³	Polygons quantity		
Dnepropetrovsk	1 440,0	1	-	-
Volnogorsk	No data	-	1	-
Dneprodzerginsk	7 500,0	-	1	-
Geltie Vodi	5 832,0	-	1	-
Krivoy Rog	3 654,0	1	1	-
Marганec	No data	-	1	-
Nikopol	1 564,5	1	-	-
Novomoskovsk	6 000,0	1	-	-
Ordgonikidze	1 070,0	1	-	-
Pavlograd	995,0	1	-	-
Pershotravensk	44,5	-	1	-
Sinelnikovo	403,0	1	-	-
Ternovka	995,0	-	-	-

7500 Waste volumes, thous. m³
1 Natural landfills quantity
1 Illegal SDW polygons
1 Legal SDW polygons
n/d There is no data record in waste storage



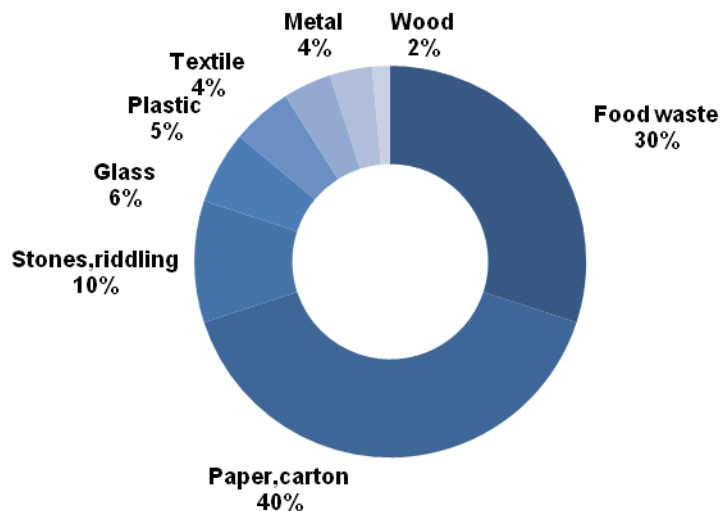
Districts	SDW volume, Th.m ³	Polygons quantity		
Apostolovsky	1 650,6	2	-	10
Vasilkovsky	No data	-	1	25
Verhnedneprovsky	1 002,2	-	2	-
Dnepropetrovsky	1 440,0	-	-	3
Krivorogsky	No data	-	-	37
Krinichansky	180,0	-	1	1
Magdalinovsky	1 215,0	-	1	7
Megovsky	104,0	-	-	13
Nikopolsky	1 564,7	-	-	15
Novomoskovsky	49,1	1	-	2
Pavlograd	No data	-	-	37
Petrikovsky	No data	-	-	10
Petropavlovsky	No data	-	-	22
Pokrovsky	400,0	-	1	22
Pyatihatsky	73,0	-	1	-
Sinelnikovsky	No data	-	-	23
Solonyansky	No data	-	1	-
Sophievsy	500,0	-	1	55
Tomakovsky	315,2	-	1	40
Carichansky	No data	-	1	15
Shorokovsky	607,0	-	1	25
Jurievsky	0,1	1	-	12

SOLID DOMESTIC WASTE (SDW) MORPHOLOGY



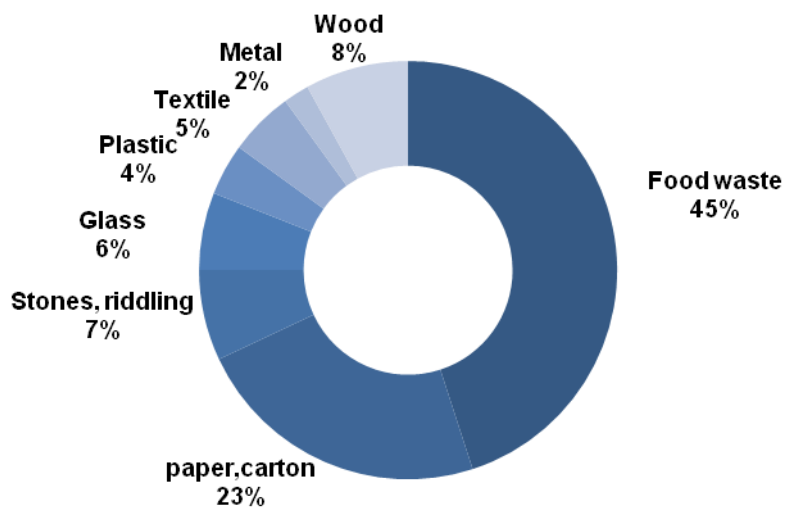
In industry districts¹

Apostolovskij,
Dnepropetrovskij,
Krivorosgskij,
Nikopol'skij,
Pavlogradskij,
Dnepropetrovsk,
Volnogorsk,
Deneprodzersginsk,
Geltie Vodi,
Krivoy Rog,
Marganec,
Nikopol,
Novomoskovsk,
Ordsgonikidze,
Pavlograd



In rural districts²

Vasilkovskij,
Verhnedneprovskij,
Krinichanskij,
Magdalinovskij,
Novomoskovskij,
Mesgovskij,
Petrikovskij,
Petropavlovskij,
Pokrovskij,
Pjatihatskij,
Sinelnikovskij,
Solonjanskij,
Sophievskij,
Tomakovskij ,
Carochanskij,
Shirokovskij,
Urjevskij,
Pershotravensk,
Sinelnikovo,
Ternovka



Comments

- ❑ Industrial cities are characterized by higher income level and variety of consumers goods. So plastic, glass and carton (shipping materials, publication paper) dominates in SDW volume.
- ❑ Domestic waste of rural zone are characterized by high percentage of organic waste (plant, bones, food waste).
- ❑ The SDW morphology is undergo the seasonal changes and characterized by increased content of food waste in summer, due to the greater fruits and vegetables consumption. In winter and autumn the content of the riddling and stones (street cleaning, road repairs) decrease.

*the 1-st source: TACIS programme survey for Donetskaya oblast held in 2005

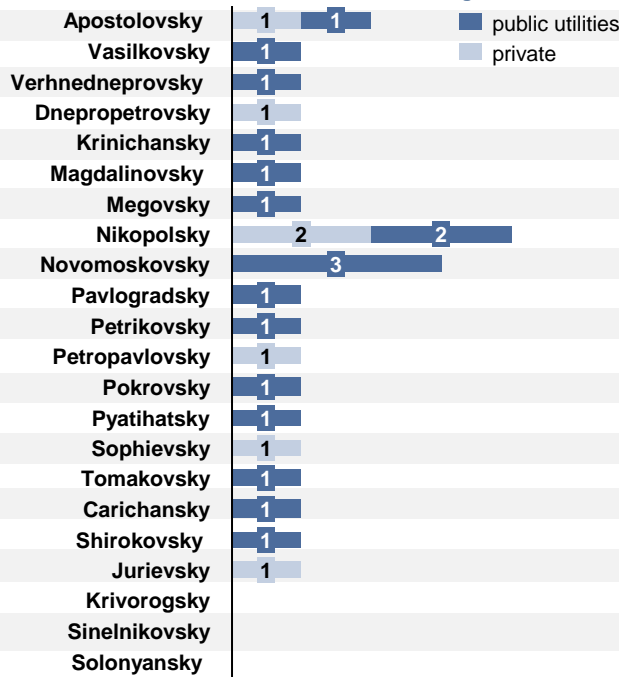
*the 2-nd source: TACIS programme survey for Donetskaya oblast held in 2005, changed according to the evaluation of experts' findings

SERVICE MARKET IN WASTE MANAGEMENT

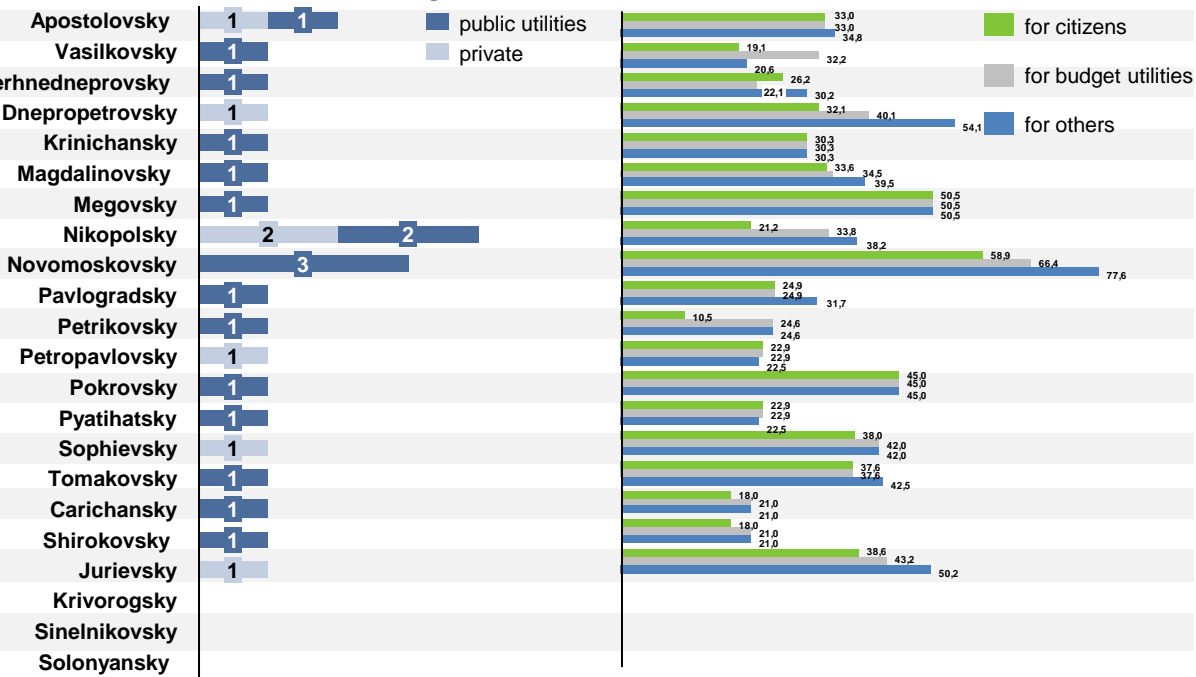


The quantity and status of market operators

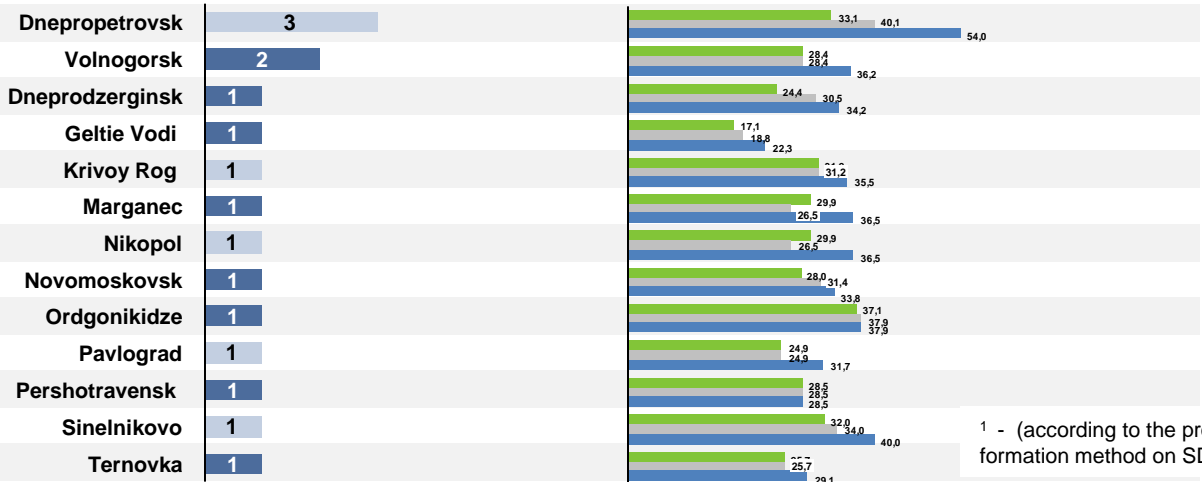
On regional districts



Tarrifs , grivnas/m3



Subordinate cities



Comments

- ❑ There are 41 enterprises (14 commercial - 34%, 27 public utility companies - 66%) involved in SDW collection and transportation. In addition, there is no service for collecting and transporting of solid waste in: Krivoy Rog, Solonyanskiy and Sinelnikovskoye areas.
- ❑ The tariff structure in the field of waste management, adopted by town and district councils¹ (for example, Krivoy Rog) consists of 80% - tariff for collection and transportation of solid waste and 20% - is dumping at the landfills tariff.
- ❑ This statement consider the possibility of commercial attractiveness of SDW collection and transportation services.
- ❑ Creation of inhouse SDW collection and transportation service will provide the opportunity for investor to get an additional profit through citizens tariffs and through risks minimization on raw materials delivery.
- ❑ The highest tariffs in Dnepropetrovsk are conditioned by high cost per 1 tone of SDW transportation to the landfill that placed in a great distance away from the city (Novomoskovsky district).

¹ - (according to the provision of Cabinet of Ministers «About adoption of tariffs formation method on SDW transportation services» dated from 26.06.2006y.)

SDW POLYGONS IN FIGURES



The possible profit volume from polygon degasification according to the Kiyoto protocol

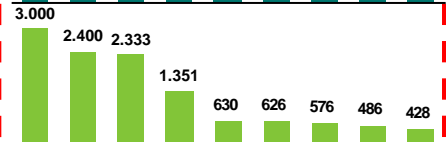


mln. euros

Comments

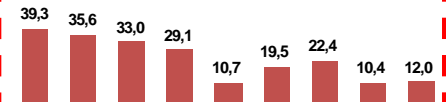
- ❑ Total volume of SDW in Dnepropetrovsk oblast is 35 million m3
- ❑ Annually 35 million of SDW produce about 29 million m3 of landfill gas per year (with methane content – 40-60%) & 296 thousands m3 of high toxic filtrate.
- ❑ In a territory of 9 largest landfills methane balance reserves amounts to **4,7 mln. m³**
- ❑ According to the approximate estimates annual filtrate emission is relative to the annual water consumption of settlement with population more than 5,5 thous. people.
- ❑ For the neutralization of landfill gas of such quantity it is necessary to plant 81 thous. hectares of wood.
- ❑ Realization of the 9 polygons degasification project within the Kiyoto protocol will bring in return – near to 1 billion euros (with 1 ECB cost of 11,4 euros)

Annual amount of greenhouse gas emission



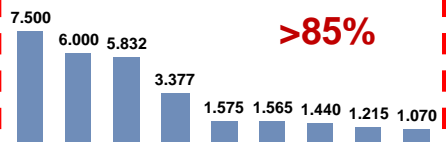
thous. m3

Annually amount of filtrate emission



thous. m3

The storing volume of SDW on the polygons

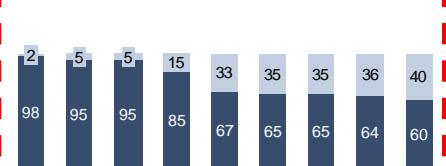


thous. m3

Polygons site



The landfill fullness



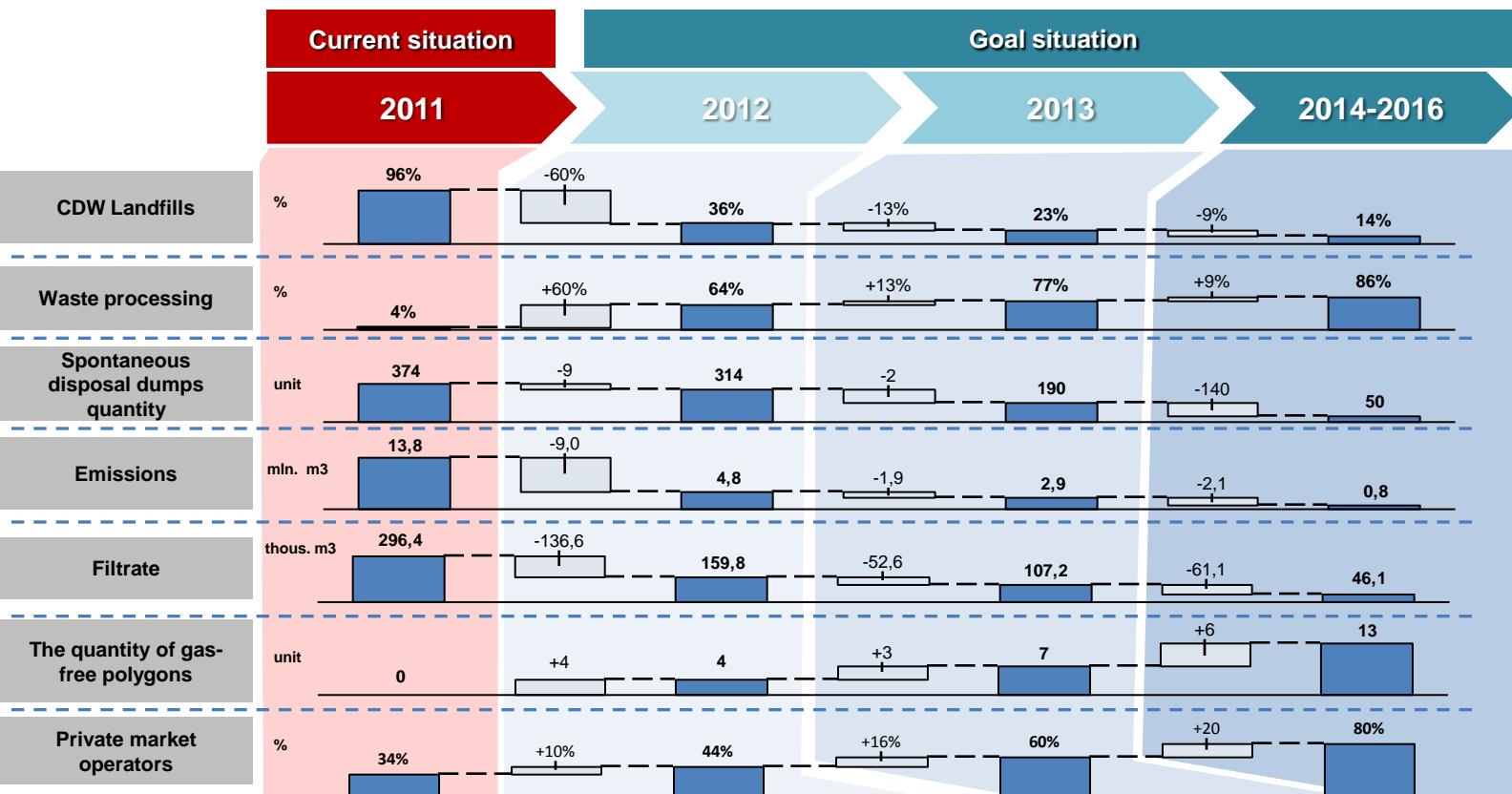
residual capacitance, % fullness, %

*On the territories of the following regions: Vasilkovskij, Krivorosgskij, Pavlogradskij, Petrikovskij, Petropavlovskij, Sinelnikovskij, Solonjanskij, Carichanskij & Volnogorsk and Marganec – there is no data record.

The source: Agency analysis

CURRENT AND GOAL SITUATIONS

(Preliminarily. Within the scope of discussion)



❑ The field of SDW management – is profitable and self-supporting sector of community facilities (more than 80% of private market operators)

❑ According to the waste processing volumes, region is stand on the relevant level to the leading European countries;

❑ The utilization percentage of waste disposal method is less than 15% - this polygons meet the all necessary ecological requirements.

❑ The disposal dumps percentage decreased on 87% since 2011y.

❑ There is an ecological load decrease due to the active polygon degasification.

❑ The polygons construction in Geltie Vodi and Jurievsky districts in concordance with national ecological standarts;

❑ 96 % of all SDW utilized by landfill method.
❑ More than 92% of waste storage places – are spontaneous disposal dumps;

❑ Low commercialization level of SDW management sector;

❑ Annual emissions of a greenhouse gas containing hazardous toxic substances;

❑ Emissions of the high-toxic filtrate.

❑ Reducing the number of gas and filtrate emission through the polygon degasification working with overflow (Dneprodzerzhinsk, Novomoskovsk, Geltie Vogi and Krivoy Rog).

❑ Decreasing in solid waste disposal through launching the first plants in Dnepropetrovsk and Krivoy Rog cities.

❑ Reducing the number of dumps improving waste logistics delivery to the plants and legal polygons.

❑ Initiated a project of garbage collecting services outsource.

❑ Started polygon degasification in Ordzhonikidze, Apostolovo, Nikopol, Dnepropetrovsk cities and Magdalinovsky, Dnepropterovsky areas.

❑ Recycling of SDW reaches to 77% of total generation.

❑ More than 60% of the market providing services in waste management – are given to private hands.

MUTUALLY PROFITABLE PARTNERSHIP



- ❑ We believe that the most effective solution of the waste problem is its commercialization.
- ❑ The fundamental principle of the future partnership – is achievement of mutual advantage from partnership.

PRIVATE INVESTOR

- ❑ Carrying out the business analysis and risks management
- ❑ Expert knowledge and technologies.
- ❑ Investments in construction.
- ❑ Competence in business management of the sector.



REGIONAL GOVERNMENT

- ❑ Providing the investor with all necessary information for optimal decision making.
- ❑ Providing the necessary raw materials flow
- ❑ Providing land on concessional terms. Assistance in service lines providing.
- ❑ Providing effective assistance to the process of all necessary approvals of the project.
- ❑ Additional benefits under government authority.

- ❑ Benefits from successfully functioning business.
- ❑ Strong positioning of a company for subsequent business expansion in Ukraine.
- ❑ Creation of a cutting edge experience and image raising.
- ❑ Providing image of a social-responsible company

INTERESTS

- ❑ Ecological situation improvement.
- ❑ Creation extra working places.
- ❑ Additional return to the budget for account of taxes.
- ❑ Decrease in financial funds for the construction of new landfills due to the reduced volume of solid waste storage on them.



THIS SLIDE DOES NOT CONTAIN THE FULL TECHNOLOGIES ANALYSIS

□ The partner selection would be based on effectiveness of suggested technology or a combination of technologies.

Factor	Waste disposal	Thermal treatment			Mechanic-and- biological reduction		
		Direct incineration (t=800 C°)	High-temperature pyrolysis (>1000 C°) ¹	Low-temperature pyrolysis (t<500 C°) ¹	Waste sorting	Anaerobic fermentation	Hydroseparation
Reduction depth	0%	60%	80%	80%	30%	40%	90%
Cost of 1 ton of waste processing	15\$	130\$	100\$	80\$	30\$	60\$	90\$
SDW type	combined	combined	combined	combined	combined	Organic fertilizer only	combined
Pre-sorting	X	X	✓	✓	-	✓	✓
Valued raw materials extraction	X	X	✓	✓	✓	✓	✓
Energy extraction ²	X	✓	✓	✓	X	✓	✓
The necessity of add. cogeneration equipment	X	✓	✓	✓	X	✓	✓
Waste sterilization	X	X	✓	✓	X	X	X
The minimal amount of harmful emissions into the atmosphere	X	X	✓	✓	X	✓	✓
The necessity of manual labor not required	✓	✓	✓	✓	X	✓	X
The necessity of residue burial	-	✓	✓	✓	✓	✓	✓
The presence of successfully operating plants	-	✓	✓	X	-	✓	X
Recommendations							

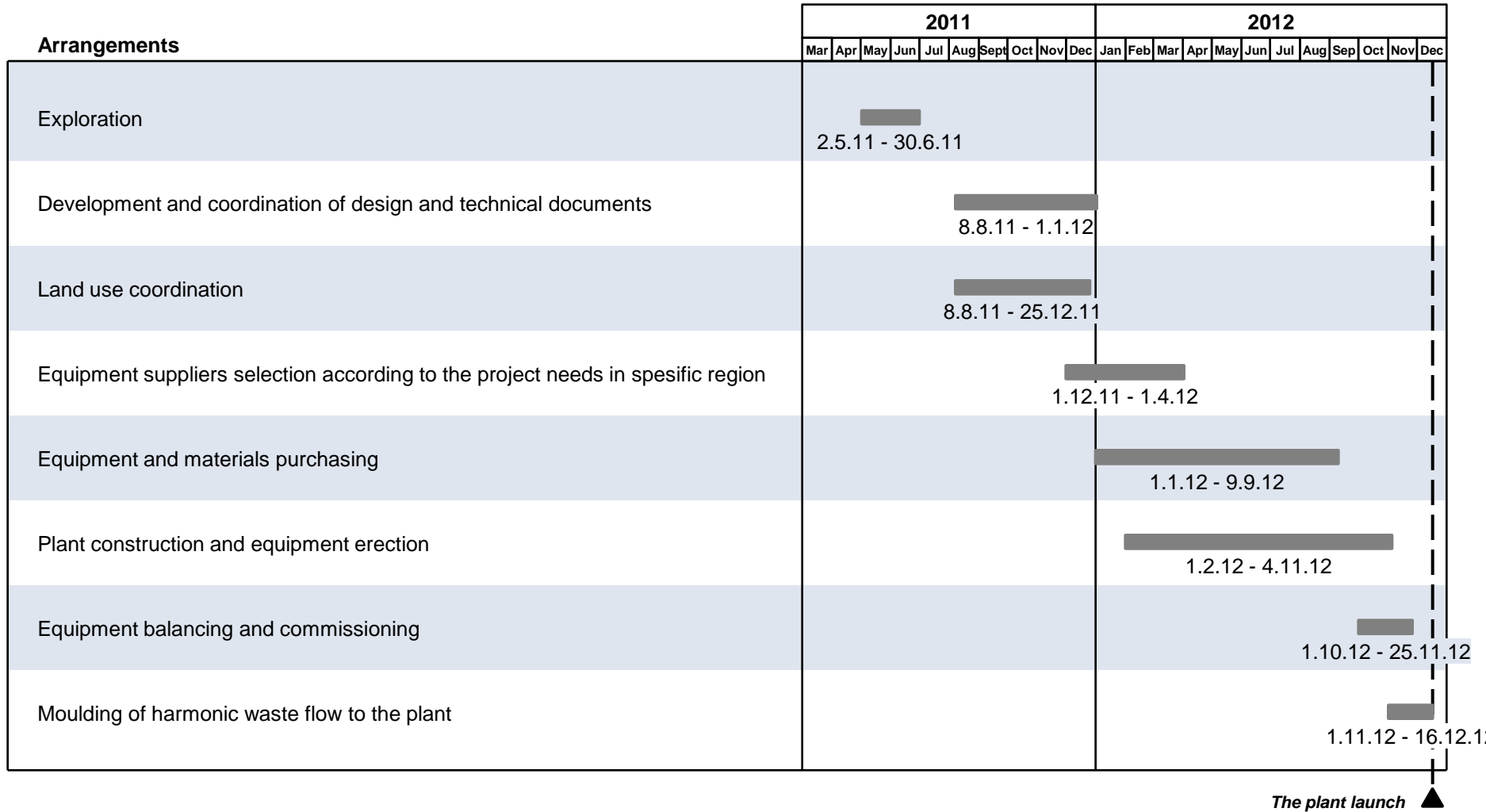
X no ✓ yes ● The best option ○ The worst option

¹ in modern plants using high-and low-temperature pyrolysis, the technology is used in combination with pre-sorting
² percentage of produced salvage and energy will depend on the SDW morphology.

THE SCHEDULE OF A WASTE RECYCLING PLANT CONSTRUCTION



PRELIMINARILY. WITHIN THE SCOPE OF DISCUSSION



SCHEDULE OF A LANDFILL DEGASIFICATION



- Project realization can be divided into two stages.

Arrangements	2011												2012											
	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Geological engineering survey – landfill potential exploration	1.4.11 - 31.5.11																							
Developing and coordination of the project developing documents (PDD)	1.6.11 - 30.9.11																							
Biogas collection system construction	1.10.11 - 28.1.12																							
Set up of the compressor station (for biogas evacuation) and a torch (for gas popping)	1.12.11 - 29.1.12																							
The system exploitation by collection of a landfill gas													1.2.12 - 31.12.12											
Sheltering slopes of the landfill with a special material to increase the efficiency of collection;													1.4.12 - 28.5.12											
Data collection of the quantity and quality of produced biogas													1.6.12 - 29.7.12											
Determination of optimal cogeneration plants.													1.8.12 - 30.9.12											
Purchase of cogeneration plants													1.10.12 - 30.11.12											
Cogeneration plants set up													1.12.12 - 28.12.12											
Production of electric and heat energy																								

The gas evacuation starts ▲

- Joint realization a procedure that allows us to obtain financing for the project. Performance of this procedure runs across the realization of the project itself.

Arrangements	2011												2012											
	мар	апр	май	июн	июл	авг	сен	окт	ноя	дек	январь	фев	мар	апр	май	июн	июл	авг	сен	окт	ноя	дек		
The (PIN) idea development according to the NAEI request	1.4.11 - 30.4.11																							
The NAEI supporting letter receiving	1.5.11 - 31.5.11																							
Developing of PDD	31.5.11 - 29.9.11																							
Determination of the project in one of the specialized Foreign organizations	1.10.11 - 30.11.11																							
Reception of the NAEI's letter of confirmation and as a CO project registration	1.12.11 - 31.1.12																							
The landfill methane pumping													1.2.12 - 31.12.12											
Monitoring and verification of the obtained reductions in emissions													1.2.12 - 30.12.12											
Release of the reduction units, receiving money for them													1.3.12 - 30.12.12											



If you are interested in information contained in this presentation, we ask you to send your suggestions(email address is attached), with the following data adjustment:

- Description of the proposed technology (es)
- Operating similar plants, their location
- Designed capacity
- Required construction area, required engineering services (electricity, gas, water and sanitary piping)
- Expected ecolodycal load decrease, European and Ukrainian standards obey
- Existed emissions into the atmosphere during operation of the proposed technology , their quantity and chemical composition
- Used measures to decrease harmful emissions into the atmosphere
- The residual waste percentage in total waste processeding volume, their toxicity and methods of utilization
- Methods to control the toxicity of residual waste
- The possibility of spontaneous dumps reduction
- Location and logistics proposals
- The project complexity (the possibility to place under investor's control SDW logistic system)
- The possibility of tariff reduction
- Budget
- The financing procedure
- Terms of contract

ANNEXES

LIST OF MAJOR WASTE-LEGISLATION OF UKRAINE



- Law of Ukraine "On Waste" (187/97-VR), changed according to the Law of Ukraine №1825-17, in redaction dating from 21.01.2010y.
➤ <http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=187%2F98-%E2%F0;>
- Presidential Decree N 31/2010 dated from 15.01.2010 "On governmental regulation in the field of waste management"
▪ <http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=n0001525-10;>
- Decree of the Ministry of Environment. About instruction approval on waste morphology and a landfills passport composition, № 60/3353 dated from 14.01.1999 y.
▪ <http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=z0060-99;>
- Cabinet of Ministers of Ukraine Ordinance. About development approval, adoption and revision of limits on waste formation and location dated from 08.03.1998 № 1218 (changed according to Ordinance KM N 1518 (1518-2002-n) from 11/10/2002)
➤ <http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1218-98-%EF;>
- Solid Domestic Waste management program (Ordinance of CM of Ukraine N 265 dated from 4.03.2004 y.)
➤ <http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=265-2004-%EF;>
- The procedure of tariffs formation on waste transporting services (Decree of the Cabinet of Ministers of Ukraine N 1010 from 26.07.2006 y., In redaction dated from 07.08.2009y).
➤ <http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1010-2006-%EF;>
- Cabinet of Ministers of Ukraine Ordinance. About landfills registration approval, № 1216 from 03.08.1998 y. (changed according to Ordinance of CM of Ukraine N 1518 (1518-2002-n) dated from 11/10/2002)
➤ <http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1216-98-%EF>