

POTENTIAL OF THE GREENHOUSE GAS EMISSION REDUCTION AT THE UKRAINIAN LANDFILLS AND WASTE DUMPS

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Ukraine – general information

Range of the town thous. inhabit	Number	Population	
		inhabit	%
50-100	56	3 950 000	8.2
100-200	17	2 220 000	4.6
200-500	22	6 450 000	13.4
500-1000	6	4 980 000	10.4
> 1000	5	7 670 000	16.0
Total	106	25 270 000	52.6

Landfill sites



Landfill gas potential



Ukrainian towns generate **10 mln tones** of MSW.

More than **90%** of MSW is disposed at the landfills. There are **700** landfills located around the towns.

Only **100** of them can be considered as suitable for extraction and utilization of landfill gas.

90 biggest landfills contain **30%** of MSW total amount.

Based on this facts, potential of landfill gas available for energy production comes to about **400 mill m³/year** that is equivalent to **0.21 mill toe** or **6.0 mill CO₂e**

The possible JI projects in the waste management sector in Ukraine

- Landfill gas capture and flaring;
- Landfill gas capture and combustion in a cogeneration plant (heat and electricity production);
- Landfill gas capture and directly utilization in a boiler/kiln/ furnace etc.;
- Bioreactor landfill cell (low technology biogas plant);
- Biogasification (high technology biogas plant);
- Mass incineration;
- Pyrolysis, and.
- Aerobic composting.

Landfill sites – JI projects summary

Town	MSW acceptance rate	MSW in place	Area,	Depth	Start year	Project	CO ₂ reduction	Project cost
	th. tons/yr	Mln tons	hectare	m			t CO _{2e} /yr	
Lviv	230	8,4	33,3	35	1959	4,5 MW _e	160,000	4,5-6,8
Odessa	150	2,3 (5,3)	11,7 (30)	22-25	1972	4-6 MW _{th}	65,000	1,1
Poltava	90-100	6,2	14,7	30-35	1974	2,0 MW _e	75,000	2,0-3,0
Chernihiv	105	4,0	24,6	10-20	1961	2,0 MW _e	90,000	2,3-3,0
Lugansk	75	1,7	8,0	20-25	1979	1-1,5 MW _e	54,000	1,5-2,2
Khmelnitskiy	70	2,7	17,4	20-30	1953	1,5 MW _e	60,000	1,7-2,3

SEC Biomass experience - 1

- “Methane Capture at the Odessa Municipal Solid Waste Landfill” (ERUPT-5, passed both PIN and PDD phases, refused without LoE).
- Project Idea: Installation of landfill gas extraction system at Odessa MSW landfill that will capture methane and replace natural gas at Cement factory kilns.
- Expected GHG Emission Reductions:
 - Natural gas replacement at Cement factory will abate on average over 7,000 t of CO₂e/year.
 - Capture of methane emissions at the landfill will abate on average over 60,000 t of CO₂e/year.
 - Total expected ERUs for the commitment period (2008-2012): 320,000 t of CO₂e.
 - Expected AAUs: 100,000 tons of CO₂e.
 - Total Cost of the Project: 1.1 million EUR.

SEC Biomass experience - 2

- Feasibility study for Lugansk landfill gas project. In cooperation with Shimizu Corporation. Positively evaluated by Japan JI program. Waiting LoE of Ukrainian Government
- Identification of 10 new JI projects on landfill gas collection and utilization. As subcontractor of Decon - Energie Consult Ingenieurgesellschaft.

Other experience

Danish environment protection agency (Cowi A/S)

- Landfill gas utilization in Kyiv landfill no. 1 and no. 5
The estimated average ERUs per year – 255,000 tons CO₂e
Investment cost (flaring and electricity production – 3,3 mln euro
- Landfill gas utilization in Kharkiv oblast (Dergachi landfill)
The estimated average ERUs per year – 80–90,000 tons CO₂e
Investment cost: 1,5 mln euro (flaring), 3,2 mln euro (electricity)
- Landfill gas utilization in Donetsk oblast
The estimated average ERUs per year – 80–90,000 tons CO₂e
Investment cost: 1,5 mln euro (flaring), 3,0 mln euro (electricity)

Problems and prospects

- Current Ukrainian legislation does not require mandatory degassing of the landfills
- LFG utilization is not always financially viable under Ukrainian conditions without JI mechanism
- Due to the low power sales tariffs, electricity sales revenues will be too low compared to the investment needed for power production - direct use of LFG is preferable option (flaring for small landfills)
- The LFG capture projects offer the highest revenues from ERU sales compared to other projects → the ERU sales plus power sales allow reaching financial feasibility of LFG-to-electricity projects in Ukraine with IRRs of 14-20% and payback periods around 4 years

Problems and prospects

- Key point - financial conditions and level of interest of the owner/operator of the landfill site
- Co-financing from owners (municipalities) and operators (municipal transportation enterprises) can hardly be expected
- Risk of failure in reaching power purchase agreements with electricity supply companies. Therefore private power (and possibly heat) sales agreements would be of benefit
- Bad technical conditions and a lack of reliable technical data at some landfills restrict practicability of potential JI projects
- Test drilling is recommended for the accurate estimation of the LFG production

Conclusion

- The main GHG emission reduction potential is connected to the towns with population more than 200 thousands inhabitants.
- The usual method of LFG utilization can be power generation by IC-engines.
- For smaller town with population less than 100 thousands inhabitants LFG can be captured and flared without utilization. For JI project it can be recommended to joint 3-5 landfills in the certain region under one project umbrella.

Thank you
for your attention

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