The Global Methane Initiative

LFG Projects Development within the Global Methane Initiative Program in Ukraine

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Presentation structure

- Ukrainian landfills
- LFG capture and utilization potential
- GMI projects
  - Landfill gas assessment (Khmelnitskiy, Lutsk), pump tests (Chernivtsy, Mariupol)
  - Infrared heaters at Ukrainian landfills (Khmelnitskiy)
  - Landfill gas recovery and flaring (Rivne)
- Problems and prospects of LFG technology development in Ukraine
# Ukrainian landfill and waste dumps

<table>
<thead>
<tr>
<th>Town</th>
<th>Population</th>
<th>Starting year</th>
<th>MSW, t/year</th>
<th>MSW in place, mill tones</th>
<th>Area, hectares</th>
<th>Depth, meters</th>
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</thead>
<tbody>
<tr>
<td>Kiev</td>
<td>2,642,000</td>
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<td>730,000</td>
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<td>33.3</td>
<td>35</td>
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<td>Mariupol</td>
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<td>1967/76</td>
<td>100,000</td>
<td>2.5+2.5</td>
<td>12+12</td>
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<td>1956</td>
<td>75,000</td>
<td>3.0</td>
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Ukrainian landfill and waste dumps

- Steep slopes (up to bottom waste loading)
- Fire events
- Improper covering (big active spot)
- Leachate flooding
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**

- Ukrainian towns generate **10-12 mill tones** of MSW per year
- More than **95%** of MSW is disposed at the landfills. There are **700** landfills located around the towns.
- Only **100** of them can be considered as potential candidates for recovery and utilization of landfill gas.
Luhansk landfill

First experience – demonstration wells (2003-2006)

60 m³/h of LFG (50% of CH₄)
GMI projects
LFG assessment reports

- Khmelnytskyi
- Lviv
- Lutsk
- Chernivtsi
- Mariupol
- Sumy
- etc.
GMI projects
LFG assessment - Khmelnitskiy

- **Landfill**
  - Starting year - 1956
  - MSW – 75,000 tones/year
  - Area – 8.8 hectares
  - Depth - 35 meters
  - Waste in place – 3.0 mill tones
GMI projects
LFG projection based on pump test - Chernivtsy

- **Landfill**
  - Starting year - 1995
  - MSW - 70-80,000 tones/year
  - Area - 25 hectares
  - Depth - 15-18 meters
  - Waste in place – 0.8 mill tones

- **Pump test**
  - Duration – two weeks in July 2007
  - Three wells and four pressure probes
  - Methane flow – 75-25 m³/h
  - Methane content – 55-40%
  - Oxygen content – < 0.6%
GMI projects  
LFG projection based on pump test - Chernivtsy

Lo total = 118.0 m³/Mg 
k (fast-decay) = 0.180/year 
k (medium-decay) = 0.036/year 
k (slow-decay) = 0.009/year
GMI projects
LFG projection based on pump test - Mariupol

- **Landfill**
  - Starting year – 1967
  - Closure - 2009
  - MSW – 75,000 tones/year
  - Area - 12 hectares
  - Depth – 25-30 meters
  - Waste in place – 2.5 mill tones

- **Pump test**
  - Duration – four weeks in August-September 2008
  - Three wells and nine pressure probes
  - Methane flow – 50-45 m³/h
  - Methane content – 65-35%
  - Oxygen content – < 0.8%
GMI projects
LFG projection based on pump test - Mariupol

Lo total = 84.0 m$^3$/Mg
k (fast-decay) = 0.140/year
k (medium-decay) = 0.028/year
k (slow-decay) = 0.007/year
GMI projects
Infrared heaters based on LFG

- Heated area – 2 x 126 m²
- Type of IR-heater – *Roberts Gordon Black Heat U30*
- Capacity – 30 kW
- Number of heaters - 4
GMI projects
Infrared heaters based on LFG
GMI projects
Infrared heaters based on LFG
GMI projects
LFG recovery and flaring (Rivne/Chernigov landfill)

- **Landfill**
  - Starting year - 1959
  - MSW – 120,000 tones/year
  - Area – 22 hectares
  - Depth – 15-25 meters
  - Waste in place – 2.0 mill tones

- **Pump test**
  - Duration – May 9-20 and July 29-August 05, 2009
  - Three wells and twelve pressure probes
  - Methane flow – 55-20 m³/h
  - Methane content – 50-35%
  - Oxygen content – < 1.2%
GMI projects
LFG recovery and flaring (Rivne/Chernigov landfill)

Future pump test
- Duration – end of December – April, 2011
- Three gas extraction wells

Landfill
- Population – 300,000
- Starting year - 1961
- MSW – 120,000 tones/year
- Area – 14 hectares
- Depth – 15-20 meters
- Waste in place – 2.0-2.5 million tonnes
Chernigov landfill

LFG collection and transportation to boiler house (District heating and hot water supply)

- Well number - 56
- LFG flow – 300-500 m³/h
- GHG emission reduction – 20-35,000 t CO₂-eqv/year
LFG project in Mariupol
(Joint Implementation)
LFG project in Mariupol (Joint Implementation)

- Population – 480,000
- Starting year – 1967/1976
- Closure – 2009/2011
- MSW – 120,000 tones/year
- Area – 12+12 hectares
- Depth – 30/20 meters
- Waste in place – 2.5+2.5 mill tones
LFG project in Mariupol
Landfill #1 – design

52 wells,
3 gas collection points,
total piping – 6.4 км
LFG project in Mariupol
Landfill #1 - construction
LFG project in Mariupol
Landfill #1 – LFG utilization options

Start up – February 2010

Stage 1 (2010) –
flaring at Hofstetter Umwelttechnik AG
HOFGAS® – Ready 800

Stage 2 (2011) –
CHP Jenbacher engine 0,625 MW

Stage ¾ (2011-1012) -
Landfill #2
LFG project in Mariupol
Monitoring
Problems and prospects of LFG technology development in Ukraine

- Local project structure and decision making – bottleneck
- Key point - financial conditions and level of interest of the owner/operator of the landfill site
- Low waste management tariffs. Co-financing from owners (municipalities) and operators can hardly be expected
- Bad technical conditions and a lack of reliable technical data at some landfills restrict practicability of potential JI projects
- Ukraine is not big. Ukrainian landfills are relatively small
Problems and prospects of LFG technology development in Ukraine

- Currently LFG projects at old landfills can hardly be implemented without Kyoto Protocol
- The main GHG emission reduction potential is connected to the towns with population more than 200,000 – 33 towns
- 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
- Condition would improve:
  - price for natural gas goes up
  - support of the government by green tariffs for electricity
  - implementation of the strategy of new regional landfill erection and old landfill closure
Thank you for your attention

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