

Biogas from landfills in Latvia

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1 Introduction

Renewable energy share in gross energy consumption should to increase up to 40% in year 2020 or should to rise by 7.5% compare to year 2005 in Latvia. Every inhabitant produces 200~300kg solid wastes, about 475000 t per year in Latvia. About 25% of them are organic waste. Different technologies are used for utilisation of these wastes. One of the best is biogas producing. There were 59 biogas plants built in Latvia, six from them in landfills (Fig.1).

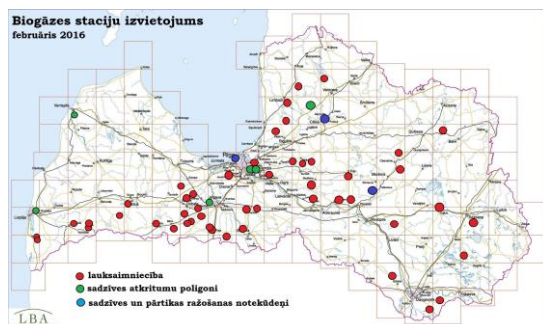


Figure 1: Biogas plants in Latvia; green- in landfills (source LBA).

The most important biogas sources include municipal landfills that can take more than 10 tonnes of waste per day or have a total capacity of over 25,000 tonnes. In Latvia, these are already existing waste disposal sites, which have formed in big cities - Riga, Liepaja, Daugavpils and Jelgava, as well as newly built regional landfills, where the collection and further processing of biogas is defined as a requirement of the EU Directive. Solid municipal waste deposited in landfills is rich in organic matter and forms biogas. It is useful to collect it to

reduce GHG emissions. In small dumps, biogas must be burned in a torch, or converted into harmless chemical compounds. In large biogas, electricity and heat can be produced. It should be noted that waste disposal is allowed only for solid municipal waste or sewage sludge with a moisture content not exceeding 80%. The aim of this study was to assess the use of the installed electrical capacity of each biogas plant at the landfill.

2 Materials and methods

In Latvia only biogas from solid household waste is produced by BO Getlini, Liepaja Ras, ZAAO, Brakši energija and Pentuli. Ltd. Reconstruction and Investment uses gas from Getlini landfill. Their gas extraction technologies were surveyed. The amount of waste and the potential of biogas from presented landfills has been estimated using statistical and literary data. The power utilization factor is calculated using the following formula:

$$Jik = Eg / Kg \%$$

Where Jik- power utilization factor %
Eg-Electricity produced per year MWh
Kg-electricity sales quota in MWh per year

3 Results

As popular technology in Latvia is forced bioconversion of municipal solid organic wastes. This so-called bio-cell technology, where waste is disposed of in specially-formed compartments, and provides additional waste of moisture, allows them

to be mineralized several times faster. A scheme with horizontal lines, vertical wells and a humidification system is also used. Approximately 250000 tons solid wastes per year are coming to landfill Getlini. 24% from them are usable for anaerobic digestion.



Figure 2. . Getlini landfill



Figure 3 . Getlini landfill biogas plant

The amount of waste, the expected biogas potential and energy production in Latvian landfill sites are shown in Table 1. Polygon Pentuli use gas for their own needs, no data.

Table 1 Extraction of energy in landfills

Name	Waste, t per year	Biogas potential, m ³ / y	Electricity, MWh / y	Therm. energy, MWh / y
Getlini Eko	1500 000	18 000 000	36000	45000
Daibe	34817	600000	1200	1400
Pentuli	19800	own use		
Kivites	30 803	1800 000	3600	4500
Braski	30 000	750000	1500	1800

The installed power capacity utilization factors for each year and for each landfill are shown in Table 2.

Table 2 Power factor % for every year

Name	Installed power MWeI	Electricity MWh / y 2014,2015, 2016,2017, 2018	Power factor% 2014,2015 2016,2017, 2018
Getlini Eko	6,28	29000; 27706; 25555; 24942; 23685.7	80.56; 76.96; 70.99; 69.28; 65.79
ZAAO Daibe	0,35	1010; 939.6; 946; 1032.3; 964.0	84,61; 72.26; 72.78; 79.4; 74.15
Rekonstr. Investm.	0,56	5543; 6013.8; 6206; 6007.3; 4883.6	98.98; 92.23; 95.18; 92.14; 87.21
Liepaja RAS Kivites	0,45	3303.6; 3720; 3268.8; 3259.2; 3261.7	91.77; 103.34; 90.8; 90,54; 90.6
Braski	0,18	913.0; 910.9; 889.8; 733.6; 597.2	61.94; 71.17; 69.51; 57.32; 46.65

4. Conclusions

The most stable capacity of its installed capacity in the last five years has been used by Liepaja RAS landfill in Kivites. Jelgava landfill Braski builds second layer of bio cells, then better use of power is expected. On average, the capacity of biogas plants in landfills of Latvia is used from 77.2% to 80.94%.