



CLOSURE OF OLD WASTE DUMPS WITH METHANE DESTRUCTION FOR GHG EMISSION REDUCTION AND MINIMIZING THE NEGATIVE IMPACT ON THE LOCAL ENVIRONMENT

TECHNOLOGY DESCRIPTION

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Waste disposal is a trailing treatment practice of municipal solid waste (MSW) management systems, being the most inefficient method in terms of resource conservation, energy efficiency and environmental impact. In essence, disposal is a final stage of a product's life cycle. Transitioning from waste disposal dominating MSW disposal practice to other modern MSW treatment methods is an integral part of a sustainable MSW management system. Thus, widespread dissemination of technologies for closure of waste dumps and landfills is necessary to implement modern MSW management systems.

The hardware components of landfill and dump closure include: landfill gas degassing system, multifunctional upper covering layer, filtrate collection and treatment system monitoring infrastructure, specialized vehicles (bulldozers and excavators) etc.

The software component includes the personnel's knowledge and experience for how to adhere to building codes, carry out construction and monitoring activity, use modelling software and analyse obtained results etc.

The orgware component includes cooperation among state institutions, business and society, legislation for landfill and dump's closure procedures; tariffs, taxes, penalties etc.

The closure of old waste dumps with methane destruction technology was identified as a highly desirable technology for its wide introduction in Ukraine.

CURRENT TECHNOLOGY READINESS LEVEL OR COMMERCIAL READINESS INDEX

More than 10 Mt or 93.7 % of officially collected volumes of MSW were disposed in 6045 operating landfills and dumps occupying 8761 hectares in Ukraine during 2020. Waste Management Strategy sets the target to decrease MSW landfilling share up to 30 %, to close all existing landfills/dumps and to reach the number of only 300 sanitary landfills in operation by 2030. Technology readiness level for the closure of old dumps with methane destruction in Ukraine is considered as formulated technology concept, commercial readiness as commercial trial.

CLIMATE RATIONALE OF THE TECHNOLOGY

Combustion of landfill gas without energy production contributes to GHG emissions reduction in such a way that landfill gas capture prevents the release of methane into the atmosphere¹. Due to the fact that methane has a high global

¹ Methane global warming potential equals to 25). For calculation of GHG emissions reduction of large scale methane capture at landfills project, the Approved Consolidated Methodology ACM0001 (Consolidated baseline and monitoring methodology for landfill gas project activities - Version 11) under the Clean Development Mechanism of the UNFCCC Kyoto Protocol (CDM) can be applied.



warming potential, which equals to 25, contribution of methane emissions from solid waste disposal sites in Ukraine equals to 2.4 % of the total national GHG emissions in Ukraine ².

Ukrainian landfills annually generate 8.0 Mt CO₂-eq. of GHG emissions. Closure of old waste dumps with methane destruction having efficiency 50% could reduce GHG emissions by 3.5 Mt CO₂-eq./year.

According to the Updated Nationally Determined Contribution of Ukraine³ to the Paris Agreement (NDC2), closure of old waste dumps with methane destruction is one of the key measures to be introduced in the national MSW management system to achieve the target on GHG emission reduction in the Waste sector by 2030.

AMBITION OF THE TECHNOLOGY

SCALE FOR IMPLEMENTATION AND TIME-LINE

The level of diffusion for old dump closure technology with methane destruction should be consistent with the target for decreasing MSW disposal. Waste disposal sites have to be ready to dispose 70 % of generated MSW in 2030; 30 % in 2040 % and 5 % in 2050. Such level of ambition for decreasing of MSW disposal corresponds to the implementation of the Waste Sector Target scenario to achieve sectoral goals stated in the NDC2, as well as to the implementation of the National Waste Management Strategy of Ukraine with a ten-year postponement. The countrywide scale for implementation and time-line for closure of old dumps with methane destruction, which corresponds to the above stated target for waste management sector development, is presented in the table below.

Component of the technology	UoM	2020	2022-2030	2031-2040	2041-2050	Cumulative, 2022-2050
Number of solid waste disposal sites to be closed	units	-	2249	3796	-	6045

AMBITION FOR TECHNOLOGY READINESS LEVEL OR COMMERCIAL READINESS INDEX

Old waste dump closure technology with methane destruction doesn't have an alternative to reach the NDC2 target in the Waste sector by 2030. New regional sanitary landfills are planned to substitute the old dumps in future. To ensure development of methane destruction at the old dumps (that are planned to be closed), Ukrainian Government has to increase the tax on CH₄ emissions and/or to introduce a new mandatory condition for closure of old deep dumps, which is the construction of methane destruction systems with active or passive degassing.

EXPECTED IMPACTS OF THE TECHNOLOGY

The expected impact of old dump closure technology with methane destruction can be roughly estimated as 10-15 % of direct GHG emissions reduction in the Waste Sector by 2030, by destruction of generated landfill gas. A significant effect on indirect GHG emissions reduction could also be achieved by reducing supply in MSW disposal services.

The process of old landfill and waste dumps closure and new regional landfill construction creates jobs associated with the design, construction and the operation of the landfills. These projects involve engineers, construction firms and equipment vendors. Many of these costs are spent locally, helping communities to realize economic benefits from the increased employment and local sales.

² Ukraine's GHG Inventory, 1990-2019. Available at: <https://unfccc.int/documents/273676>

³ Published in 2021, available at: <https://bit.ly/3ik1wMQ>



POLICY ACTIONS FOR TECHNOLOGY IMPLEMENTATION

EXISTING POLICIES IN RELATION TO THE TECHNOLOGY

The acting waste management legislation is out-of-date. The draft law “For Waste management” (in line with EU requirements for waste treatment system, involving the implementation of waste hierarchy principles, extended producer’s responsibility, electronic licensing systems, and also implies changes in waste classification and accounting system) is still at the approval procedures stage. In order to facilitate transformation processes on the basis of EU principles and practices, the National Waste Management Strategy up to 2030 was approved by the Cabinet Ministers of Ukraine in 2017 and the National Waste Management Plan up to 2030 in 2019. However, it is possible that the National Waste Management Strategy up to 2030 will not be fully implemented by 2030 as part of old dump closure technologies development.

PROPOSED POLICIES/MEASURES TO ENHANCE TECHNOLOGY IMPLEMENTATION

In order to achieve the GHG emission target in the Waste sector, which was set up in the NDC2, the following main policies and measures are proposed to be implemented for dissemination of old dump closure technology with methane destruction:

1. The creation of necessary infrastructure:

- 1.1. To monitor existing disposal sites and their conditions by means of creation of MSW disposal sites inventory (2022-2024).
- 1.2. To create and implement waste disposal sites phase out plan by means of development and adoption of list of MSW disposal sites, which operation has to be stopped (2024-2025).
- 1.3. To close existing solid waste disposal sites which do not meet the established operational requirements by means of facilitating projects for MSW disposal sites closures (2025-2040).

2. The introduction of disposal face-out motivating financial mechanisms:

- 2.1. To ensure the availability of funds for landfill closure by means of the introduction of disposal face out stimulating tariffs for waste disposal (2022-2023)
- 2.2. To introduce landfill operators’ responsibility for MSW disposal for environmental damage and commitments to finance the restoration of environmental components that have been adversely affected by landfills (2022-2023).

COSTS RELATED TO THE IMPLEMENTATION OF POLICIES

Approximately 1.69 bln euros are needed to achieve the level of ambition for waste disposal sites closure, which is to close 99.95 % of acting landfills or 6045 units by 2040 in Ukraine including 0.63 bln euros for the 2022-2030 period and 1.06 bln euros for the period 2031-2040.



USEFUL INFORMATION

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LINKS TO TNA REPORTS

Reports prepared within the TNA Project:

- Technology Needs Assessment
- Barriers Analysis and Enabling Frameworks
- Technology Action Plan

Full texts of the TNA reports are available at: <https://tech-action.unepdtu.org/country/ukraine/>

TNA Project page at the web-site of the Ministry of Environment and Natural Resources of Ukraine:
<https://menr.gov.ua/news/33450.html>