

TECHNOLOGIES TO SOLVE THE WASTE CRISIS IN UKRAINE

Dmytro Shliaha

Faculty of Electrical Engineering and Automatics,

National Technical University of Ukraine «Igor Sikorsky Kyiv Polytechnic Institute»

The problems of waste management have long ago moved into the category of global problems, requiring new approaches to their solution. Perhaps the most threatening problem is the fight against methane emissions, since methane is not only a powerful greenhouse gas, but also a local pollutant. It forms secondary ground-level ozone, which causes many diseases, for instance, asthma and contributes to smog. In summer, methane emissions can even spontaneously combust. The decomposition of household waste is the third largest source of methane emissions to the atmosphere; this greenhouse gas is 86 times more potent than CO₂. Controlling methane emissions is critical to achieving climate goals and is a priority to limit global warming.

In 2021, Ukraine joined the EU and US Global Methane Challenge initiative,

which aims to reduce global methane emissions by 30% or more of 2020 levels by 2030 and reduce global warming by at least 0.2°C by 2050. If the problem of methane in landfills does not turn into regeneration, it will be difficult for Ukraine to conduct a dialogue with the EU on cooperation on the «green course» and attracting investment to decarbonize the economy.

Experts of the United Nations Environment Program (UNEP) recommend seven basic technologies for the new national waste management system: 1) landfill methane collection with energy production; 2) closure and reclamation of old landfills with methane capture or biodegradation; 3) sorting of resource-valuable components of household waste with subsequent recycling of residual waste using other technologies; 4) mechanical and biological treatment by separating the organic fraction for biogas production; 5) separation of the solid fraction for the production of alternative fuel for the cement industry; 6) processing of sewage sludge into biogas; 7) composting of food and garden waste. Each of these technologies require investment in one form or another. Accordingly, in order for someone to invest in them, the state must develop return mechanisms, such as fees for waste collection and recycling in the commercial sector, economically justified tariffs for the population, taxes and fees under extended producer responsibility.

Waste management technologies recommended by UNEP as environmentally friendly are common in the EU, but not in the United States.

There are more than 2,600 solid waste landfills in the U.S., most of them are large and developed with engineered facilities and methane capture and disposal systems. The U.S. Environmental Protection Agency (EPA) monitors air and groundwater conditions around these landfills. U.S. experience shows that huge landfills can accumulate biogas for 15 to 30 years after they are closed. This resource can be used to generate electricity and heat by burning it in combined heat and power plants, pumping it into gas pipelines or fueling vehicles with it. Some landfills in the U.S. purify methane and bring it up to natural gas standards, the other produce purified methane from agricultural waste.

According to the European approach, the first measure in the waste management

hierarchy is to prevent the formation of mixed waste, which is difficult to recycle and dispose of. This is exactly what the Ukrainian «municipal solid waste» is, where organic matter is mixed with plastic, packaging, metal, glass and wood. When they end up in the landfill and begin to rot, large amounts of methane and other substances are released, as well as a highly toxic liquid - leachate. If organic residues and dry waste are collected separately, effective and environmentally sound waste management at the local level becomes possible.

I believe that for the Ukrainian reality composting is the most simple and effective technology for processing organic waste with the help of bacteria among the main technologies proposed by UNEP for the national waste management system. As of today, the overall level of organized composting of household waste in Ukraine is extremely low – less than 0.1%. Despite the fact that this technology does not require significant investments, only a few municipal enterprises use it. Compost production is a profitable business if it is carried out under a public-private partnership model. For this purpose, local waste management plans should provide for the appropriate location of compost production facilities. Compost can be used to feed urban green spaces and reclaim degraded land. The use of compost on agricultural land increases soil fertility and increases profits for producers. It also reduces the use of chemical fertilizers and limits their harmful effects on soil and water.

Despite the military situation in Ukraine, reforms to address the waste crisis continue to be extremely important and urgent. The adoption of a framework law on waste management could accelerate the development of a national strategy to reduce the disposal of biodegradable waste. It should define goals and measures to achieve them, such as separate collection, composting, biogas production, and recovery of materials or energy from waste. Implementation of the reform will require landfills to obtain temporary permits to dispose of waste in accordance with basic environmental requirements. Landfills should be built in accordance with EU standards. A strategy is also needed to reduce the volume of biodegradable waste disposal, which will stimulate the introduction of composting and mechanical-biological waste recycling technologies. Since mixed waste can decompose and release methane over several

decades, in the most optimistic reform scenario Ukraine will have to collect methane in landfills for a long time. However, in developing waste management systems, the country should move along the path of the EU countries, which seek to move to a «circular economy» and actively work to associate the concept of "waste" with the «green course» of economic development.

All in all, among the technologies available to solve the problems of waste management and reduce the garbage crisis, there are technologies acceptable to any economy. Ukraine needs a healthy economy, and after an unconditional victory in the war Ukraine has all the possibilities to overcome the waste crisis as effectively as possible, using its own capabilities and progressive world experience.

Reference:

Savytskyi, O. (2022, June). *Ukraina zmozhe podolaty smittievu kryzu. Shcho peredbachaie ukhvalenyi Radoiu zakon? [Ukraine will be able to overcome the waste crisis. What does the law passed by the Rada provide for?]*. Retrieved October 29, 2022, from <https://www.epravda.com.ua/publications/2022/06/20/688345/>.