Principle of Mobility in Processing Waste of Production and Consumption - Solution of the Problem of Liquidation of Russian Garbage Dumps

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Abstract. Research carried out in EU countries resulted into the conclusion about the high environmental hazard of garbagelandfills. These studies found the need changes in attitudes towards solid municipal wastenot as waste, but as renewable energyresource, with huge daily renewal. Based of these studies, the author created a mobile complexprocessing, this infinitely renewable resource, in electricity and energy carriers, which is intended forelimination of authorized and unauthorized landfills.

1. Introduction
The mode of existence of modern humanity is a struggle with Nature. This way of existence was very precisely and succinctly formulated at the beginning of the twentieth century: "We cannot wait for favors from nature, our task is to take them from her." This slogan has become the strategy of mankind for the entire XX century. This method has formed the consumer attitude of man (mankind) to Nature, and now we are confidently and rapidly turning our planet into a global garbage dump.

2. Relevance and problem statement
Large equipped dumpsites in large cities are less dangerous than hundreds of thousands of unsettled dumpsites in small towns, villages and villages in Russia, which are located directly in Nature. Analysis of publications and modern developments [1-6] showed that at present the issues of creating waste processing plants for landfills in large cities are being worked out. But, at present, no one in Russia will build such factories in small cities, towns and villages. Therefore, to solve this extremely urgent environmental problem, the author has set the task of creating a mobile complex for processing production and consumption waste based on a KAMAZ vehicle.

3. Theoretical part
The needs of modern man are constantly growing, constantly increasing the environmental burden on Nature. Even if the person has no needs
(everyone is satisfied), then social "tools" have been invented for arousing new, non-characteristic needs in a person.

The result of the consumer strategy of human existence is a deep ecological crisis of the Planet. This crisis is generated by the barbaric technologies of withdrawal (extraction) of fossil energy resources
from Nature, the creation of technology and technologies that displace the biosphere from human life and replace it with the technosphere, the release of human waste into Nature, which Nature is unable to process. The amount of this waste is increasing annually, because mankind is constantly “recycling” Nature into waste. The modern World is facing the prospect of turning the Planet into a global garbage dump, poisoning the Earth's atmosphere and lithosphere.

Today in the world there is an acute problem of utilization of production and consumption waste, the main share of which is solid municipal waste (MSW). Today all over the world MSW is stored in landfills, both specially organized and spontaneous. The annual increase in the volume of MSW requires a constant increase in the area of land for the creation of more and more garbage dumps. Collection and concentration of MSW at landfills remains the most common method of their disposal. In Russia, over the past decade, the amount of MSW has increased 2.5 times and is 67 million tons per year.

Studies carried out in Western countries have led to the conclusion about the environmental hazard of landfills, about the need to search for new directions and methods of utilization of MSW. These studies have shown the need to change the attitude towards MSW not as waste, but as a daily renewable energy resource with its huge, renewable daily volume. Russia produces 60 million tons of peat annually, and annually 67 million tons of MSW are disposed of to waste dumps in Russia, the energy value of which is commensurate with peat. Thus, Russia annually loses millions of kWh of electricity, millions of kcal of thermal energy, millions of cubic meters of gas (methane), etc.

The constant growth of MSW is a national environmental problem in Russia. But, at the state level, this problem is not solved for three reasons. First, MSW processing plants are an expensive pleasure, and the Russian government never has money for this.

Secondly, the processing of MSW by the manual sorting method, which is currently being implemented, is ineffective and unprofitable.

Thirdly, the processing of MSW at landfills with the generation of electricity and heat is impractical, because landfills are located at a considerable distance from cities and it is not possible to transfer heat and electricity over such distances.

Therefore, all good undertakings in Russia to process MSW at existing landfills "hang" on these three problems.

Fourthly, at present, no one in Russia will build plants for the processing of MSW in small cities, in regional centers, large settlements and large villages, and landfills there are growing at a catastrophic speed, threatening the surrounding Nature much more than landfills of large cities from - for their direct presence in Nature and their unsettledness (spontaneity).

4. Practical significance
The research group led by the author chose a different approach to solving this state problem: to solve it not from above - by disinterested state clumsy structures, but from below - by people who do not want to live on our Planet as in a garbage dump. Therefore, we have developed a concept focused on small and medium-sized businesses and have chosen the principle of mobility of disposal of landfills. We have developed a mobile MSW processing complex based on a KAMAZ vehicle. This mobile complex has the following parameters:

1) is intended for the elimination of authorized landfills of large and small cities, large settlements and rural regional centers, as well as unauthorized landfills of villages and small settlements;
2) productivity is 300 cubic meters. MSW per day;
3) electricity generation 150 kW per hour;
4) transmission of electricity to any distance;
5) hydrogen production 20 cubic meters per hour;
6) oxygen production 10 cubic meters. in hour;
7) continuous work in three shifts;
8) the number of shift is 20 people;
9) the state is recruited temporary from the inhabitants of the given city (village);
10) the number of permanent service personnel is 5 people;
11) The assembly units of the complex are transported to the site by three KAMAZ vehicles in two flights;
12) production of the complex:
   - black scrap metal,
   - colored scrap metal,
   - packaged aluminum cans,
   - packaged cans,
   - packaged PET,
   - electricity,
   - hydrogen in cylinders,
   - oxygen in cylinders;
13) the cost of the complex is 60 million rubles;
14) average monthly profit of 5 million rubles;
15) recoupment of the complex in 12 months;
16) the complex can be used in megalopolises and small towns, in regional centers, in settlements and villages;
17) the complex solves the problem of using electricity on site for the production of hydrogen and oxygen in cylinders by water electrolysis;
18) the complex solves the problem of transmitting electricity over long distances by a vortex resonant electromagnetic waveguide - highly efficient, cheap, highly reliable, without losses; 19) for the deployment of the complex at the facility, 5 work shifts are required, for the folding - 3 work shifts.

The complex consists of the following modules:
- module for large-size separation of solid waste;
- module for aerodynamic separation of MSW;
- module for electromagnetic separation of MSW; - energy module (pyrolysis and power generation module);
- module for internal power supply and long-distance transmission of electricity using a vortex resonant waveguide;
- module for the production of energy carriers by electrolysis of water (hydrogen and oxygen) in cylinders;
- module for processing car tires into crumb rubber;
- module for packaging and shipment of finished products;
- module for packaging and disposal of non-recyclable waste.

In the large-size separation module, large-size MSW is sorted out: household appliances, metal assemblies and parts, large scrap metal, dimensional cardboard, dimensional PE film, dimensional glass, glass bottles, etc. All this goes to the packaging area - it is packed and shipped to consumers. The rest of the MSW goes to the aerodynamic separation module, in which they are automatically separated into heavy and light fractions. The heavy fraction enters the electromagnetic separation module, where ferrous and non-ferrous metals are automatically extracted from MSW. And the remaining MSW goes along the conveyor to the fuel separation site for the power module.

The light fraction in the aerodynamic module is separated into waste paper, PE bottles, aluminum cans, cans, and PE film. At the fuel separation site, fuel is sorted from non-recyclable MSW (fine glass, stones, ceramics, street sweep, etc.).

MSW - how fuel enters the power module, where it is converted into electricity by pyrolysis. Electricity enters the energy carrier production module, where it is used for the production of hydrogen and oxygen by the electrolysis of water or is transmitted through a resonant high-frequency waveguide to supply power to a remote consumer. Cylinders with hydrogen and oxygen are sent to the cassette warehouse for shipment to the consumer.

Trolleys with the separated light MSW fraction (PE bottles, aluminum cans, cans) and trolleys with the separated heavy MSW fraction (ferrous scrap metal, nonferrous scrap metal, glass, glass bottles) enter the packaging and shipment module.
PE containers, aluminum cans, cans are loaded into special mechanized presses, these packages of products are packaged and shipped to the consumer.

Waste from the power module - processing MSW by pyrolysis (slag, coke) is packed in high-strength PE bags and fed to the non-recyclable waste disposal module.

The shipment of the packaged products of the complex is carried out on special pallets, mechanized trolleys with lifting hydraulics.

Loading of packaged products into the car body is carried out from a special collapsible portal, which sharply reduces the time and increases the efficiency of the loading operation.

The mobile complex, developed by us, provides the ability to liquidate a landfill in a settlement with a volume of up to 50,000 cubic meters within 6 months - from May to October.

5. Conclusions
1. A mobile complex for the elimination of landfills based on a KAMAZ vehicle is an effective way to resolve the "garbage crisis" of large and small cities, towns and villages in Russia.
2. Mobile complex for elimination of landfills is a promising direction of alternative energy.
3. The mobile landfill liquidation complex is an independent mobile cost-effective enterprise.
4. The widespread use of a mobile landfill liquidation complex in Russia is the provision of additional jobs in small towns, villages and villages.

6. References
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