

THE IMPORTANCE OF WASTE INCINERATION

**Dragoș Teodor LUP^{1*}, Ana Maria STROE¹,
Paul Mihai CHEZAN², Elena Maria PICĂ¹**

¹*Technical University of Cluj-Napoca, Departament of Engineering Materials and the Environment, Cluj-Napoca, România*

²*Aqua D&P Technologies S.R.L., Snagov Alley, Nr. 1/24, Cluj-Napoca, România*

**Corresponding author: lupdragos@yahoo.com*

ABSTRACT. The problem of waste incineration has become more and more important lately. Protecting the environment, increasing the amount of waste produced by both industrial and household consumers has led to the implementation of precise directives as well as increased investment to improve this process.

Waste incineration is a thermal process of waste disposal by oxidation at very high temperatures. In the next period, waste producers will be required to deploy and implement solutions in order to be able to safely incinerate the waste for the local population.

Due to growing concern, the incineration benefits have also increased in this segment: environmental pollution is very low due to combustion gases treatment; reducing the volume of waste stored; complete neutralization of waste; after combustion, thermal energy can be used for various purposes; reducing transport costs with the location of an incinerator close to the one that produces them.

An advanced incinerator technology allows the burning of all types of waste. With a growing population and growing consumption, the issue of waste management will become increasingly important and will be a real challenge to have a healthy and clean environment.

Key words: *environment, incineration, waste*

INTRODUCTION

Waste in the current society is products that result in increasing amounts of human activity and which, if not properly managed, can lead to soil, subsoil, water and air pollution.

Waste appears as an inevitable consequence of human activities, but their management has become more and more important in recent times. Waste treatment processes known to date are: waste incineration, co-incineration of waste and pyrolysis (thermal decomposition at high and no air temperatures) of waste. The most important thermal process is waste incineration.

Priority is that uncontrolled waste deposits are replaced as soon as possible by management that leads to product lifecycle through recycling - reuse, along with the construction of sanitary ware or other treatment methods.

Efforts must be directed both towards incineration, composting or organic decomposition, as well as to reduction and reuse or recycling.

Starting from the international priority in the field of waste management, namely the reduction of the amount of waste stored in ecological deposits, the solution of their incineration has been advanced, technology by which the waste loses 70% of the initial volume in organic incinerators, as shown in figure 1.

However, incineration is a very widespread process and its contribution to reducing the amount of waste to be stored and energy resulting from the combustion process cannot be omitted.

Waste incineration - the last phase of the waste management process and is mainly aimed at reducing the volume of waste to be stored and so reducing its environmental impact. If these wastes also have a high calorific value, then the process becomes profitable (Bara, 2004).



Fig. 1. *Organic incinerator model*

THE ADVANTAGES OF WASTE INCINERATION

Of all methods of thermal waste treatment, incineration has the following advantages:

- Versatility and modularity (can be used in all applications and can be of any dimension);
- The lowest costs for implementation;
- Exploitation and cheap maintenance.

As common advantages of heat treatment vs. other types of waste management:

- Energy recovery and reuse;
- Biosecurity;
- Prevention of pollution of water, soils;
- Elegant solution, used in all developed economies.

Another advantage is that incineration is a fast way of waste treatment, and very large quantities can be destroyed in a relatively short time.

The amount of solid material resulting from combustion represents only 15-20% of the initial weight of the waste, leading to the reduction of the land areas required for storage and their use for other purposes (Cismaru and Gabor, 2004).

WASTE INCINERATION

According to data presented by some market operators, Romania produces about 267 million tons of waste per year. It should be noted that about 670 000 tons are dangerous. The burning of solid waste ensures on the one hand the reduction of their volume and weight (up to 5-15% of the values introduced in the process) as well as the potential toxicity and, on the other hand, the recovery of their energy in the form of hot water, steam or electricity (<http://www.zf.ro/eveniment/romania-produce-anual-267-milioane-tone-deseuri-din-care-670-000-tone-super-periculos-15799778>).

The incineration plant is considered to be any technical, stationary or mobile unit and equipment for the thermal treatment of waste, with or without the recovery of the resulting combustion heat. Figure 2 shows how to assemble an incinerator and figure 3, the main waste incineration chamber, part of an organic incinerator.

Due to the technology available today, almost all waste producers can buy or rent an incinerator, so that transport and possible hazards to the population, especially with regard to hazardous waste, are eliminated.

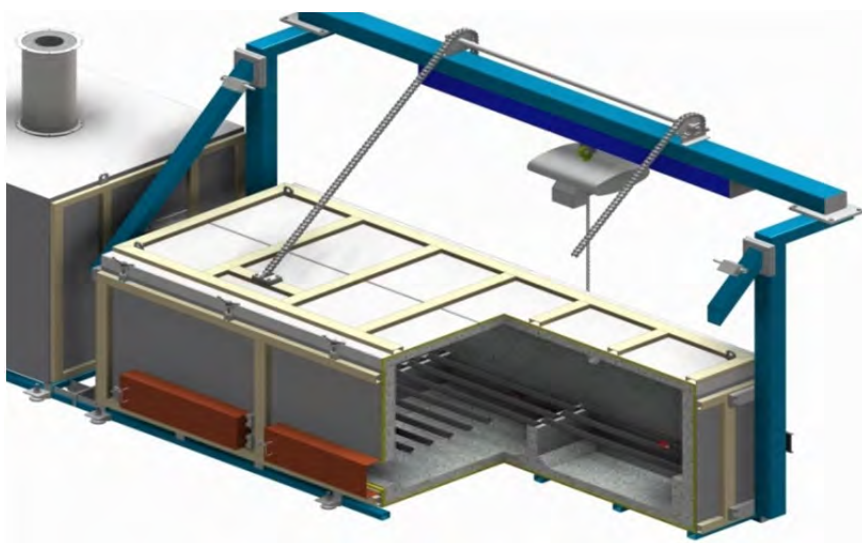


Fig. 2. Incinerator assembly model



Fig. 3. *The combustion chamber*

Also thanks to the technology, incinerators can be provided with heat recovery or even with gas treatment plants resulting from incineration. In order to ensure sustainable economic growth in the EU, resources need to be used in a smarter and more sustainable way. It is clear that the linear growth model that our country has relied on in the past is no longer adapted to the needs of today's modern societies and to the globalized world, and that is why another model of economic growth, namely the circular economy model (europa.eu/rapid/press-release_MEMO-15-6204_ro.pdf)

To facilitate the transition to a more circular economy, the European Commission proposes a package of measures including measures to review waste legislation as well as a comprehensive action plan, thus drawing a concrete mission for the European Commission. Waste proposals set a clear and ambitious vision in the long run to increase recycling and reduce disposal, while proposing concrete measures to overcome the obstacles on the ground for improving waste management, also taking into account the different situations in the Member States.

By moving to a circular economy, cost reductions and job creation will be achieved. This may be possible by preventing waste generation, ecodesign, re-use and other similar measures. Total annual greenhouse gas emissions would be reduced by 2-4% (europa.eu/rapid/press-release_MEMO-15-6204_ro.pdf).

Even if the transition to a circular economy is a priority of the European Union with increasing consumption, the resulting waste will be increasing and incineration will be an optimal solution (Tofan et al., 2017).

CONCLUSIONS

Waste incineration is a viable solution for protecting the environment. The advantages of the technology used provide the possibility of creating more and more efficient systems and installations.

At the same time, a stricter and more effective regulation of the legislation in the field will lead to an intensification of the implementation of waste incineration technology.

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REFERENCES

- Bara S., 2014, *Incinerarea deșeurilor*, 15p., available online at:
<https://www.scribd.com/document/264525968/Incinerarea-deseurilor>
- Cismaru C., Gabor V., 2004, *Gestionarea deșeurilor solide* Editura Performantica, Iași, 157p.
- Tofan A., Mușuroaea O, Oberdörfer A., Harber C., Goldenberg V., Păunescu R., Delimart L., 2017, *Planul Operațional Capacitate administrativă 2014-2020: Asistență Tehnică pentru realizarea Planului Național de Gestionare a Deșeurilor și a Planului Național de Prevenire a Generării Deșeurilor*, available online at:
http://www.mmediu.ro/app/webroot/uploads/files/PNGD_versiunea1.pdf
- *** <http://www.zf.ro/eveniment/romania-produce-anual-267-milioane-tone-deseuri-din-care-670-000-tone-sunt-periculoase-15799778>
- *** europa.eu/rapid/press-release_MEMO-15-6204_ro.pdf