

THERMAL TREATMENT OF WASTE IN A COMMUNITY WHICH BELONGS TO A REGIONAL LANDFILL MOSCANICA

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ABSTRACT

This work shows reasons and opportunities for thermal treatment of Municipal waste in commune which belongs to a regional dump Moščanica in Zenica. The modern approach to waste disposition in the world was explained and set out to find LCA analysis for possible disposal for collected waste. In this work we have presented reasons for accepting thermal treatment of waste as optimum solution for the existing situation of waste management in commune.

Keywords: Thermal treatment of waste, LCA analysis, Waste management

1. INTRODUCTION

Today, the waste is managed throughout the world in accordance with the waste hierarchy. This hierarchy is managed in the following ways: impacts on reducing waste formation, re-utilization of waste, waste utilization for other purposes, waste recycling, thermal treatment of waste (with energy recovery), biological treatment of waste, and disposal is left just for things that cannot be disposed or treated in any other way and that are not harmful for the environment. Bosnia and Herzegovina has adopted the EU waste hierarchy and wants to act in accordance with it. This means that, avoiding the production of waste, its reduction, recycling and treatment, we will be able to dispose only the parts of the waste that can not be exploit in any other way.

Modern waste management means universally considered waste, as shown in Figure 1 [1]. This means that the energy is recovered from collected waste. Recovered energy is seen through the conversion of waste to energy. Waste is converted by WtE (Waste to Energy) plant into a source of renewable energy, in line with modern observation of the waste. Waste problems which are settled with WtE plants were: not illegal disposal of waste, ie., so that there are no need for landfills. Also, on the other hand, WtE plants enable meeting the demand for electricity as well as heat to the commune in which such facilities are built, and through its direct impact on the achievement of a better living conditions while reducing costs for the commune.

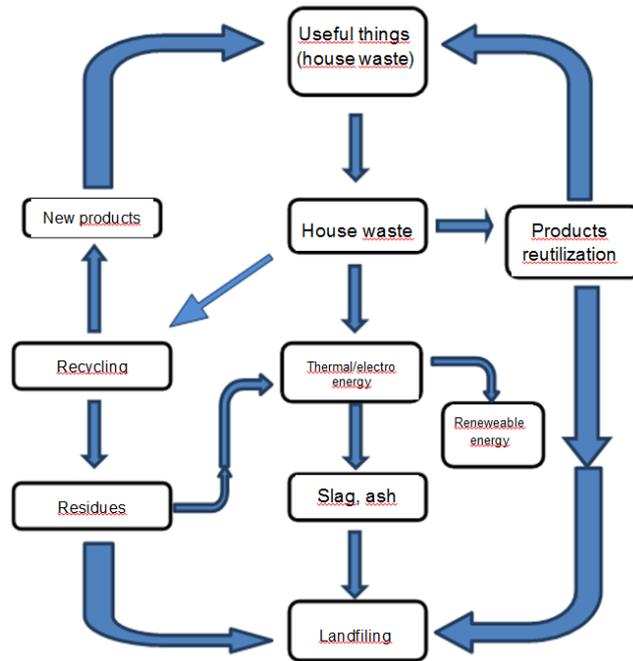


Figure 1.: Schematic representation of the principles of modern management of waste materials.

This modern and complex method for treating municipal solid waste allows changes in sustainable urban planning. This especially applies to the functioning of municipal planning authorities, local institutions, common enterprises specialised for waste management, companies that work for protection of the environment, as well as other small and medium enterprises engaged in the disposal of waste, its transport and subsequent processing.

2. THE NEED FOR THERMAL TREATMENT OF WASTE

The need for thermal treatment of waste today arises from several reasons:

- ✓ Already realized energetic value of wastes.
- ✓ The more perfect plants for combustion and incineration.
- ✓ The ability of the combined combustion of waste with other types of fuel.
- ✓ Lack of any other proven ways to treat the total waste.
- ✓ Proven need for the overall waste management in the society.

Unlike the old incineration plants that worked with small efficiency and without the utilization of energy made from waste, and especially without the equipment for the subsequent purification of flue gases and solid residues, new plants can certainly be used without any concern for the environment. So now we can talk about the cycle of energy from waste [2].

Priority in the incineration is now focused on the low-pollution burning i.e. combustion with low pollution, which is achieved by primary pollutants reduction in the appropriate designed plant and less with their purification of the resulting flue gas.

Plants that are now available for burning and incineration are usually used for furnaces for mass burning, fluidized furnace, rotary kilns, plants for pyrolysis and gasification and melting plant (Japan).

3. LCA ANALYSIS OF WASTE MANAGEMENT

Numerous examples of LCA analysis of individual ways of waste management explored in developed and in developing countries, indicate that the confirmed feasibility of inclusion of thermal treatment of waste can be used in the Integrated waste management system with the renewal of materials and energy.

Based on the facts from above it can be concluded that the thermal treatment of waste in developed and established community has more advantages than disadvantages. Detailed explanations for this conclusion are:

- ✓ Waste Management in the community is established by building modern landfills for disposal. Waste collection system has been established on the part of the community and will require increased efforts to encompass the entire community. It could be especially difficult to make an effective plan for total waste management in the regions that belong to the landfills, since the economic, social and political conditions are extremely complex.
- ✓ Improving the system of waste collection, although difficult and slow compared to the desired, affects the quality of the classification of the collected material, thereby directly contributing to the increased energy calorific value of waste fuel.
- ✓ The possibility of using heat from burning waste to produce electricity and thermal energy for the needs of the community, as applied to the heating system of the city. Specifically city heating system is one pipe system with a unique source of heat, so it is possible to use the heat produced by burning waste for the production of thermal energy and for heating of the city. Also, during the period when thermal energy is not necessary for district heating it could be possible to redirect the production of electricity and thus increase the cost effectiveness and efficiency of the waste incineration plants.
- ✓ Possible incorporation of the waste incineration system in the existing system of power plants, because of the space, infrastructure, equipment, as well as the amount of collected waste quantities is sufficient for the construction of an effective and environmentally friendly plants, taking into account the EU standards and regulations.

Stated directly in favour of accepting the thermal treatment of waste as an acceptable solution because all the LCA analysis of treatment of waste in developed countries, developing countries, and non – developed countries indicates that the thermal treatment is justified in conditions such as previously described [3,4]. Specifically, the constructed landfills for disposal already exist, and with a developed system for recycling or other means of waste treatment, shows that it is profitable to think about and to build a plant for thermal treatment. Particularly interesting is that even in a very advanced systems for waste management, with extremely developed system for recycling waste, which even includes up to 60% of the total waste, and the existence of modern landfill construction of a modern system of waste incineration is reimbursing precisely because the possibilities of utilization energy contained in the waste. This energy represents a contribution to reducing the use of non-renewable sources of energy as well as reducing pollution and global warming.

The construction and operation of WtE plants is primarily determined by the amount of MSW to be treated, not with energy needs. To distinguish energy recovery from waste disposal, the European Union (EU) has introduced revised Waste Framework Directive (WFD, 2008/98/EC) in 2008 [14]. In the Directive, the energy efficiency of the WtE plant is evaluated using the "R1 formula", which is the ratio of net energy output of the entered equivalence factor of 2.6 times for the production of electricity and 1.1 for the production of heat. New or existing WTE plants (granted after 31 December 2008) with R1 efficiency ≥ 0.65 can be classified as an action of return, while the efficiency of 0.60 applies to older plants.

WtE of MSW plays a crucial role in the production of renewable energy in many developed countries, especially in countries with limited natural resources, such as Japan, Korea, etc.

The combined production of heat and electricity from municipal solid waste for the community that belongs to the regional landfill Moscanica has all the conditions for achieving the above level of effectiveness, according to the Waste Framework Directive (WFD, 2008/98/EC), because the WtE plant could and should be built within the space of the current facility for the production of thermal energy for district heating of city of Zenica, as a part of the thermal Power Plant - Heating Arcelor Mittal.

There, it could be very easily established connections with the boiler to produce superheated steam, but also with condensing turbine to generate electricity. This way, taking the advantage of all the benefits combined with the existing Thermal energy plants – with district heating system, such as nearness to sources of waste to be treated, the possibility of utilization of produced heat and electricity

throughout the year, having built – in infrastructure (thermal stations, pipeline remote heating substation for takeover electricity, apparatus for collecting waste water, waste water treatment, sewage, water supply of natural gas with a reducing stations, access roads, railways, etc.), personnel familiar with the work of the boiler plants, both in servicing and taking care of them.

In addition, it would be enabled by a simple delivery by rail or large amounts of waste that could be conveyed by the other communities in the environment, which would increase the capacity of the plant, the overall efficiency of such a plant, but also to enable the production of large quantities of renewable energy which would give a significant contribution to the future obligation to the community, and also to the Federation till 2020 (prior to say till 2030) produces a certain amount of renewable energy. Additionally, due to the capacity and proven level of quality construction and operation of new WtE plants, it could be expected to reduce the total pollution, since that modern WtE plants have stringent criteria for their work, but existing installations for the production of heat and electricity using fossil fuels.

Looking to the foregoing proposed placement of the plant for thermal treatment of municipal solid waste in our community as part of the power section of the company Arcelor Mittal - Zenica, with possible connections to the existing plant, shown in Figure 2

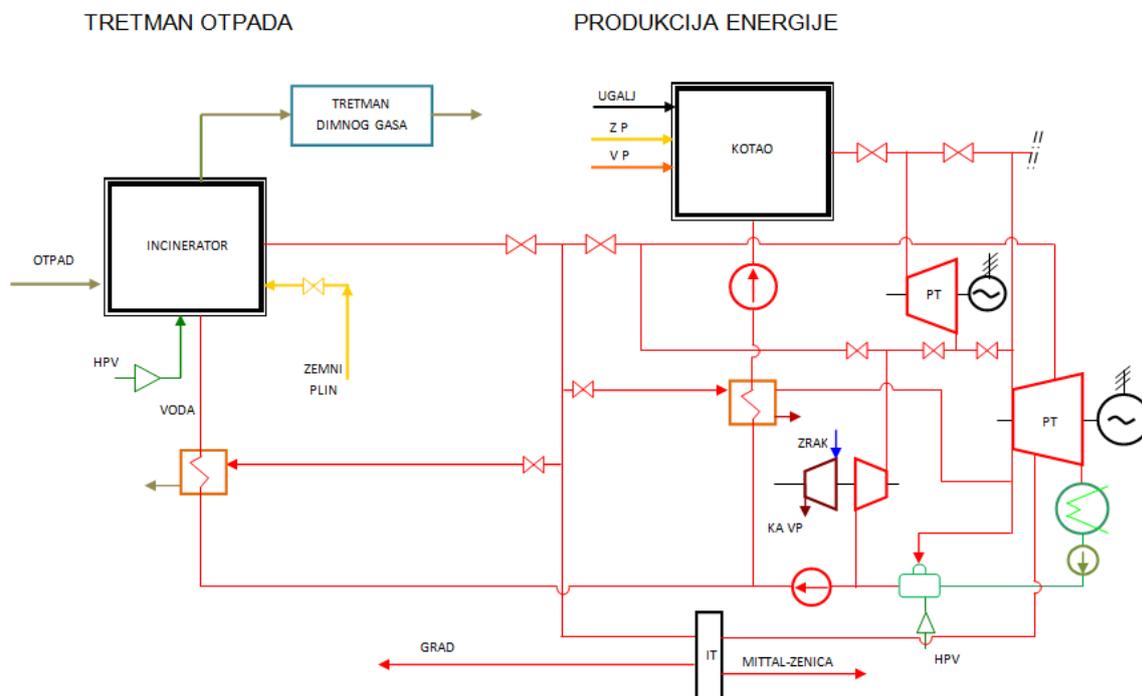


Figure 2: Proposed plant for thermal treatment of waste within the power station of the company by Arcelor Mittal - Zenica

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