

TECHNOLOGY OF TREATMENT AND DISPOSAL OF ANIMAL BY-PRODUCT WASTE AND ENVIRONMENTAL PROTECTION

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ABSTRACT

The purpose of this paper is to identify and analyse the environmental impact and the necessary measures to protect the environment and public health regarding the location where animal waste and animal by-product waste will be treated.

The plant for animal by-product waste treatment is very important for Kosovo, based on data regarding this waste and its treatment.

In this paper, analysis have also been made regarding the current state of the environment and technical characteristics of the works which will be undertaken to build and operate this treatment plant.

For all the activities that will happen in this plant, there is a need to do an environmental impact assessment, which will define all relevant impacts that may occur in the plant – environment relationship, not overlooking the impact in the surrounding area.

Key words: Animal waste, Environment, Treatment plant

1. INTRODUCTION

This study is a very important step in supporting the Agency of Food and Veterinary (AFV), in developing the laws and regulations to create a system supported by the EU for the collection and disposal of animal by-products,

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including building a new treatment and disposal plant. (Kosovo, Government of, 2015)

Considering this goal and the methodology of creating an environmental impact assessment rapport, this paper will help in defining the measures to be undertaken in order to protect the environment from negative impacts.

The study has been done in a location opposite the industrial park in Sankoc, KK.Gllogoc.

Environmental impact assessment and measures to decrease negative impacts on the environment will be our purpose during both the construction of the main building and also the other facilities. The treatment and disposal of waste will be according to the laws of the Republic of Kosovo. (Government of Kosovo, 2012)

2. LOCATION CHARACTERISTICS AND THE ENVIRONMENT

To define the main location characteristics and the ecological potential, one must consider several natural factors such as: soil, water, air, landscape, flora and fauna.

Each one of the ecological potentials has certain functions which essentially relate all too environmental protection (Government of Kosovo, 2009).

The location where the plant will be built is close to the main Prishtinë – Pejë road and is connected into the entire Kosovo road network as seen of Figure 1 and 2. (Government of Kosovo, European Union Office in Kosovo)



Figure 1 & 2 – Location of the plant in the orthographic map

Regarding the climate conditions, the air temperature regime is expressed either daily monthly or yearly with certain values as seen in Figure 3. Through the climate studies, all average yearly values, minimal and maximal monthly temperatures, and the daily frequency with temperatures higher than 25, 30 and 35⁰ C, and the possible frost with over 5 cm of soil have all been defined.

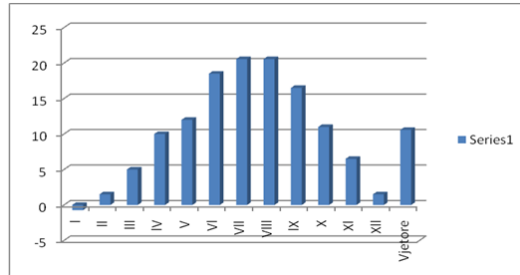


Figure 1 – Temperature variation graph

Average wind speed has been shown in the variation graph for each season as measured by the Fushë Kosovo meteorological station for the time period of 1954-2003 and can be seen in Figure 4.

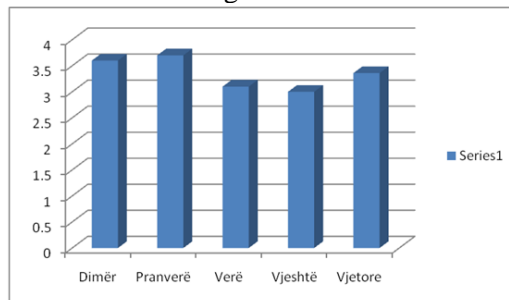


Figure 2 – Yearly average wind speed

Regarding the geological, hydrogeological and geo-mechanical aspects, the location is from diluvia deposits very heterogeneous and with layers both horizontally and vertically. These deposits in this micro-location are products of erosion (sand, gravel) and are thought to be a very appropriate location for such activities.

3. PROJECT AND TECHNOLOGICAL PROCESS DESCRIPTION

The urban plan where the plant is to be built consists mostly of:

- Administration building
- Industrial halls for the treatment and disposal of animal product waste
- Wastewater treatment plant

As can be seen in Figure 6.

The purpose of this project is to convert the animal by-product waste that is not destined for human consumption into energy production or animal feed.



Figure 6 – View of the treatment plant

The plant will be divided into sectors, and each sector will be responsible for a part of the technological process. The internal division of the plant into sectors and the placement of equipment can be seen in Figure 7.

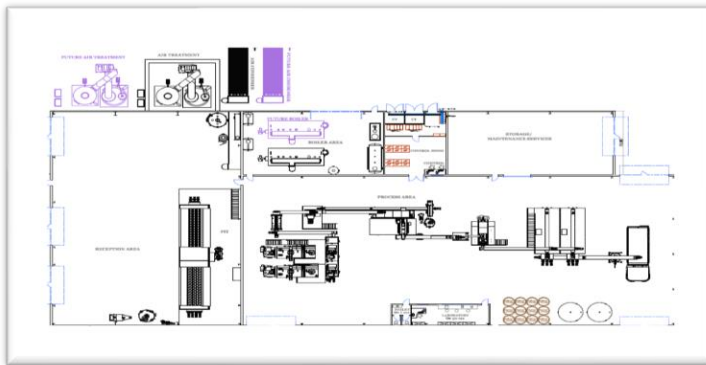


Figure 7 – Schematics of the equipment placement

In order to draft a rapport with a safe nominal capacity and assuming a 240 day/year timetable, the plant will need to treat around 84 t/day of material. For the plant's optimal performance, main components are:

➤ *The influent sector*

The part that gets all the waste will have 2 x **100 m³** barrels, specifically designed for animal waste.

➤ *The blood collecting sector*

This space will have a reservoir to collect and store the blood with a capacity of **10 m³**, and it from the blood that comes from butchers' which needs to be filtered so that all bones and other objects that are transported with the blood can be removed.

➤ *Oven sector*

The oven sector will have two ovens with a capacity of **6.500 kg**, specifically designed for meat treatment and all other solid waste such as feathers and also blood.

➤ *The pressure sector*

This sector will have steel plates for 2 presses with a capacity of 2500 – 3000 kg/h for the waste it gets from the boiling reservoir.

➤ *Grease and fat sector*

This sector will have a filter for all grease removal and a centrifugal pump, and also a reservoir for fat and grease storage with a capacity of **2.5 m³**

➤ *Food sector*

Food sector will have feeding troughs and hammers with a capacity of storage **1 m³** and hammering capacity of **2-4 t/h**

➤ *The air and vapour treatment sector*

This sector will have bio filters, and the pollutant values should be as low as possible. The cooling troughs for condensation with a capacity of **7,200 kg/h** and room temperature of **15 ° C**.

➤ *Boiler room*

To heat the plant with hot water and steam, a boiler room system will be installed which will work with electricity. However, the water will also be heated with the energy exchange from the condensed vapours. The boiler room will also have a hot water reservoir so that there will be water at all times, which is needed for industrial purposes and washing the trucks. The necessary hot water quantity is **10 m³/day** with a temperature of **35°C**. In the figure below, you can see the flow of the process itself.

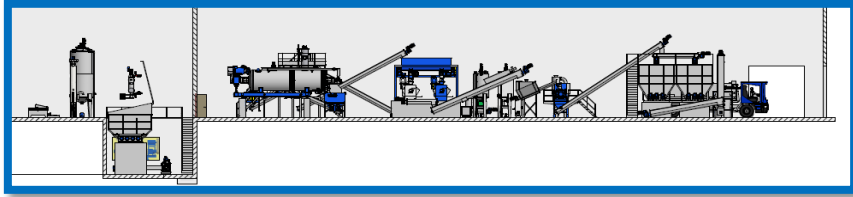


Figure 8 – Process illustration

4. ANIMAL BY-PRODUCTS

With “animal by-products” we mean the entire body or animal body parts that are not destined for human consumption. Animal by-products are categorized into 3 groups according to their hazard level:

4.1. Highly hazardous materials:

CSE risk, (waste from treatments will illegal chemicals and environmental polluters)

Material from the first category, as seen in figure 10, are highly hazardous regarding contagious spongiform encephalopathy (CSE), materials with specific risks (MSR) – these parts of animals are most likely to carry diseases such as cattle spine or likely to carry illegal chemicals. This type of waste should be completely incinerated or deposited in a landfill only after heat treatment.

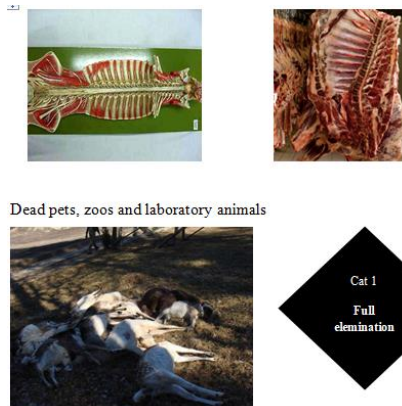


Figure 9 – Category 1 waste

4.2. Microbiological risks, veterinary medicinal waste

This is the second category, as seen in Figure 11, slightly less hazardous (mostly animals who died in the farm after some disease caught them), and the biggest problems are medicine, digestive track contents, fertilizer, and wastewater from butcheries. They can be recycled for other uses except food, such as biogas, compost, grease products.

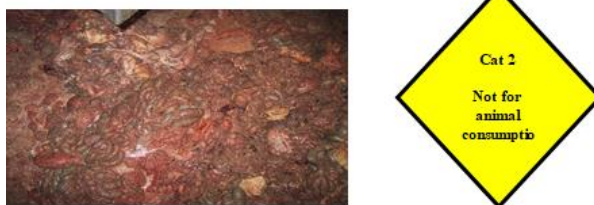


Figure 10 – Category 2 waste

4.3. By-products from healthy animals, kitchen waste

Third category materials (products from healthy animals for human consumption, fresh fish, and milk from healthy animals), as seen in figure 12, can be used as animal food.



Figure 11 – Category 3 waste

4.4. Gathering and transporting waste

Animal and by-product waste should be gathered and transported in new packaging, in covered containers, as seen below, or transportation that does not leak. The **operators** gather, identify and transport the animal by-products **as soon as possible** in conditions that **prevent human and animal health risks**.



Figure 12 – Animal waste containers

4.5. Environmental impact assessment

Assessing the potential environmental impacts which result from technological processes in the plant, can be done with a fully encompassing analysis and is not the same in all project stages, so all the impacts are divided into 3 categories:

- Plant construction phase
- Technological process phase
- Post-plant activity phase

➤ **Impact on air**

During the activities in the plant, air pollution happens from:

- Dust from construction
- Gas from transport vehicles
- During the process of waste incineration
- From the equipment at work

➤ **Impact on soil**

During the activities in the plant, soil pollution happens from:

- Depositing base material for the technological process
- Solid waste generated from maintenance
- Organic and inorganic waste from employees
- Liquid waste from grease and fat

➤ **Impact on water**

During the activities in the plant, water pollution happens from:

- Leaking of liquids
- Washing the equipment
- Washing the operational spaces and areas
- Grease and oil leakage from equipment maintenance
- Wastewater leakage from the kitchen with oil and detergents, toilet water, road washing water etc.

➤ **Impact on the flora and fauna**

According to the analysis conducted so far, if there is pollution on water, air and soil, it may impact the flora and fauna. However due to the location chosen, there is not much vegetation lost except the one where construction will happen.

➤ **Impact on the population**

Building this plant on a location that is economically under - developed, will very much help the population because a large number of them will be employed.

➤ **Impact from noise**

During the activities in the plant, noise pollution happens from:

- Activities during the technological process
- From the transportation vehicles during loading and unloading
- From the equipment

Usage of the equipment will guarantee level of noise at the source under 90 dB. For populated areas, the noise will not go past the standard value of 50 dB, as shown in detail below in the table.

Table 1 – Equipment noise level and the distance it is felt in

Noise	Distance (m)			
	10	50	100	500
90db – modern equipment noise level	59	45	39	25

4.6. Measures to prevent or minimize negative impact on the environment

To prevent or minimize negative environmental impacts as in water (Government of Kosovo, 2013), soil, air and human health, measures must be taken both during the process at the plant and after.

5. CONCLUSION

After this Environmental Impact Assessment rapport regarding the animal by-product waste treatment plant, we can conclude that the plant does not pose a significant risk to human health, or the soil, water, air and landscape.

After identifying and implementing all recommended safety and protection measures, we firmly believe that all negative impacts can be sufficiently minimized or completely eliminated during the rehabilitation phase.

The construction of this plant will be according to all lawful standards. The impact on air, soil and water can be controlled. These impacts need to be monitored and a rapport made at the end of each year or as requested.

This plant will have a very positive socio – economic impact from employing the people of that location.

We believe that this data is enough and can aid the competent people or organizations in giving a positive go-ahead for the construction of this plant for the disposal and treatment of animal by-product waste in the location opposite the Industrial Park in Sankoc, Municipality of Drenas (Gllogoc).

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