PURIFICATION OF WASTEWATER IN ORDER TO PRODUCE ELECTRICITY AND HEAT

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INTRODUCTION

Our Bosnia and Herzegovina is rich in natural beauty. Many people would envy us on that. It is a great pity that we do not know to appreciate these values.

Lack of environmental awareness and culture of behavior has led to a high level of air pollution and water in Bosnia and Herzegovina.

The analysis showed us that the water in Bosnia and Herzegovina is very polluted.

A healthy environment means a healthy and quality life of every individual. Everyone should contribute to environmental preservation of our natural beauty.

Therefore, we have chosen this theme in order to raise people's awareness and to have more similar ideas that will make our lives better and of high-quality.

MAIN PART

All wastewater should be, by rule, treated in plants for waste water, however in practice this is not the case. While in developed countries there are a number of different plants for wastewater treatment, in our country the majority of wastewater is discharged into watercourses without the previous purification.

Wastewaters are, from place of formation to treatment plants or discharge into watercourses, drained away through sewage system consisting of pipes, channels and devices.

Only recently the man noticed that wastewater discharge into rivers or their plunge into the soil may have harmful consequences for drinking water. Unhygienic, polluted water is often a cause of great tragedies and epidemics in the Middle century, and later until the end of the nineteenth century (eg. Large cholera epidemic in 1854 that has befallen London, from which around 5000 people have died and the cholera epidemic in Hamburg in 1892, which killed 10 000 people).

Construction of water supply affected the amount of wastewater, which has rapidly increased, and which was drained away by sewage in the river, so that the level of self-purification of watercourses was quickly reached, which resulted in the ensuing necessity of building a plant for wastewater.

Figure1.1. Public sewerage system

Today, most of sewerage networks in the world of so-called mixed type where the clean rainwater drains in the plant for wastewater together with dirty water. With heavy rains, all the water does not have enough space in the plant, so that large amount of raw sewage ends up directly into watercourses. In addition, wastewaters are getting very dilute, so the purification processes are slowing down.

In the future, it is necessary to drain "side" water (pure rainwater from roofs, hiking trails or unpolluted parts of streets) through special systems into the soil or if this is not possible, directly into watercourses.

Treatment of wastewater in BiH

It is known that watercourses have the ability of self-purification or auto-purification. Since the existence of all living creatures on earth, water is used and a bit is being polluted by plant, animal and human waste, the so-called organic pollution. At first, it had a little influence on water pollution, because the organic waste was biodegraded by air, mainly to the useful substances. Therefore, nature was able to purify itself those amounts of water.

However, the amount of organic waste water is significantly increased by the development of human society and the number of individuals and their concentration in large cities. Their concentrated discharges into rivers impeded the process of self-purification and natural biological treatment. In addition, the development of industry in the late 19th and early 20th centuries, man increasingly used water as a result of industrial production, resulting not only in organic, but also chemical pollution of water. Because of that there was a need to find an artificial biological or chemical processes of purification.

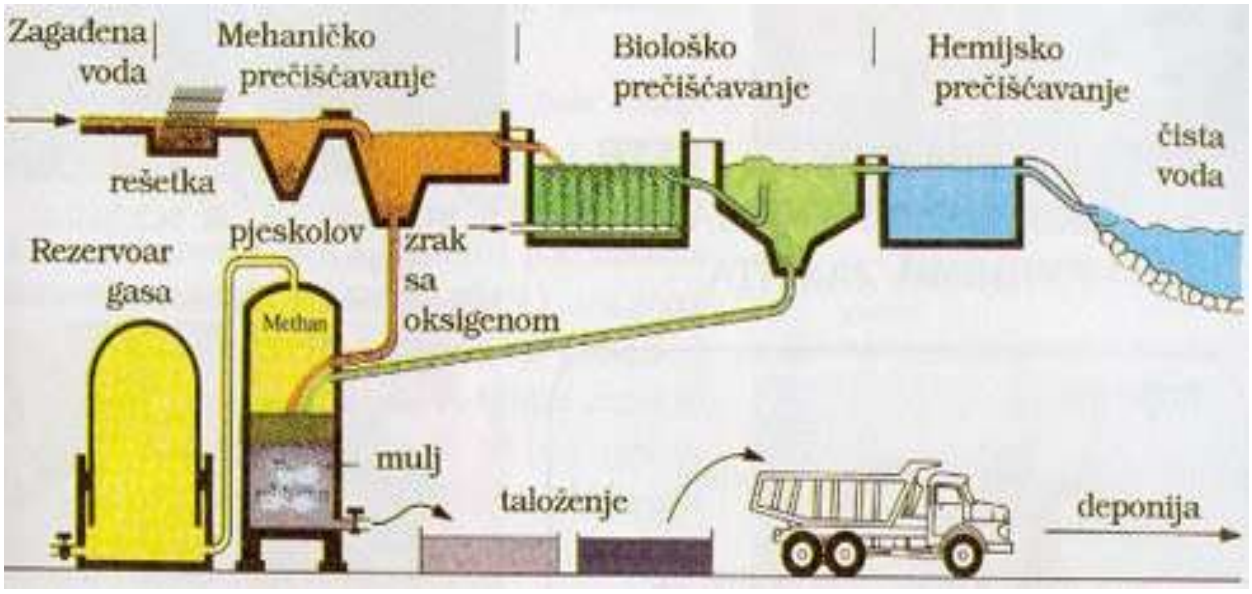


Figure 1.2. Mechanical, biological and chemical treatment

When we talk about draining and treating wastewater in BiH, the situation is more than alarming. From the following table you can see what coverage of sewage and purifiers was before the war, although the situation is still not better.

Function before the war **Function during the war** **Function now**

	Funkcioniranje prije rata	Funkcioniranje tijekom rata	Trenutno funkcioniranje
Bos. Grahovo	0	0	0
Celinac	X	0	X
Gradačac	X	0	X
Grude	0	0	X
Ljubuški	X	X	X
Neum	X	0	X
Odžak	0	0	0
Sarajevo	X	0	0
Srebrenik	0	0	X
Siroki Brijeg	0	0	0
Trebinje	X	X	X
Trnovo	X	0	0
Ukupno	7	2	7

Figure 1.3. Chart

Wastewaters from the settlement significantly affect the watercourse pollution. Controlling the outflows in many settlements is quite difficult, because the discharge is performed in several places. It is estimated that watercourses, through urbane sewage, get pollution load of about 1.5 million population equivalent. Water pollution from agriculture is also becoming increasingly important, due to the increasing application of pesticides and herbicides.

However, the greatest burden of pollution of natural water streams is coming from industrial wastewater, which discharge wastewater without any purification, or insufficient degree of purification.

Purification of wastewater in order to produce electricity and heat.

The result of the basic activity of this idea is not only water purification from the complete sewer system of our cantons, across the country. As products of purification multi energy sources arise from different renewable sources.

The electricity is produced from wind and hydro power-on areas where there is a possibility for it, then solar energy, and the electricity will be produced by the construction of new plants from methane which is a product of rotting sludge.

Thousands of liters per second or hundreds of billions of liters per year are treated in several stages in water treatment.

Figure 1.4. The first stage is mechanical, which involves the separation of solid waste first through the tabs, and then in pools deposition of silt and other solids. By means of sedimentation it is possible to daily get a couple of tons of solid waste, which after drying and burning leads to new energy sources.

Figure 1.5. The completion of the mechanical treatment/purification in two phases in basin implies biological treatment of wastewater. There is a process of self-purification of water 'copied' from nature, which means that the injection of oxygen and water ventilation enhance the activity of microorganisms that will consume the remaining organic impurities from the water in these basins for the final treatment. Note that the wastewaters are totally 20 hours in water treatment until they reach the final purification.

Before being discharged into the river channel and from it into the river, another analysis of water quality is performed. Then the water in its natural fall is discharged into the channel moving a hydroelectric turbine which is a part of, for example, company that deals with the purification and thus realizes the concept of renewable energy sources for electricity production.

Using the potential of renewable energy sources, there is a production of energy required for the operation of treatment plants, which is of great importance.

And the most important concept of energy production is from the sludge or solid waste which, after drying, produces thermal energy that is delivered remotely to users.

Tens of thousands of tons of dried sludge can be collected, from which thermal energy is produced by burning process. In plants for dry sludge during the process of decomposition there is a production of gas that will be used as an energy source. For example, in the 35 meter high silos during the 20-day process of decomposition of sludge there will be a production of 20 million tons of methane per year which will be used for the production of electricity. In that way, it is possible to achieve hundred percent energy production for the needs of such companies.

INNOVATION

Innovation is reflected in the fact that instead of classical technology nitrification and denitrification, there is an application of anaerobic and aerobic treatment of wastewater, which turns biological waste into biogas, which is then used to generate electricity. Production, filtering, drying and burning of biogas in operation is cutting the gas consumption by 37% and electricity by 34%. With electricity and gas, hot water generated during the operation of the plant for combined production is used for heating various processes in the plant.

It is the application of innovative, economically and energy efficient technology. The plant is designed to clean or purify heavy wastewater. The plant includes three basic wastewater treatments:

- Anaerobic filtering procedure - optimal setting of parameters of wastewater and fermentation in highly efficient anaerobic reactors.
- Aerobic filtering procedure- economic elimination of ammonia from wastewater; biological treatment of wastewater purification.
- Chemical-physical treatment of wastewater - elimination of excessive phosphorus and fine suspended substances before releasing treated/purified water into watercourse.

Figure 1.6. System for purification of waste waters.

CONCLUSION

SOCIAL UTILITY

Conversion of biological waste satisfies the needs for energy filters of wastewaters while saving natural resources, preventing pollution of the environment and emission of methane into the atmosphere.

The introduction of modern plant for treatment of heavy industrial wastewaters will reduce the pollution of water resources of rivers in Bosnia and Herzegovina and the quantity of released mud.

The project will reduce emissions of methane and unpleasant smells, vector of infection, bacteria and will lead to improved sanitation facilities in the local quality of life.

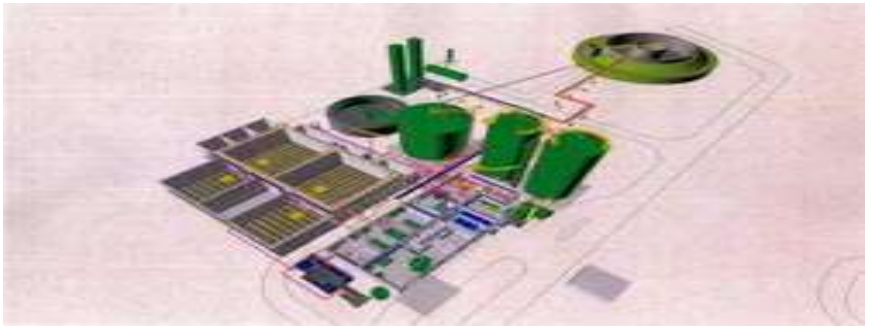
The use of biogas produced during the anaerobic treatment of wastewaters as a source of energy in cogeneration plants will reduce dependence on fossil fuels and lead to increased use of renewable energy sources.

The project will give a valuable example for the industry that is interested in similar plant for wastewater treatment.

This will increase public awareness of wastewater management and generation of renewable energy.

By means of the latest technology of wastewater treatment, the project will contribute to transfer of technology and through training of local labor it will lead to transfer of appropriate knowledge and skills.

The project will create new jobs !!!



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