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**PROJECT FOR SOLVING OF ENVIRONMENTAL  
PROBLEMS CAUSED BY ASH EMISSION AND  
DEPOSITION FROM THE THERMAL POWER PLANT  
NIKOLA TESLA AT OBRENOVAC**

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ABSTRACT

The problem of ash emission and deposition from the Thermal Power Plant Nikola Tesla (TPPNT) in Obrenovac commences with the date of their construction. Up to now, mainly, some analysis of several possible influences of ash (emitted or deposited on the ash and slug dump) was done. We believe that is time now, due to the consequences for a long time, to pose and to resolve the whole problem of ash emission and deposition from TPPNT

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Obrenovac. Due to the very big production capacity, an enormous amount of fly ash (particle size of 90-200  $\mu\text{m}$ ) is emitted to a large area near Obrenovac. Very large quantities of ash and slug (more than 2 millions tons annually) produced during coal burning were deposited on the dump very close to the river Sava. Some of the multiple consequences due to elution of heavy metals, water spilling from the dump and mixing with ground water and surface water of river Sava, weathering of fine particles of ash by wind, acid rains near to the thermal power plants, and other influences of flying and deposited ash on the environment of the whole area are always present. Due to the complexity of the posed problem, a multidisciplinary experts' team was formed to cover all aspects of negative influences of ash emission and deposition from TPPNT Obrenovac. Our project comprises a large number of subprojects covering different problem solving, diminution or removal of all negative influences according to European standards and regulations.

Key words: coal fired power plant, environmental impact, effluents

## INTRODUCTION

The Thermal Power Plant Nikola Tesla uses lignite from the Kolubara basin as fuel. Due to the poor quality of lignite, a very large quantity of ash and slug were produced (annually approx. 2 million tons). A similar situation is evident in the other big thermal power plants in Serbia. Some estimations show that more than 180 millions tons of ash and slug were deposited on dumps in Serbia. The total area covered by ash and slug dump is approx. 1500 ha from which only a small part (approx. 125 ha) was recultivated.

Besides the bottom ash and slug, a large amount of fly ash was produced also. A series of electrofilters with nominal efficiency of 99 – 99.83 % were placed to prevent the emission of particles. The permitted quantity of particle emission is limited at 50  $\text{mg}/\text{m}^3$ , but real emission is always several times higher than the permitted one, depending on working and service conditions. Emission of solid particles and toxic gases ( $\text{NO}_x$  and  $\text{SO}_2$ ), exceeding permitted levels, is a permanent problem of all thermal power plants.

The second source of solid particles are ash and slug dumps. All thermal power plants have hydraulic transport of ash and slug, but the problem of wetting of large areas during a long time is unsolved. Dry surface of ash and slug dump is open and serves as a permanent source of fly ash.

Hydraulic transport of ash and slug is the source of pollution of surface and ground waters. Ash and slug dumps are situated very close to the river. Such terrains have a very high level of ground waters, depending on the seasons, and their level varies and water could be polluted by different heavy metals eluted from the deposited ash and slug on the dump. Some water quantities are spilled over the walls of the dump, some water drains through the deposited ash and slug and eluted heavy metals could be transported by water flow to surface and ground waters.

The problem of ash emission and deposition from TPPNT Obrenovac is very old and starts with the construction of the plant. During the previous time period some of the mentioned problems, concerning ash emission and deposition, are increasing. Due to the complexity of

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the consequences of mentioned above, various experts must be included in the problem resolving.

## **PROPOSED MEASURES**

A multidisciplinary approach to the problem resolving is necessary and a team of experts covering different fields must review all possible influences of emitted and deposited ash and slug on the environment. The aim of the project is to critically evaluate all data collected during the years and to propose the ways of problem resolving.

The complete project will be divided into several subprojects comprising different problems of ash emission and deposition:

1. Social, economic and legal implications of TPPNT working (local policy on the working of TPPNT, ecological consciousness of TPPNT management, life quality of employees in TPPNT and the local population, problem of migration caused by dumps, etc).
2. Evaluation of influences on health of employees and the local population.
3. Evaluation of the state of the art:
  - 3.1. Evaluation of all available data on particles, sulfur and nitrogen oxides, heavy metals and PAH concentrations in the emitted gases.
  - 3.2. Evaluation of available data on air quality in Obrenovac and areas near to TPPNT.
  - 3.3. Estimation of the state of the art of all wastewater of TPPNT and possibility of their cleaning.
  - 3.4. Estimation of the state of art of ash and slug dump including all dump walls.
  - 3.5. Estimation of the state of art of soil close to the TPPNT.
4. Evaluation of working efficiency of electrofilters and proposal of measures to increase their efficiency.
5. Resuspension, transport and deposition of fly ash in the atmosphere of Obrenovac and Belgrade.
6. Evaluation of the feasibility of desulfurization of chimney gases.
7. Management of water from dump and wastewaters from TPPNT.
8. Problems and solutions of ash and slug transport.
9. Decreasing of deteriorating influences of ash and slug dump.
  - 9.1. Possibilities of ash and slug deposition in the future.
  - 9.2. Examination of temporary covering of dump to prevent ash dissipation by wind.
  - 9.3. Possibilities of ash solidification.
  - 9.4. Recultivation of inactive cassettes after exploitation finishing.
10. Evaluation of the possible fly ash uses, including the possibility of their collecting, preparation and deposition in dry or wet conditions.
11. Compatibility of proposed measures with international regulations and standards (EU, OSHA and ISO).
12. Proposal of measures for verification and evaluation of amelioration after effectuation of individual solutions.
13. Proposal of all measures and works for processes evaluation on ash and slug dump after finishing of their exploitation.
14. Summary of the necessary investments to realize all proposed solutions.

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All subprojects will be comprise of the following:

1. State of the art.
2. Proposal of solution(s).
3. Proposal of the institution or company for effectuation of proposed solution(s).
4. Estimation of the costs for effectuation of proposed solution(s).
5. Terms and dynamics for effectuation of proposed solution(s).
6. Compatibility of proposed solution with international regulations and standards (EU, ISO, OSHA)
7. Mode of evaluation of validity of effectuated solution(s).

### **PROJECT REALISATION**

Teams of experts covering different fields will be engaged to analyze and to propose the best solution(s) of individual subprojects according to the mentioned scheme. All subprojects will be united in unique projects comprising all influences and consequences of ash emission and deposition from TPPNT Obrenovac. Resolving of individual subprojects will be possible according to the available funds.

The first part of project realisation includes the analysis of the state of the art and proposal of measure(s) and solution(s) will be realized within six months.

### **RESULTS OF THE PROJECT**

For the first time the complete problem caused by working of the thermal power plant Obrenovac will be reviewed. All unfavorable consequences and long time influences on Man's health and the environment will be analyzed and the measure for their diminution and removal will be done.

### **SUPPORT**

Project realization is strongly supported by the Thermal Power Plant Nikola Tesla – Obrenovac, by the Environmental Sector of the Assembly of Obrenovac, by the Ecological Club of Grabovac and by the Municipal Secretary of Environmental Protection of Belgrade. The Ministry of Health and Environmental Protection of the Republic of Serbia, Directorate of Environmental Protection accepts financing of the project realization.