



***Revitalization and Modernization of
REK Bitola, III phase -
Reduction of SO_x and
Dust***



Skopje, 2019

Introduction

JSC ESM prepared a study for construction of desulfurization plant in cooperation with an external consultant within the period 2011 -2012. The study includes analysis of only one desulfurization technology, so called "wet method", which represented the most conventional solution at the time. However, considering the high investment cost of the processed technology, as well as the fact that meanwhile two reference technologies (dry and semi-dry) have emerged on desulfurization technologies' market, which is increasingly applied in the contemporary industry, JSC ESM in cooperation with Rudis, D.O.O. Trbovlje from Slovenia developed a new Feasibility Study in 2016. This study covered parameters related to the cost-effectiveness of the SO_x and dust reduction procedure, including assessment of the impact of all harmful substances arising from the production process in TPP "Bitola".

Project Description

Comparative analysis of wet, dry and semi-dry methods of the applicable technologies for desulfurization in REK "Bitola" had been carried out in order to compare the techno-economic parameters, whereby world experience for all variants separately are taken into account. According to the results of the comparative analysis, the technology for desulfurization using the "wet method" is optimal and most appropriate for the existing technological process and equipment in operation in REK "Bitola".

The study concerning the selected optimal technology for reducing emissions of SO_x and dust during the operation of the three units in REK "Bitola", was prepared precisely to present a detailed analysis of the procedure itself. In this way, the following elements have been defined and elaborated: principles for selection of technology, selected technical solutions including technical description and elaboration of options for implementation, subsystems, devices and system equipment for desulfurization and reducing emissions of solid particles, total costs for implementation, as well as the allocation of costs for construction and exploitation of desulfurization system and for reduction of emissions of solid particles.

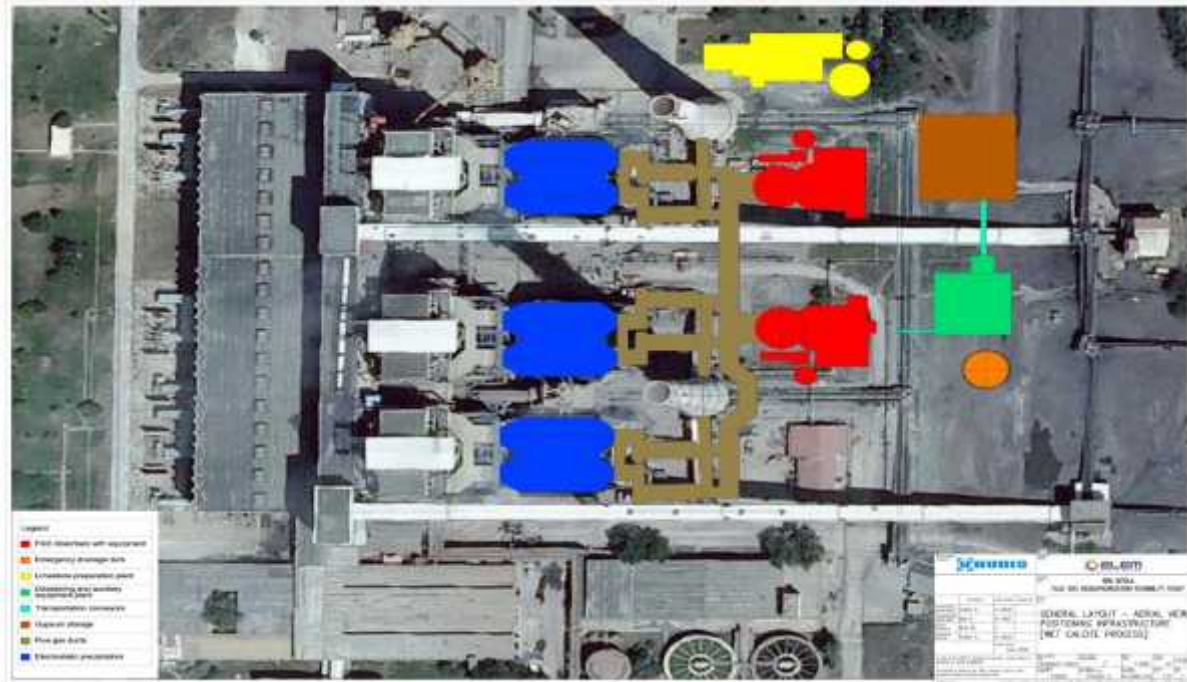


Figure 1: Location of the Desulfurization Technology within REK "Bitola"

In accordance with the recommendations by the elaborator, the study includes that the implementation of this project will be implemented in two phases:

Phase I –Reduction of dust, where the phase is to be characterized by:

- Reconstruction of the electrostatic precipitator and
- Replacement of the ID fans and exhaust gas ducts

II phase -Reduction of SOx-desulfurization, which would mean the following:

- **Preparatory work**
- **Construction works**
 - Constructive part
 - Storage of plaster
- **Mechanical equipment installation:**
 - Desulfurization 1
 - Desulfurization 2
 - Steel construction

- Limestone Crusher
- Additional equipment

- **Electrical Equipment and Installation:**
 - High Voltage Supply
 - Low voltage Distribution
 - Control System
 - Developer's Costs

Investments

Capital Expenditures

Investment Costs	EUR	%
1. Preparation works	750.000	0,52%
2. Reconstruction of the electrostatic precipitators	12.900.000	9,00%
3. ID fans and ducts	7.500.000	5,23%
4. Desulfurization equipment	113.129.400	78,95%
- construction works	8.500.000	5,93%
-hardware and construction	94.829.400	66,18%
- <i>Electrical equipment and construction</i>	9.800.000	6,84%
5. Developer's costs	5.000.000	3,49%
Total capital expenditure	139.279.400	97,20%
6. Investment costs	2.825.000	1,97%
7. Working capital	1.186.200	0,83%
TOTAL	143.290.600	100%

Operating Costs

Annual operating costs (Average for 2021-2045)	EUR/ per year
1. Fixed operating costs	8.103.800
2. Variable costs	5.565.500
Total	13.669.300

Significance of the project

- Reduce emissions and immission of SO_x and dust in accordance with limit values based on the European directives and national legislation of R. North Macedonia;
- Improve the ambient air nearby REK "Bitola" and in the city of Bitola;
- Reducing the noise of the plant;
- Possibility for producing of gypsum and its placing on the market;
- Improved conditions for workers and the population living around REK "Bitola" and
- Possible reduction of external costs (reduced absenteeism, etc.).