STUDY ON THE PERSPECTIVES OF COAL BURNING IN CLASSIC THEROELECTRIC POWER PLANTS IN ROMANIA

Cristinel Racoceanu, *Professor, "Constantin Brâncuşi" University of Târgu Jiu*

ABSTRACT: This paper presents a case study on the prospects for coal-fired electricity generation in classic thermoelectric power stations in Romania, in the context of respecting the environmental legislation. The results of the assessment of the pollutant emissions by measurements made with specialized equipment are presented, at 330 MW energy groups that operate on lignite in Rovinari and Turceni thermoelectric power stations.

KEY WORDS: Emmissions, CO_2 , CO, SO_2 , NOx, ash, dense slurry, desulfurization.

1. INTRODUCTION

The thermoelectric power stations in Romania ensure the safety of the functioning of the National Energy System. Oltenia Energy Complex is the largest producer of coal-based electricity. The share of coal in the electricity production in Romania represents on average 35%. The Ministry of Energy estimates that in Oltenia there are reserves of about one billion tonnes of coal.

Energy lignite production is mainly carried out in the mining basin of Oltenia in a number of 15 mining perimeters, where a production of 25-30 million tonnes / year is realized. According to a forecast study conducted by Transelectrica, in the period 2018-2027, 7 of them will

The largest coal-fired power plants in Romania - Rovinari and Turceni power plants - have 330 MW of power. At these energy groups were implemented technologies for desulphurization of flue gases and ash evacuation in dense sludge.

The 330 MW energy groups operate on lignite with the heat output of 1400-1800 kcal/kg. To ensure the stability of the flame, fuel oil with a calorific power of 9200 kcal/kg is used. For starting the boilers, natural gas with a calorific value of 8000 kcal/m^3 is used.

2. EXPERIMENTAL RESULTS

Figure 1 shows the Rovinari thermoelectric power station, which comprises 4 power groups of 330 MW. The steam boiler of the 330 MW power group is BENSON type, with the flow rate of 1035 t/h.

Figure 2 shows the diagram of the BENSON boiler. The boiler is tower type with a single flue gas path and has a height of 92m.

Fig. 1. Rovinari theromoelectriv power plant

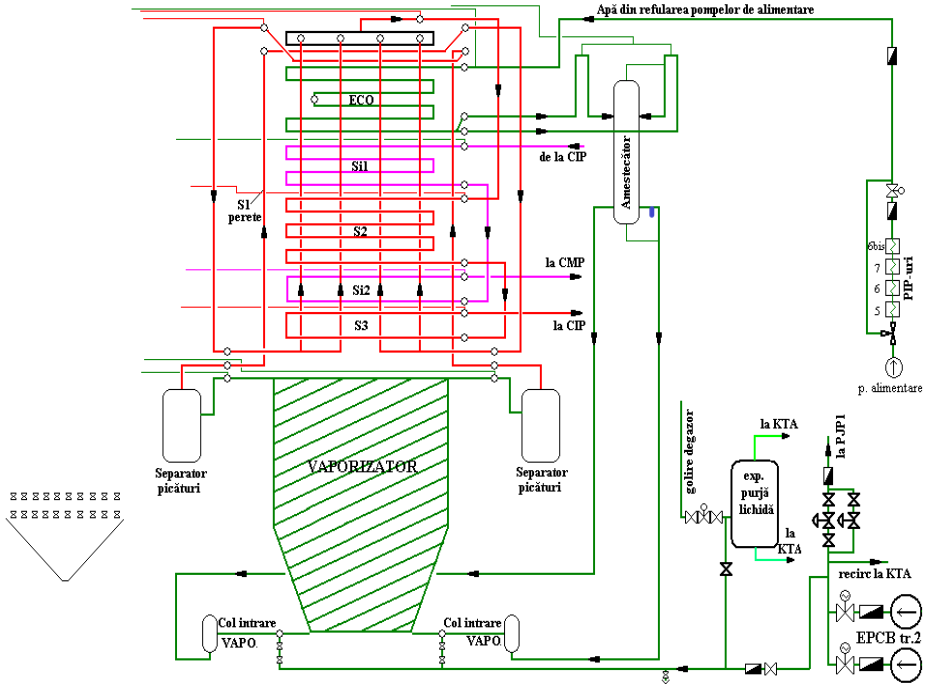

Fig. 2. BENSON boiler

Measurements of the pollutant emissions were made for the energy group no.3 from Rovinari and Turceni power plants, with the TESTO 340 gas analyzer. Table 1 shows the temperatures of the flue gases in the chimney of the boiler, the speed of the flue gases released into the atmosphere, summer, fall, winter. In the table are presented also the mass flows of pollutants evacuated into the atmosphere. By equipping the energy group with a

wet desulphurisation plant, the exhaust gases in the atmosphere are evacuated through a new chimney with a height of 120 m.

Table 2 presents the results of the experimental measurements for the energy group no. 5 from Turceni power plant, and in figure 3 is presented the TESTO 340 gas analyzer. The permitted limits for the concentration of pollutants in the flue gas are:
SO_2 : 200 mg/Nm^3
NO x : 200 mg/Nm^3
Ashes: 50 mg/Nm^3

Fig.3 TESTO 340 gas analyzer

Table 1

Period	Ash (mg/Nm^3)	NOx (mg/Nm^3)	SO_2 (mg/Nm^3)	Speed of flue gas to the chimney (m/s)	Temperature of flue gas to the chimney (°C)
Spring	42,3	312,8	190,1	15,1	142
Summer	40,7	320,1	187,4	15,3	145
Autumn	41,5	300,2	198,6	14,8	141
Winter	44,2	310,4	186,9	15,4	146

Table 2

Period	Ash (mg/Nm^3)	Nox (mg/Nm^3)	SO_2 (mg/Nm^3)	Speed of flue gas to the chimney (m/s)	Temperature of flue gas to the chimney (°C)
Spring	44,8	357,2	192,7	14,8	143
Summer	42,1	334,6	188,2	14,6	144
Autumn	45,9	331,8	190,1	14,9	143
Winter	47,3	342,1	187,8	15,2	145

3. CONCLUSIONS

Coal burning in the 330 MW energy groups of the Oltenia Energy Complex represents a solution for ensuring the security of the National Energy System. The large reserves of lignite in the Oltenia mining basin allow the use of coal for the production of electricity for several decades.

In order to comply with the environmental norms of the European Union, the 330 MW power groups have to solve the following technical issues:

- reduction of NOx emissions to the limit of 200 mg/Nm^3;
- reduction of CO_2 emissions.

In order to reduce NOx emissions, catalytic reduction technologies are implemented in the boilers of the energy groups from Rovinari and Turceni power plants.

In order to reduce CO_2 emissions, the solution of capturing these emissions and their storage will have to be implemented, with very high financial costs.

The Oltenia Energy Complex has succeeded in reducing ash emissions and ash pollution by applying the ash disposal technology in dense sludge.

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