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## **Studies of Thermochemical Heat Recovery of Exhaust Gases of Furnaces**

The review of schemes and methods of thermochemical heat recovery (TCR) of exhaust flue gas for different power plants operating on hydrocarbon fuels have been performed.

The essence of the heat of flue gases TCR is to use their physical endothermic heat for pre-processing the original hydrocarbon fuel, which thus receives a greater supply of chemically bound energy in the form of increased heat of combustion. If the traditional VTU, energy of fuel is converted into heat in one stage by direct incineration, in plants with TCR the process of transformation of the fuel energy is divided into two stages. The first stage is the heating of the reaction mixture and carrying out endothermic reactions of the initial fuel conversion, resulting in an increase in its calorific value. The second stage is burning of the reaction products, i.e., reformed gas having a large heat of combustion compared to the original fuel.

The efficiency of thermochemical heat recovery of exhaust flue gas to the various power plants, working on gas fuel was shown. Information about the introduction of the schemes of thermochemical heat recovery of energy in addition to positive effect and a positive environmental effect were shown. The shortcomings of the TCR schemes of heat by the steam reforming of natural gas were considered. The solution of this problem is the use of combustion products containing water vapor and carbon dioxide for the conversion of the original fuel. The prospects for the use of the TCR of the heat of the exhaust flue gas through the natural gas conversion products of its complete combustion were considered. Energy-efficient technical solutions for this method, TCR developed and patented.

The result of the study of this topic revealed the functional dependence of quantity of the transformed physical warmth of flue gases in the chemical energy of the reformed gas from the process parameters: temperature, pressure and composition of the reaction mixture and the variation ranges of process parameters that allow the effective functioning of the system TCR of the heat of the exhaust flue gases.

### **References:**

1. Pashchenko, D. I. the Use of thermochemical regeneration of heat in gas-powered plants / D. I. Pashchenko // Vestnik Samgtu. Series "Technical Sciences". – 2009. – №3 (25). – P. 232-236.
2. Pashchenko D. I. Production and use of synthesis gas in a system of thermochemical regeneration of heat / D. I. Pashchenko, I. A. Schelokov // Alternative energy and ecology. – 2009. – №12 (80). – P. 10-14.