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COAL PROCESSING – BASIC DIRECTION OF INCREASING COMPETITIVENESS

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Abstract. Technology of coal combustion and pilot plant in the Sakha Republic (Yakutia) could be successfully implemented as a boiler fuel, initially at one of the boiler-stations, which burns stone or brown coal. Previously these could be coals of Kangalassky, Harbalahtsky and Kirovsky deposits.

Keywords: North, coal, competitiveness, processing, briquetting.

In conditions of the North, extreme climatic conditions, where the duration of the heating season is 9 months or more, the problem of heat supply is vital. Nowadays traditional wood is used to solve this problem but its stocks decline inexorably. Our republic is rich in oil, gas and gas condensate. They occupy dominant position in the fuel market because it is easy to use, transport through pipelines and the cost is quite low. However, there are remote places in the country where the delivery of these fuels is very difficult and there are sectors of the economy, which need in processing products of coal.

On the other hand, there are huge reserves of coal and brown coal mined by open pit and underground methods in the Republic now.

The above has required conducting research to improve the competitiveness of coal and the development of innovative technologies of processing.

One of the famous directions is briquetting coal with and without using binders.

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There are traditional methods of briquetting, designed for medium and high rank coals of types G, T, anthracite duffs, and the briquetting methods based on its own resin, obtained by heating to 90 - 100 degrees. However, these technologies are not suitable for lignite of Kangalassky, Kirovsky fields, which provide fuel to most settlements of the Sakha Republic (Yakutia). These coals are characterized by a low content of humic acids, resins and bituminous substances, briquetted only by adding expensive peroxidation hard bitumens [1].

As a result, a single science-based approach to the selection of effective binding and technological regulation of coal briquettes production for brown coal is not available. In this regard, the development of production technology of briquetted lignite for consumers of our Republic is very urgent. This development has a great practical perspective to solve fuel problem for far northern areas with seasonal transport schemes and where there are no traditional types of fuels and oil delivery is difficult.

Research on the quality and calorific properties of briquettes using oil bituminous binders, organobentonit and briquetting without binders has been done. Experiments have shown the effectiveness of briquetting, using binders from organobentonit.

Another promising area is the underground gasification of coal, which provides the use of combustible components of coal. However methods and techniques of control of endogenous burning have not been worked out yet. The development of science and technology have allowed to come closer to problem solution of obtaining liquid fuel extracts from coal. The pilot plant to get light fuels from coal is being prepared at the moment.

One of the most researched areas of coal use is improving of the technology and methods of coal combustion in boilers and increasing of coefficient of efficiency and calorific ability. There are pilot plants and as practice shows, they are the most researched and acceptable.

The most appropriate technology in severe climatic conditions is the development of scientists of the Krasnoyarsky Scientific Center of the Russian Academy of Sciences, Siberian Federal University and the company "SIBTERMO" for getting heat and coke.

Thus total air emissions are 20-30 times lower than when traditional coal is combusted. The basic physical principle is the phenomenon of reverse thermal wave. The essence of this wave is that when the organization of the process with the use of this phenomenon is applied, coal is separated into two components - a solid and a gas.

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Solid component is a fine-grained coke remainder with calorie about 29 MJ / kg (7000 kcal / kg) and is a highly active carbon reductant, which may have broad application prospects as a component of the pulverized fuel for injection into blast furnaces, as technological fuel in the cement industry, in production of alumina etc. So this product is a cheaper substitute of classic coke / 2 /.

Gas component is a fuel with a specific heat of combustion of 1035 kcal/nm³ and can be a substitute for other types of fuel: natural gas, gas condensate, wood, fuel oil in boilers, diesel oil in reciprocating power plants, for drying and burning construction materials.

The proposed project is based on the experience of the use of first variants of technology in semi-industrial scales.

For example:

1. Factory of lignite coke production in Krasnoyarsk at Joint Stock Company "Carbonica-F" has been working profitably for 15 years, producing sorbent and delivering hot water.

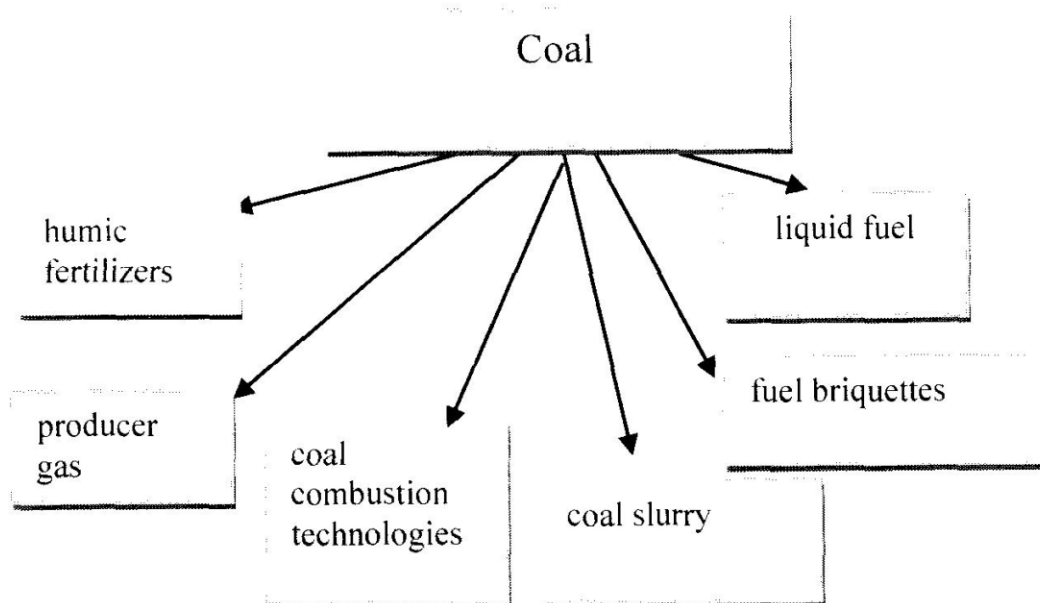
2. Coal gasification installation for drying grain was produced and put into exploitation in September 2007, it worked for three seasons at the JSC "Balahtinsky bread". It compensated itself in one season.

This technology of coal combustion and pilot plant in the Sakha Republic (Yakutia) could be successfully implemented as a boiler fuel, initially at one of the boiler-stations, which burns stone or brown coal. Previously these could be coals of Kangalassky, Harbalahtsky and Kirovsky deposits.

Thanks to organic origin of carbon it has become possible to get chemically humic fertilizer for agriculture from coal. The development and the start of the pilot plant for getting humates from coal is being planned.

The most scientific and capital-intensive area is the deep coal processing and getting out of it different chemicals, medical supplies etc. However, this area in the republic is not developed due to the lack of high-tech manufacturing.

In recent years, there are the following trends in coal processing in the Sakha Republic (Yakutia).



Coal briquetting is one of the most well-known technology with and without using binders. Nowadays there are two traditional methods of briquetting, designed for medium and high rank coals of types G, T, anthracite duffs, and the briquetting methods based on its own resin, obtained by heating to 90 - 100 degrees. However, these technologies are not suitable for lignite. This type of coals is characterized by a low content of humic acids, resins and bituminous substances, briquetted only by adding expensive peroxidation hard bitumen.

At present the choice of effective binders and process regulations production of coal briquettes for lignite is absent. In this regard, the development of production technology of briquetted brown coal is very urgent and it has a great practical perspective for fuel problem solutions to the remote northern regions with the seasonal transport scheme. It is necessary to do research on the quality and calorific properties of briquettes using oil bituminous binders.

Considering the importance of severe climatic conditions of the North we believe that the top priority is heat provision to population using coal briquettes for providing fuel and energy resources to remote areas of the republic.

In this regard, preliminary studies of coal samples of brown coal deposit area in central Yakutia have been done. As the output of its own coal resin in the place was insufficient for briquetting, BN-70/30 petroleum bitumen was used as a binder. The examined coal, heated to +70 ° C was mixed with pre-heated to + 180 - 200 ° C binder. Mixing was carried out at the temperature +95 ° C and then, after cooling to +60 ° C it was pressed at specific pressure of 20

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MPa. According to test results obtained briquettes satisfied the requirements of strength, bucking and water proofness.

The heat of obtained briquettes combustion was 21 MJ/kg, which corresponds to the regulatory requirements.

Thus, the development of the above coal processing technologies will significantly enhance the competitiveness of coal.

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