

## **POSSIBLE TOPICS OF PROJECTS**

### **1. Theoretical and experimental determination of parameters of intensification of processes of anaerobic processing of plant biomass, by-products of poultry and animal husbandry:**

- models of physical and chemical processes in a bioreactor during methanogenesis under the influence of a magnetic field;
- preliminary mechanical-magneto-hydrothermal treatment of biomass, including lignocellulosic biomass, sewage sludge and food waste;
- study of the hydrogen methanation process in an ex-situ bioreactor with inert biomass as a carrier. The process of methane synthesis as a result of the endothermic reaction of carbon dioxide reduction using the electron donor H<sub>2</sub> with the participation of hydrogenotrophic methanogens;
- creation of an electrotechnical complex for the processing of fermentation residues into hydrocoke.

### **2. Creation and practical implementation of the process of destructive energy processing of biomass with simultaneous production of pyrogas and biochar.**

Increasing energy efficiency and reducing heat release into the environment due to the regeneration and conversion of the heat of the spent coolant, the use of the dissipative energy component of the electric drive, and the dynamic regulation of the defining parameters of the pyrolysis process under the influence of the magnetic field.

### **3. The technology of preparation and long-term ecologically safe burning with solid fuel heating of a pyrogas-water-gas-air-fuel mixture with the least negative impact on the surrounding natural environment.**

Study of the thermal ionization of dry water gas in the afterburner chamber with the formation of hydrogen and oxygen in the combustion mass, the formation of a combustible pyrogas-water-gas-air mixture in the afterburner chamber and its combustion in the afterburner chamber - the combustion chamber.

The use of solid fuel in the form of heterogeneous waste carbon fuel raw materials (wood, tires, plastic, paper, coke, reforestation residues, agricultural waste) for pyrolysis combustion allows efficient, economical and long-term burning, stationary or mobile premises with hot water for heating.

### **4. Creation of energy-saving technology and equipment for the conversion of H<sub>2</sub>O water into hydrogen-containing gas in a combination of**

**catalytic media of the  $C_nH_{2n+2}$  series (used oils) in a continuous thermal fire environment at a combustion temperature of over 500 degrees.**

Use of contaminated hydrogen-containing gaseous waste, heavy oils, edible oils, industrial lubricants, spent hydrocarbons, used or contaminated organic solvents, chlorinated solvents, paints.

**5. Numerical modeling and experimental studies of energy storage processes using the latest organic phase-changing storage devices with an improved structure of thermal conductivity for devices and systems of heat supply of buildings and structures.**

**6. Numerical modeling and experimental studies of hydrodynamics and heat exchange processes in thermal power plants and systems, development of new compact designs of bundle heat exchangers based on small-diameter tube bundles with nanocoatings for energy installations of industry, utilities and agriculture**