

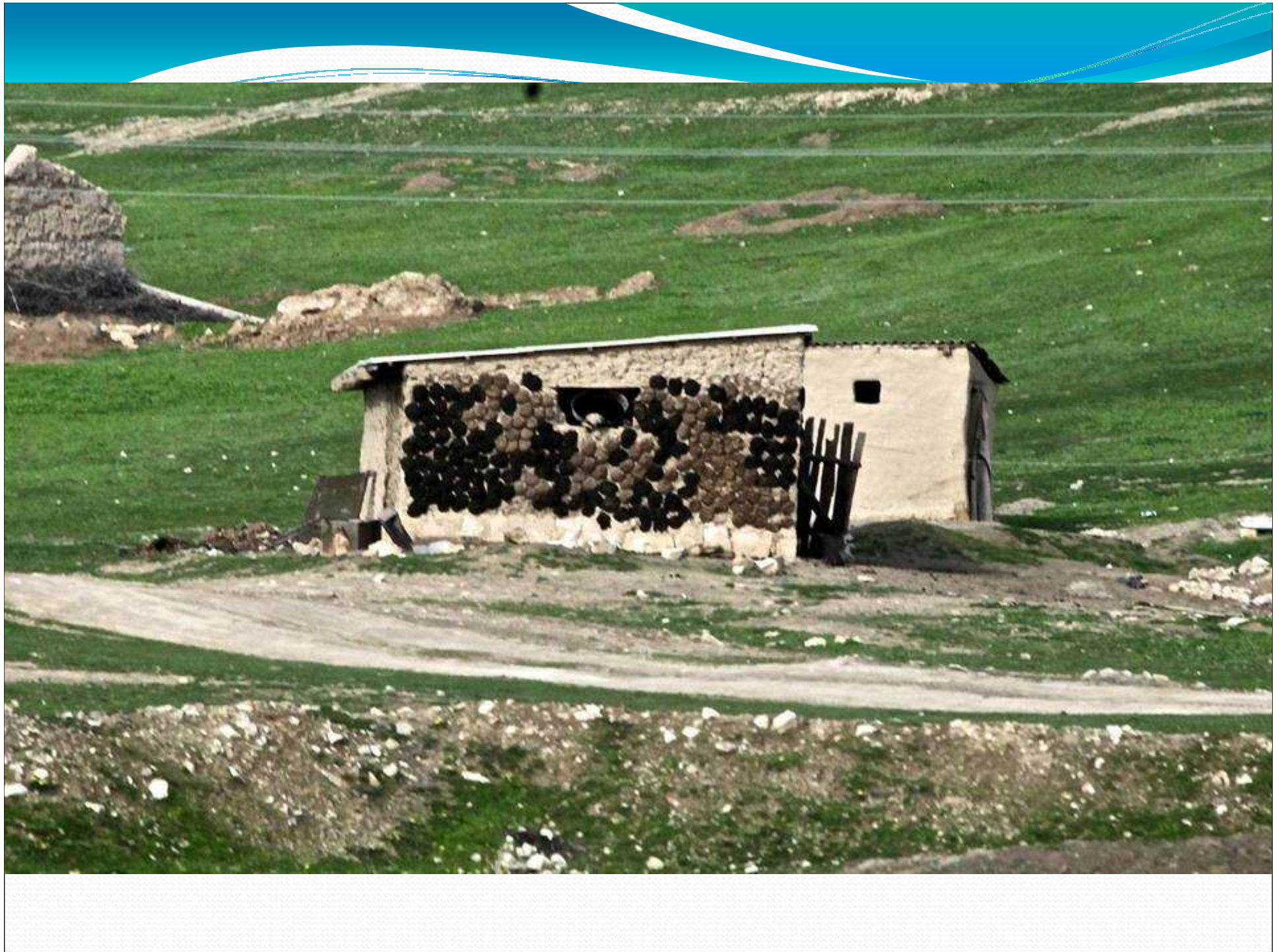
Manure as Alternative of Supply of Mountain Regions by Electric Power

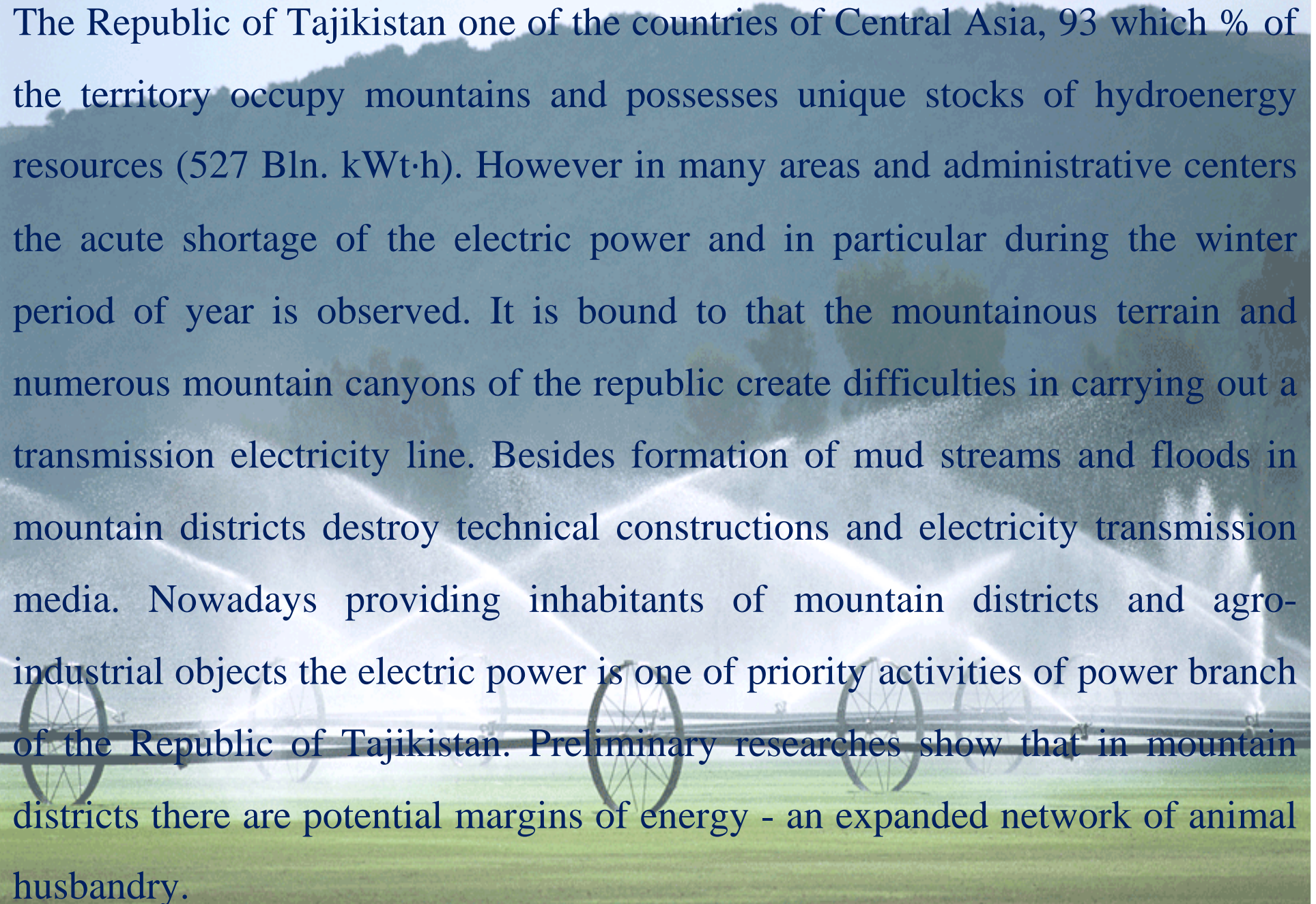
Naim Narzulloev

Tajik National University, Tajikistan

E-mail: naimnn@mail.ru

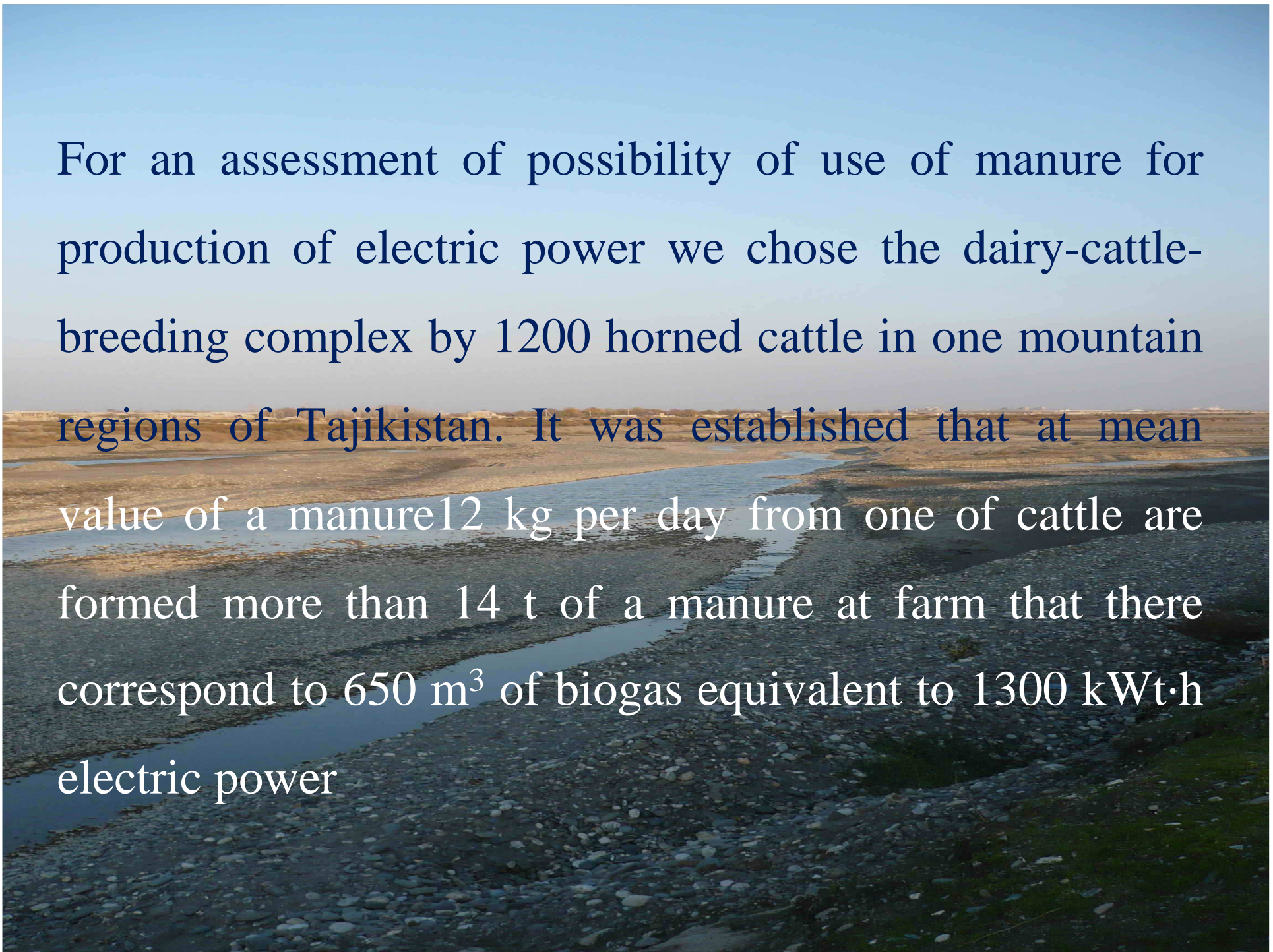
**16th Seminar of the ISTC Scientific Advisory Committee
ENERGY SECURITY, HOW TO FURTHER THE TECHNOLOGY”
Almaty, Republic of Kazakhstan 22-23 October 2013**





The Republic of Tajikistan one of the countries of Central Asia, 93 which % of the territory occupy mountains and possesses unique stocks of hydroenergy resources (527 Bln. kWt·h). However in many areas and administrative centers the acute shortage of the electric power and in particular during the winter period of year is observed. It is bound to that the mountainous terrain and numerous mountain canyons of the republic create difficulties in carrying out a transmission electricity line. Besides formation of mud streams and floods in mountain districts destroy technical constructions and electricity transmission media. Nowadays providing inhabitants of mountain districts and agro-industrial objects the electric power is one of priority activities of power branch of the Republic of Tajikistan. Preliminary researches show that in mountain districts there are potential margins of energy - an expanded network of animal husbandry.

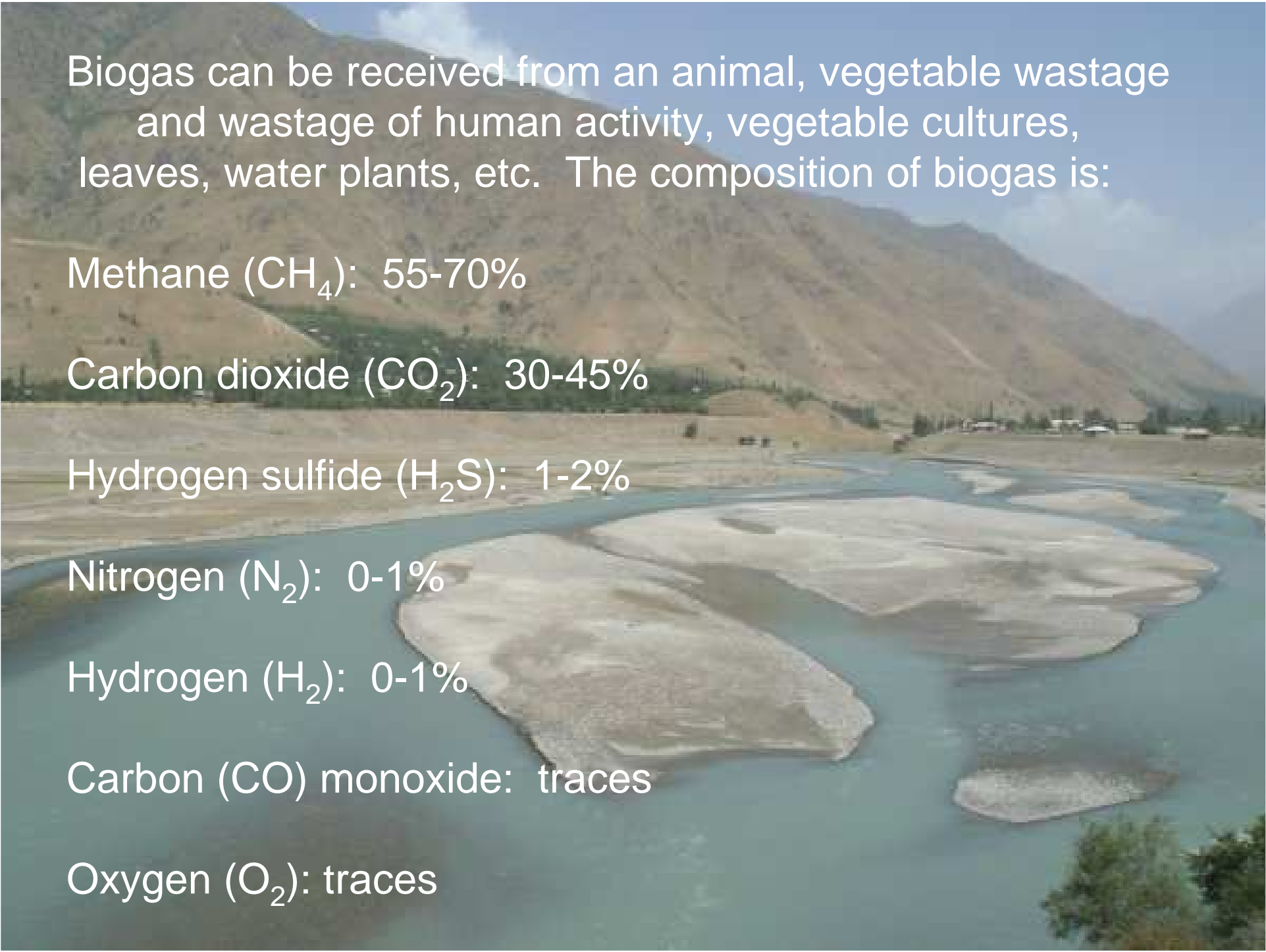
For an assessment of possibility of use of manure for production of electric power we chose the dairy-cattle-breeding complex by 1200 horned cattle in one mountain regions of Tajikistan. It was established that at mean value of a manure 12 kg per day from one of cattle are formed more than 14 t of a manure at farm that there correspond to 650 m³ of biogas equivalent to 1300 kWt·h electric power





Biogas represents valuable fuel. For its production in many countries express methane tanks which are filled with manure drains or sewage. Methane tanks vary in sizes from one cubic meter (in individual farms) to thousand cubic meter used in larger commercial installations. In process of bacteria activity heat is formed, however in the conditions of a cold climate the supply of manure by heat is necessary for maintaining of optimum temperature (35 °C). Biogas can be a source of heat. In the limiting case all gas can be used for heating





Biogas can be received from an animal, vegetable wastage and wastage of human activity, vegetable cultures, leaves, water plants, etc. The composition of biogas is:

Methane (CH_4): 55-70%

Carbon dioxide (CO_2): 30-45%

Hydrogen sulfide (H_2S): 1-2%

Nitrogen (N_2): 0-1%

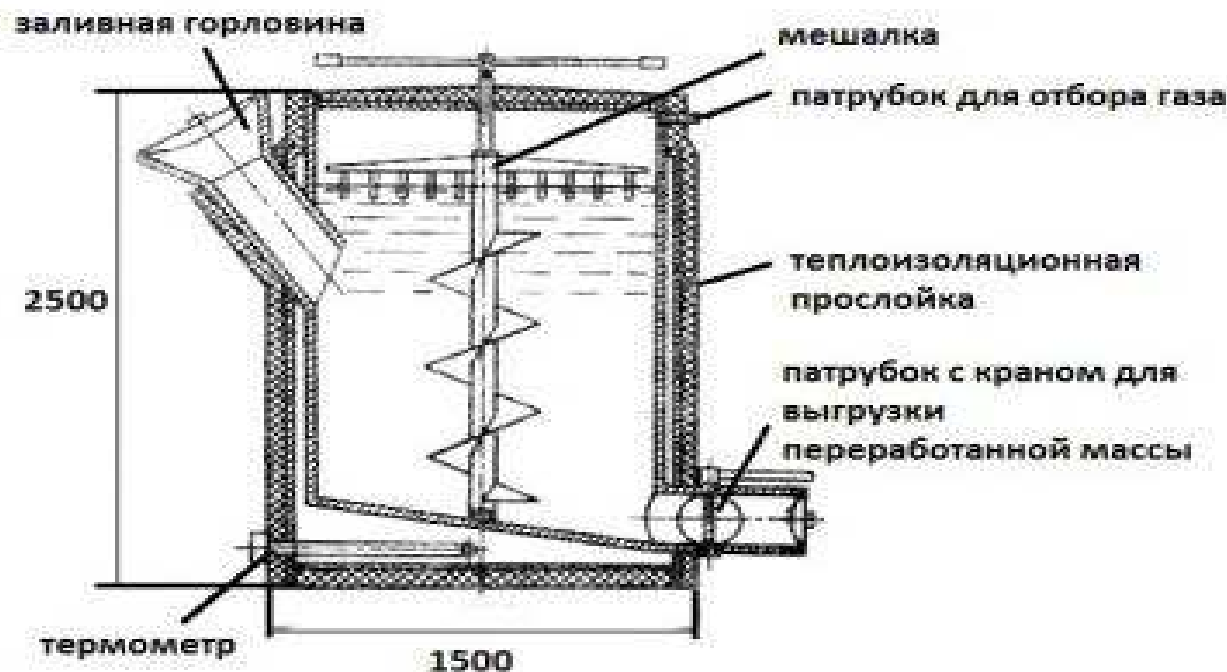
Hydrogen (H_2): 0-1%

Carbon (CO) monoxide: traces

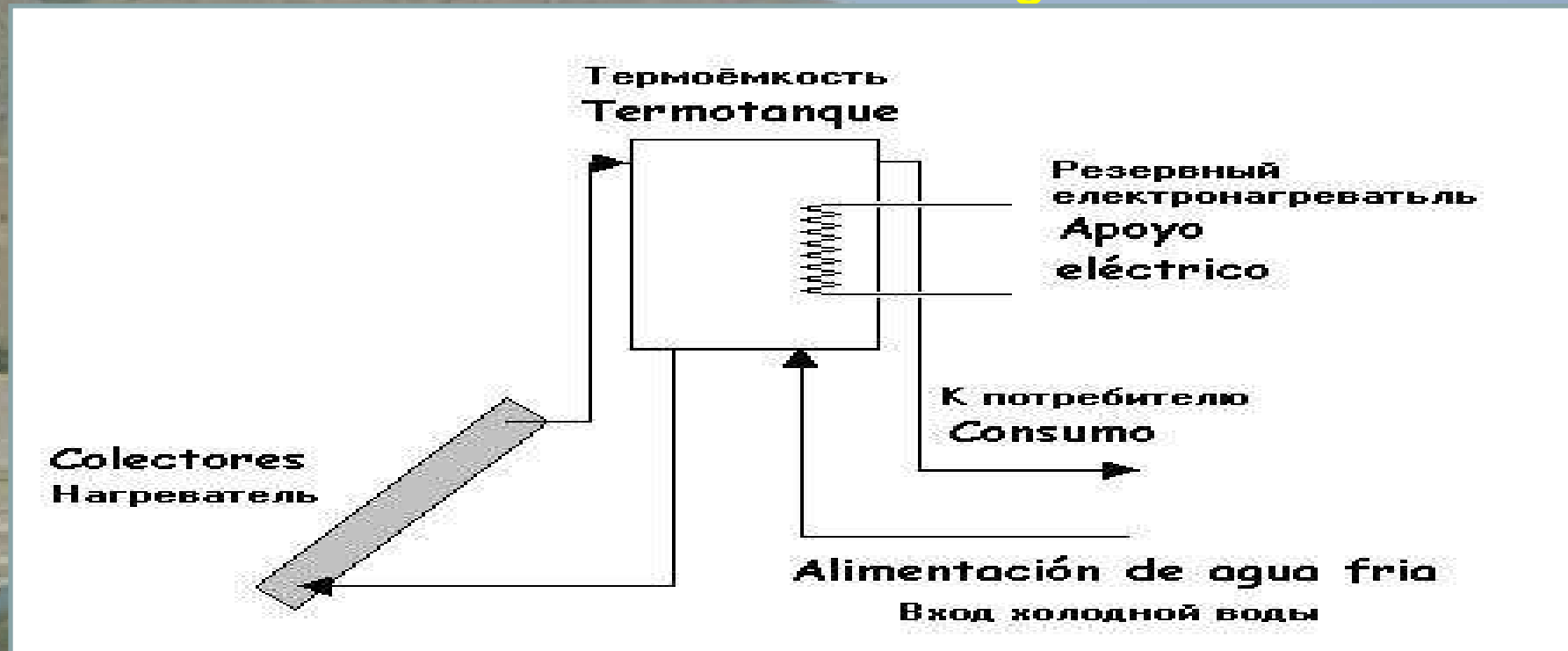
Oxygen (O_2): traces

One cubic meter of biogas contains 4500-5500 kcal of thermal energy and at combustion in the specialized torches having effectiveness of 60% and can provide 2700-3200 kcal of heat.

СХЕМА БИОГАЗОВОЙ УСТАНОВКИ



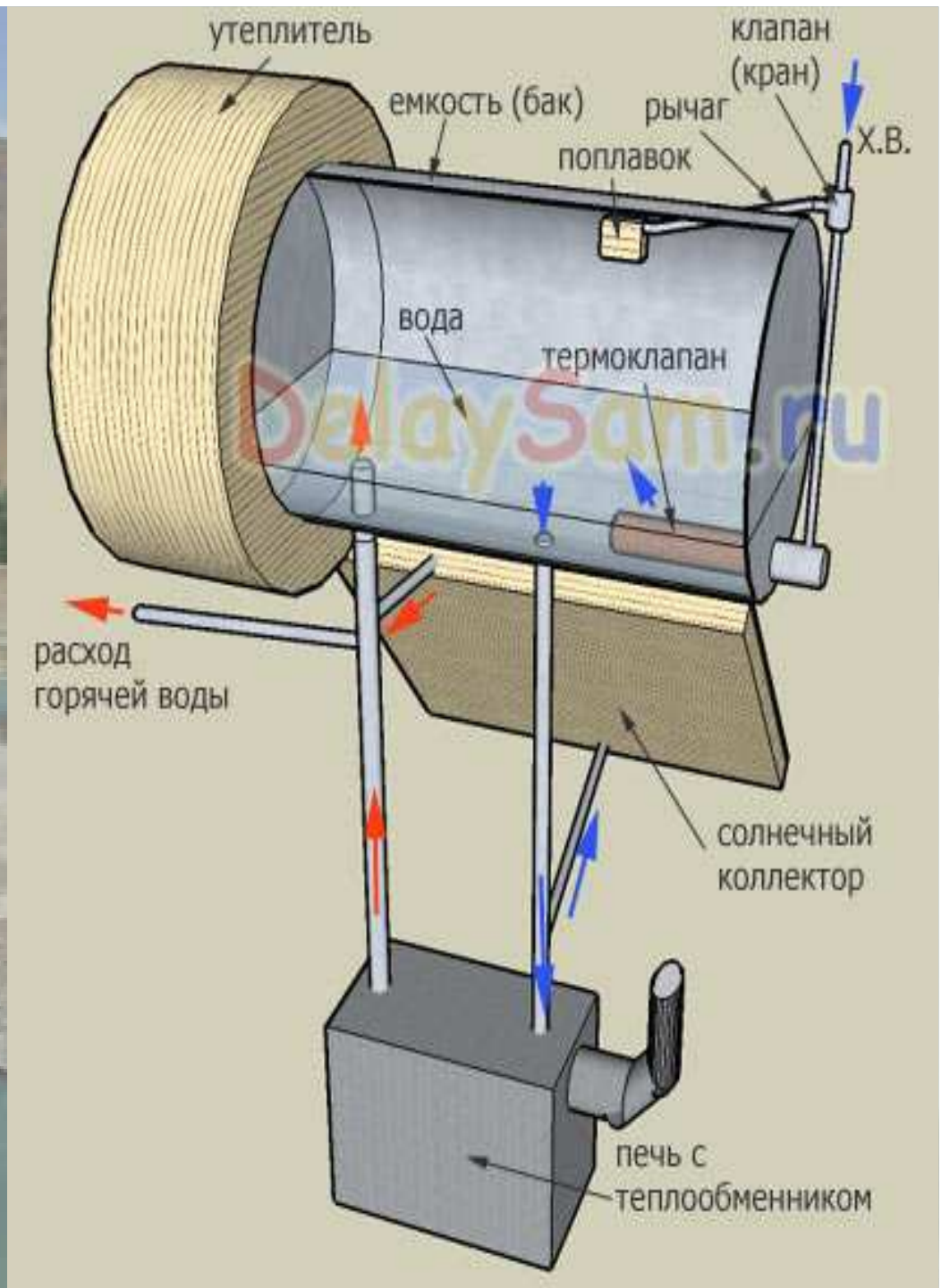
Application of a solar collector for water heating

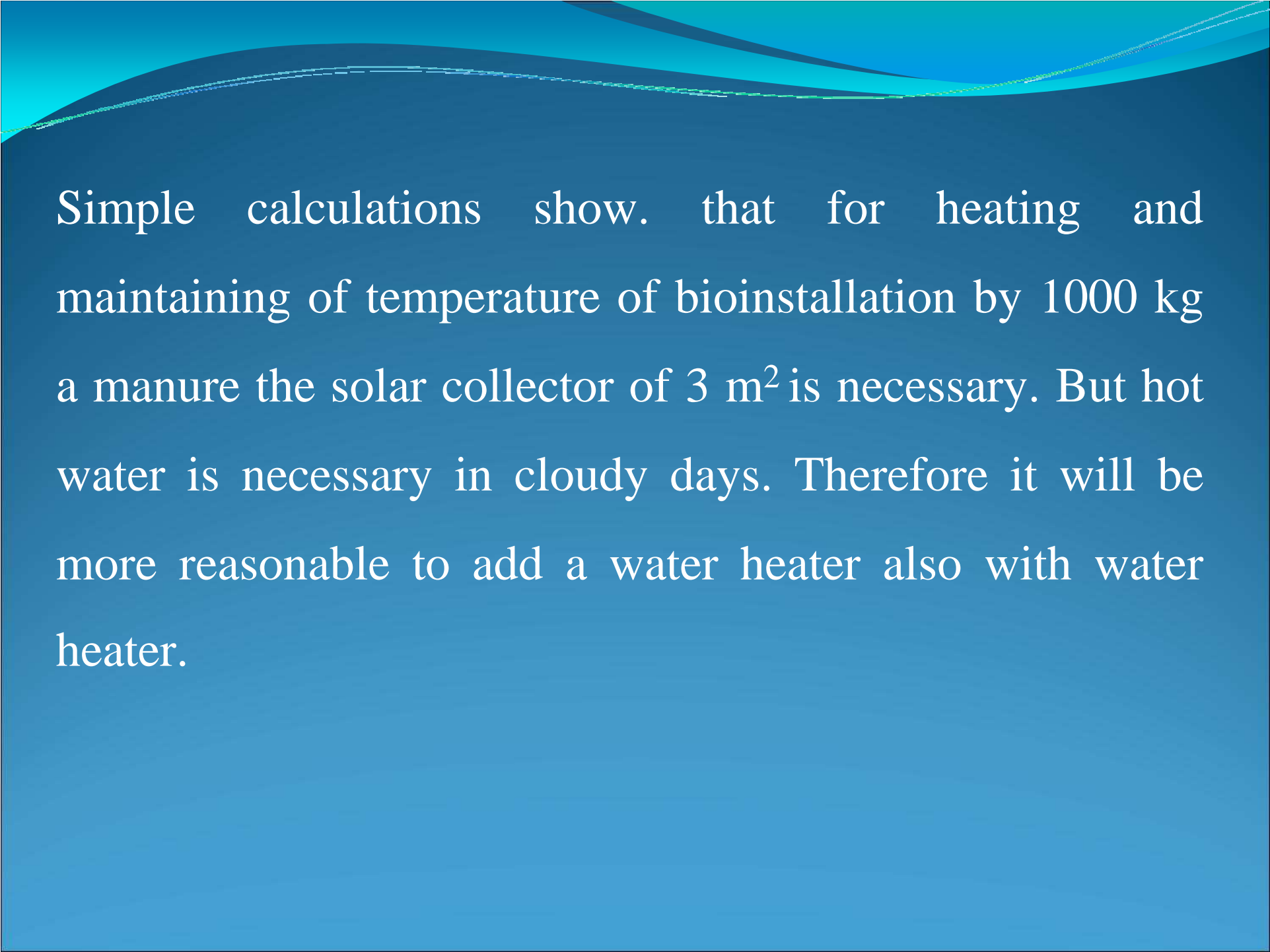


In the reactor heating elements (a spiral from a pipe along vertical walls of the reactor) are mounted on which hot water from a solar collector flows past. The polypropylene or metal plastic pipes are applied. Looking some inferior indexes of a thermolysis, than at metal pipes, polymeric pipes normally cope with the task and are absolutely not subject to corrosion

Insolation

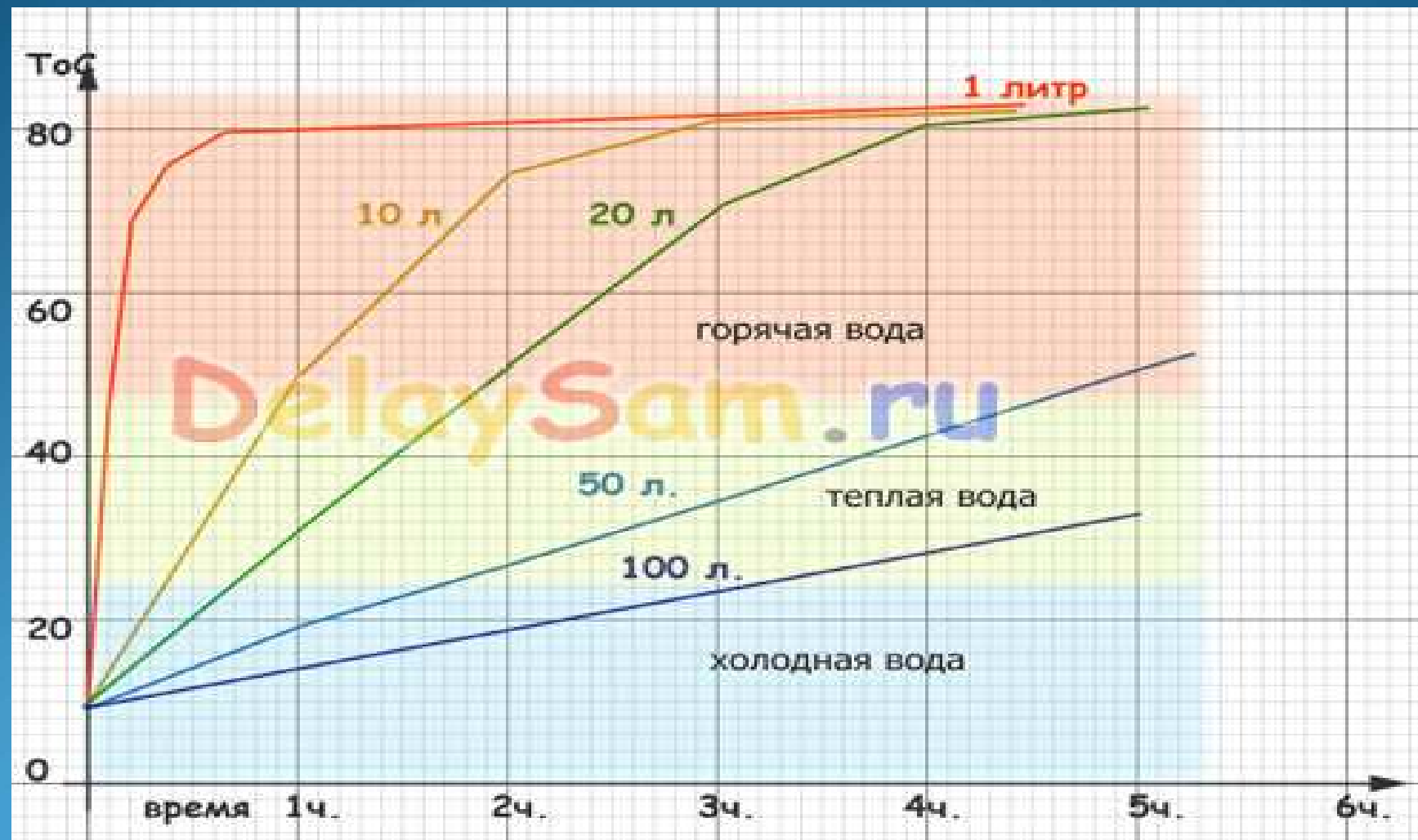
It is known that for heat of 1 l of water (1 kg) on 1 degree, it is necessary of 4200 Joules. Other known fact that on each square meter of a surface perpendicular to sunshine about 600-800 J per second (or 600-800 W) fall. For Tajikistan this correspond to 1200 W.





Simple calculations show. that for heating and maintaining of temperature of bioinstallation by 1000 kg a manure the solar collector of 3 m² is necessary. But hot water is necessary in cloudy days. Therefore it will be more reasonable to add a water heater also with water heater.

On the next slide it is presented results of calculation of effectiveness of a solar collector by area of 1 m^2 and the power of 500 W for water heating



The offered bioenergy module allows solving the following problems:

- electricity supply;
- increases of fertility of soils (on 15-25 %);
- export of high-quality pollution-free organic fertilizer;
- ensuring environmental protection;
- ensuring sanitary and hygienic wellbeing of farms.

The calorific value of the biogas containing 70% methane makes 25100 kJ/m³ (a methane - 35880) or 5990 kcal/m³. From biogas developed in economy of 65 m³/h it is possible to produce 172 kWt·h of the electric power and 163500 kcal/h of heat.

A scenic mountain valley with a river and greenery under a cloudy sky. The text is overlaid on the image.

Thank You for Yours Attention

Naim Narzulloev

Tajik National University, Tajikistan

E-mail: naimnn@mail.ru