1. ABSTRACT

1.1 The projected scientific and technical development is an ecological (environmental, waste-free) biotechnology (BT) of methane (biogas) production from blue-green algae (BGA), that are massively developed in summer in Dnieper cascade reservoirs, which provide drinking water to more than 80% of the population of Ukraine. The by-product of BT is a mineral-organic fertilizer, which makes the technology practically non-waste. Implementation of BT in the national economy will cover these three functions - energy, environmental and agricultural.

1.2 Application of the development will provide farmers with cheap methane and fertilizer as well as improve the ecological state of the Dnieper River, coastal towns and vacation spots, increase productivity of fish and reduce the cost of water treatment in accordance with ISO "drinking water" because the removal of cyanobacteria from the water will lead to the improvement of its quality (during the natural fermentation water accumulates methane, acetone, acetic acid and butyric, butanol, phenols, amines type "cadaveric poisons" (putrescine)).

1.3 In the future, it is expected to build a network of stationary and mobile systems of BGA and other surplus biomass (higher aquatic vegetation, crops and livestock waste, deciduous litter of settlements, etc.) utilization along the Dnieper national ecological corridor to ensure a sustainable ecological and economic development of Dnieper regions.

2. APPLIED PROBLEM TO BE RESOLVED BY THE PROJECT

2.1 The object of the development is blue-green algae (Cyanophyta), more precisely cyanobacteria (Oxyphotobacteriobionta), which are the oldest group of autotrophic organisms, whose remains were found in Precambrian stromatolites ageed to 2,7-3,2 billion years. Since it is a cosmopolitan, cyanobacteria, despite the minor species diversity (about two thousand species), are found everywhere because of their adaptive capabilities (ecological plasticity and resistance). Their ability to absorb four gases: carbon dioxide for photosynthesis, oxygen for breathing, hydrogen sulfide and nitrogen for chemosynthesis for its fixing, allows one initial cell during the growing period (70 days) to produce 1020 subsidiaries and that leads to their mass development - water "blooming".

2.2 The subject of the development is collection and recycling of BGA collected during the " blooming " of the waters of the Dnieper cascade reservoirs (use of alternative energy sources) to produce methane gas and bio-fertilizers.

2.3 Description of the problem that is being solved: the solution provides an introduction of BT designed to obtain additional sources of energy as well as mineral organic fertilizers and sustainable use of biological resources addressing national environmental issues related to water use.

2.4 Approbation of the process of obtaining methane was conducted at the laboratories of the Department of Environmental Biotechnology and Bioenergy Faculty of Science Kremenchug Mikhail Ostrogradsky National University.
The experimental development differs by a type of substrate used (biomass BGA) and quantitative composition of biogas (an increase in the methane content due to the absence of hydrogen sulfide and reduced carbon dioxide). The technical result is to obtain 1.2 dm3 gas mixture with 1.0 dm3 of concentrated substrate for a week at the optimum temperature of 20-30 ° C with quantitative and qualitative composition: methane (85%), carbon dioxide (10%), other gases (5 %), and the disappearance of hydrogen sulfide, which is part of the biogas derived from other (zoogenous) substrates, and causes corrosion of metal structures.

2.5 Relevance of the problem and explanation of the project results in order to meet the needs of the market. Use of cyano bacteria has below environmental effects:
- The use of ecologically safe, without significant energy costs, method of zestoa collection.
- The fulfillment of conditions of the Kyoto Protocol to the UN Framework Convention on Climate Change (Rio de Janeiro, 1992).
- Accession to the Directive 2000/60 / EC of the European Parliament and of the Council "establishing a framework for Community action in the field of water policy" from October 23, 2000.
- Recovery of disturbed structural-functional organization of the littoral ecosystems Dnieper cascade reservoirs (gas balance, hydro-chemical regime, reducing the toxicity of water and spawning fish fauna etc.).
- Rehabilitation of the environment and of the population by improving the quality of natural, including drinking water.
- The use of manufactured products as organic mineral fertilizers in agriculture and forestry;
- The use of social and financial effect for sustainable ecological and economic development Dnieper regions.

Utilization of BGA has the below energy resources and energy-saving effects:
- Free use of raw materials as substrate for fermentation;
-Introduction of low-cost production of biogas and its transformation into electricity;

- While collecting zestoa in "bloom" spots in the water area only Kremenchug reservoir area of 2250 km2 of up to 50 kg / m3 volume of 828 million M3 of water was shallow (depth of 2 m, 18.4% of the area of the reservoir) its biomass will be 4.14h107 during the growing period (70 days); subjecting this biomass fermentation in the process of methane-genesis, you can get up to 28.98 million m3 of biogas (≈ 18,837 million m3 of methane), equivalent to 20 thousand tons of oil or 17 thousand tons of diesel fuel.