NATIONAL METALLURGICAL ACADEMY OF UKRAINE

INNOVATIVE TECHNOLOGY OF MANUFACTURING GENERATOR GAS FOR LOW-POWER COGENERATION UNITS ON THE BASIS OF INTERNAL COMBUSTION ENGINE

Purposes and implication

Modular cogeneration unit for generation of electricity and useful heating on the basis of internal combustion engine. Potential users of the equipment are industries that recycle biomass processing waste, agricultural sector, electricity and heat consumers. Types of fuel include: solid biomass such as wood waste (bark, wood chips, etc.); agricultural waste (sunflower/ buckwheat/ rice husks, straw, corn and sunflower stalks, etc.); biomass based pellets.

Indicators of scientific significance of the technology

The innovation of the project lies in the use of a two-stage technology of biomass gasification. The main advantages of the two-stage technology include: the reduction of resin content in synthesis gas up to 6.5 … 7.1 mg/m^3 that is 2.5 times as low as in gas produced by the existing technologies of biomass processing; the possibility to use biomass with significant (up to 50%) moisture content without its preprocessing; the reduction of harmful substances emission in the air; the cost reduction in transmitting electrical and heat energy due to the installment of cogeneration units at the locations where the energy is supplied that prevents efficiency loss in heating systems.

Intellectual property rights protection

Three patents for the utility model registered in Ukraine.

Specifications

Cogeneration unit capacity: electric power - 10 ... 100 kW; thermal capacity - 60 ... 600 kW. During gasification process synthesis gas with heat of combustion 5 ... 8 MJ/ m^3 is produced. Main chemical composition of gas is CO, CO_2, CH_4, H_2, N_2.

Market demand

The given technology is highly demanded due to the state energy policy of Ukraine that tries to refuse purchasing natural gas.

Availability of the technology

There have been constructed two pilot semi industrial units with the capacity of 75 and 100 kW that match original fuel. It is necessary to manufacture industrial cogeneration unit with automatic biomass loading system, heat exchange and pump equipment, internal combustion engine, and automation system.

The unit for producing synthesis gas

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