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Combined Power Supply at Well Drilling in Extreme Climate Conditions

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Abstract : Power supplying of well drilling on oil and gas fields at ambient air low temperatures is characterized by increased requirements of electric and heat energy. Power costs for heating of production facilities, technological and living objects may several times exceed drilling equipment electric power consumption. Power supplying of prospecting and exploitation drilling objects is usually done by means of local electric power structures based on diesel power stations. In the meantime, exploitation of oil fields is accompanied by vast quantities of extracted associated petroleum gas, and while developing gas fields there are considerable amounts of natural gas and gas condensate. In this regard implementation of gas-powered self-sufficient power units functioning on produced crude products for power supplying is seen as most potential. For these purposes gas turbines (GT) or gas reciprocating engines (GRE) may be used. In addition gas-powered units are most efficiently used in cogeneration mode - combined heat and power production. Conducted research revealed that GT generate more heat than GRE while producing electricity. One of the latest GT design are microturbines (MT) - devices that may be efficiently exploited in combined heat and power mode. In conditions of ambient air low temperatures and high velocity wind sufficient heat supplying is required for both technological process, specifically for drilling mud heating, and for maintaining comfortable working conditions at the rig. One of the main heat regime parameters are the heat losses. Due to structural peculiarities of the rig most of the heat losses occur at cold air infiltration through the technological apertures and hatchways and heat transition of isolation constructions. Also significant amount of heat is required for working temperature sustaining of the drilling mud. Violation of circulation thermal regime may lead to ice build-up on well surfaces and ice blockages in armature elements. That is why it is important to ensure heating of the drilling mud chamber according to ambient air temperature. Needed heat power will be defined by heat losses of the chamber. Noting heat power required for drilling structure functioning, it is possible to create combined heat and power complex based on MT for satisfying consumer power needs and at the same time lowering power generation costs. As a result, combined power supplying scheme for multiple well drilling utilizing heat of MT flue gases was developed.

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