

Studying efficient small-scale natural gas liquefaction plants

© A.M. Arkharov¹, V.Yu. Semenov², N.I. Likhacheva¹

¹Bauman Moscow State Technical University, Moscow, 105005, Russia

²Public joint-stock company “Cryogenmash”, Balashikha town, Moscow region, 143907, Russia

Currently there is a growing interest in producing liquefied natural gas (LNG) on a small scale due to the development and modernisation of the gas and transport industries. LNG production consumes a lot of energy, and small-scale production means that energy consumption and prime cost of the output increase even further. This makes a comparative analysis of the efficiency of a given technology specifying the origins of irreversibility quite relevant. The study deals with the best-known natural gas liquefaction technologies using refrigerant blends, SMR (APCI) and Limum (Linde), which are used in small-scale production. We supply the results of comparing their efficiency using the statistical entropy analysis method. We show that the Limum technology is more efficient due to the presence of an extra refrigeration stage. On the basis of experimental and computational data we also discovered that the thermodynamic efficiency of various LNG cycles depends on the minimum liquefaction work.

Keywords: natural gas liquefaction plant, refrigerant blend cycle, thermodynamic efficiency, statistical entropy analysis, minimum liquefaction work

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Arkharov A.M. (b. 1931) graduated from Bauman Moscow Higher Technical School in 1954. Dr. Sc. (Eng.), Professor, Head of the Department of Refrigeration, Cryogenic Engineering, Air Conditioning and Life Support Systems, Bauman Moscow State Technical University. Laureate of the USSR State Prize and the Russian Federation National Award, Honoured Figure of Science and Engineering of Russia, Academician of the Russian Academy of Natural Sciences, awardee and Honorary Member of the International Institute of Refrigeration (Paris, France), Academician of the European Academy of Natural Sciences (Hannover, Germany), Chairperson of the Moscow regional branch of the International Academy of Refrigeration. Author of 25 books and over 450 scientific publications in the field of cryogenics.

Semenov V.Yu. (b. 1959) graduated from Bauman Moscow Higher Technical School in 1982. Cand. Sc. (Eng.), Head of the Laboratory of Cryogenic Technology, Safety and Gas Separation Processes, Public joint-stock company “Cryogenmash”. Author of over 50 scientific publications in the field of cryogenic engineering, including inventor's certificates. e-mail: v.semyonov1959@gmail.com

Likhacheva N.I. (b.1993), student, Bauman Moscow State Technical University. Specialises in natural gas liquefaction, plants using refrigerant blends. e-mail: nadyusha2712@bk.ru