

LIQUEFIED NATURAL GAS PRODUCTION TECHNOLOGY AND THE POSSIBILITIES OF ITS APPLICATION IN UZBEKISTAN.

*D.G. Azizova Professor of the Department
"Oil and gas work and processing technology"
Karshi State Technical University*

*A.Kh. Samadov Professor of the Department
"Technological machines and equipment"
Karshi State Technical University*

*J.B. Yuldashev Senior teacher of the Department
"Oil and gas work and processing technology"
Karshi State Technical University*

Khasanov F.B.
*Master's student in the specialty "Oil and gas
industry machinery and equipment"
Karshi State Technical University*

Annotation

The steadily increasing demand for oil and gas products, along with the need to address environmental protection issues, remains highly relevant. This article presents information on the work being carried out in our republic on obtaining liquefied natural gas (LNG) through the processing of associated petroleum gas and flare gas.

Keywords: *liquefied gas, technology, greenhouse effect, evaporation, utilization, condensation, throttling.*

ТЕХНОЛОГИЯ ПРОИЗВОДСТВА СЖИЖЕННОГО ПРИРОДНОГО ГАЗА И ВОЗМОЖНОСТИ ЕЕ ПРИМЕНЕНИЯ В УЗБЕКИСТАНЕ.

*Д.Г. Азизова., доцент кафедры
«Нефтегазовое дело и технология их переработки»
Каршинский государственный технический университет*

*Самадов А.Х., доцент кафедры
«Технологические машины и оборудование»
Каршинский государственный технический университет*

*Ж.Б. Юлдашев, старший преподаватель кафедры
«Нефтегазовое дело и технология их переработки»
Каршинский государственный технический университет*

*Хасанов Ф.Б., Магистрант направления
«Оборудование и машины для нефтегазовой промышленности»
Каршинский государственный технический университет*

Аннотация

Постоянно растущий спрос на нефтегазовую продукцию, а также необходимость решения вопросов охраны окружающей среды остаются в высшей степени актуальными. В данной статье представлена информация о проводимых в нашей республике работах по получению сжиженного

природного газа (СПГ) путем переработки попутного нефтяного газа и факельного газа.

Ключевые слова: сжиженный газ, технология, парниковый эффект, испарение, утилизация, конденсация, дросселирование.

At the current stage of global economic development, significant reforms and new directions in the structure of energy resources are emerging. Natural gas ranks third in the global energy balance and, according to optimistic forecasts at the beginning of the 2000s, its full production potential had not yet been realized. According to press reports, gas demand in European countries has been increasing by up to 3% annually. Considering that the United States is one of the largest gas importers, it was predicted that production gaps might arise in the Middle East, Africa, and Australia. These assessments now appear to have been overstated. Over the past 15 years, the share of gas demand has increased by approximately 1.5%. In 2014, natural gas accounted for 24.1% of the global energy market, oil for 32.5%, and coal for 30.4%.

The development of the global gas industry and marketing has shown that proven gas reserves have increased approximately 1.7 times, while production and consumption have grown by 75%. About 30% of exported gas is sold in liquefied form, and roughly 10% of globally produced gas is marketed as LNG.

LNG production organizations are carrying out promising projects aimed at ensuring the fuel and energy balance of countries by compensating for shortages of petroleum products with alternative fuels.

In addition, the use of natural gas as a fuel helps address two key environmental issues: reducing atmospheric pollution and mitigating the greenhouse effect. About one-quarter of the gas produced worldwide is liquefied and transported in liquid form by specialized tankers from producing countries to consumer countries.

Table 1

General state of gas networks in the global energy balance.

Title	1990	1995	2000	2005	2010	2015
Reserves, trln.m ³	116	140	154	152	165	191
Mining, trln.m ³	2	2,1	2,4	2,8	3,2	3,7
Consumption, trln.m ³	2	2,1	2,4	2,8	3,2	3,6
Selling across borders, mln.m ³	308	506	651	848	982	1122
Gas stations, mlrd.m ³	236	413	508	659	686	721
Liquefied natural gas, mlrd.m ³	72	93	142	189	296	401

LNG Production Technologies.

Two main methods are used in practice to obtain LNG:

- Gas condensation under constant high pressure;
- Refrigeration-based heat exchange using coolants, including turbo-expander or throttling technologies.

Currently, these technologies are widely applied in our gas fields. For example, at “Sho‘rtanneftgaz” LLC and “Muborakneftgaz” LLC, systems are used in depleted fields and for maintaining reservoir pressure. In these processes, liquefaction occurs due to the sharp expansion of gas at very low temperatures.

Before liquefaction, the gas is purified from water, sulfur dioxide, carbon oxides, and other impurities. LNG is a colorless, odorless liquid with a density approximately twice lower than that of water and is non-toxic. It consists of about 95% methane, with the remaining 5% comprising ethane, propane, butane, nitrogen, and other components. Depending on its composition, its boiling point ranges from -158°C to -163°C .

Pure LNG does not burn, self-ignite, or explode. In open space at normal temperatures, it vaporizes and rapidly disperses in air. Combustion occurs only when the vaporized gas concentration in air ranges between 5% and 15%. Below 5%, combustion is insufficient; above 15%, there is not enough oxygen for oxidation.

- LNG Plant Structure
- A typical LNG production facility includes the following main units:
- Pre-treatment block for mechanical impurities and formation water removal;
- Gas metering and pressure reduction unit;
- Gas compression unit;
- Acid gas removal (amine treatment) unit;
- Gas dehydration unit (often using molecular sieves);
- Fuel gas preparation unit;
- Diethylene glycol (DEG) regeneration unit;
- Natural gas liquefaction block (cryogenic cooling to approximately -162°C);
- Artificial refrigerant system;
- Fractionation unit;
- Storage tanks for gas fractions and LNG;
- LNG loading and dispatch facilities.

After drying and purification, the gas enters the liquefaction block, where it is cooled in the main heat exchanger using a refrigerant mixture containing nitrogen and hydrocarbons (C1–C5). The circulation is maintained by compressor units. Liquefied hydrocarbons are separated in separators and directed to storage tanks. The final liquefied methane (CH_4) is stored and later transported to consumers via special tank trucks.

Literature used

1. Samadov A.X., & Ashurov Sh.M. (2024). ZAMONAVIY NEFT VA GAZNI TASHISH VA SAQLASH TEXNOLOGIYASI VA LIHOZLARI. Экономика и социум, (5-1 (120)), 748-752.

2. Толумбаев А. Решение проблем утилизации НПП в Казахстане: хорошо проработанные законы//Нефтегазовая вертикаль, 2006, №16, с.120.

3. Samadov A.Kh., Ashurov Sh.M., & Boikobilova M.M. (2024). ASSESSMENT OF THE EQUIPMENT USED IN THE DISPOSAL OF GASES IN LOW-PRESSURE FIELDS AND ITS ECONOMIC EFFICIENCY. Экономика и социум, (11-1 (126)), 469-473.

4. Ilkhom Abdirakhimov. Development of effective demulsifiers on the basis of local raw materials // Universum: технические науки: научный журнал. – №

2(83). Часть 4. М., Изд. «МЦНО», 2021. DOI: 10.32743/UniTech.2021.83.2-4.36-39. <http://7universum.com/ru/tech/archive/category/283>.

5. Рачевский Б.С. «Сжиженные углеводородные газы», Москва, Изд-во «Нефть и газ», 2009.-640 с., ил.

6. Yuldashev T.R., Murtazayev A.M. Mahsuldor qatlamlarni ochish va quduqlarni o'zlashtirish. T.:Noshirlik yog'dusi -2015, 320 bet.

7. Ахметов С. А. Технология глубокой переработки нефти и газа: Учебное пособие для вузов. — Уфа: Гилем, 2002. — 672 с