International Journal of Financial Management and Economics

P-ISSN: 2617-9210
E-ISSN: 2617-9229
IJFME 2024; 7(1): 132-141
www.theeconomicsjournal.com
Received: 26-12-2023
Accepted: 03-02-2024

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Natural gas between the future importance in energy markets and facing challenges

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DOI: https://doi.org/10.33545/26179210.2024.v7.i1.274

Abstract
This research discusses the issue of the natural gas industry in the future, especially liquefied gas, to give a picture of the future of the gas industry and its future results. The future oil industry confirms that it has a promising future, as global reserves of natural gas achieved cumulative growth rates during the past ten years from 2010-2021 until they reached (48%) and the amount of proven outlook of the reserves. It increased from (138) billion cubic meters in 2010 to (6641) billion cubic meters in 2021.This was accompanied by an increase in production quantities from (3150) billion cubic meters to (3853) billion cubic meters, achieving a growth rate of 3.1%. As for global consumption, it rose from (3160.5) billion cubic meters in 2010 to (3822.8) billion meters. Cube in 2021, thus increasing the consumption rate to (2.9%). When examining the above data, we note that the relative importance of natural gas has increased by a large percentage, as long as the quantities of proven reserves are widely available as a result of the acceleration of discoveries, and that the prices are low when compared to other fossil energy sources or others, as well as its technical specifications and efficiency Natural gas, including efficiency in electric power generation or industrial uses and less waste and environmental pollutants, all these reasons made the gas industry a focus of interest for investors and energy companies. The research reached a set of conclusions that confirm the validity of the hypothesis and stress the importance of future gas in the energy ladder and priorities, and may occupy an advanced position even in the oil industry.

Keywords: Energy markets, fossil fuels, environmental pollution, competition between energy types, challenges, future importance

Introduction
The world in general is witnessing a continuous and growing need for energy sources of all kinds, and natural gas is a major and important source of fossil fuels compared to other sources. And the increase in the quantities of proven reserves accompanying the acceleration of exploration operations as a result of international competition to increase production and consumption, which led to a high rate of competition, and turned into political and economic competition. Nevertheless, the agreements regulating the gas market are still ineffective in establishing an organization that includes gas-producing countries.

Since 1991 and the European Energy Charter, its content has not been implemented, and understandings are limited to the countries of the region, such as the Shanghai Declaration of 2001, as a result of security matters, as well as the agreement (Russia, Iran and Turkey) on the basis of economic and technical background, in addition to the agreement of the Forum of Gas Exporting Countries in Tehran in 2001, and the Middle East Gas Forum in Cairo in 2020, although the International Energy Agency (IEA) established the oldest bloc (1974), and its goal was to diversify energy sources with its interest in consuming countries without taking into account the interests of producers, but as a result of the importance of gas as a future source And promising prospects as a strong competitor to other sources, a high-level coordination is required to find a grouping that guarantees the rights of the parties and maintains the stability of markets, in addition to the importance of this source and the need to increase investments in the gas industry to facilitate production and transportation operations, and thus reduce costs to be an important competitor to energy sources in all its forms and keep it away from risks political conflict.

The research reached a set of conclusions that confirm the validity of the hypothesis and

stress the importance of future gas in the energy ladder and priorities, and may occupy an advanced position even in the oil industry, which requires attention to this industry and directing appropriate investments, especially in the early stages, because of its potential Strong, highly competitive and requires the producing countries to enhance cooperation and coordination with consuming countries, in order to ensure market stability and appropriate prices for all parties.

Research importance

The importance of research is related to the importance of gas as a major source of energy, as the gas industry carries with it many economic opportunities for producing and consuming countries alike, as well as the importance of the gas industry in reducing and preserving environmental pollution. In order to maintain a clean environment and build international relations that preserve the interests of the parties and reduce differences in the future.

Search problem

The problem of the research lies in the presence of large quantities of proven reserves of natural gas in all its forms (free and linked) in most countries of the world, and large quantities of it are burned during oil production operations, and gas is an important source of energy as well as its economic returns and most countries need its revenues, and with All the volume of investments directed to the gas industry is not commensurate with the quantities of available reserves, as well as the entry of natural gas into various industries as a raw material.

Research goal

The research aims to shed light on the strategic importance of the natural gas industry through its prominent economic role as a source of wealth, and its industrial role as a raw material in many different industries such as petrochemicals, aluminum and various medical industries, and to clarify the future picture of the prospects for the natural gas industry.

Research hypothesis

The research stems from the hypothesis that the natural gas industry is a promising industry that opens up many future horizons in its stages for the development of energy sources and industry, and thus achieving economic development and raising economic growth rates, since gas is a competitive source for other sources, and investments for that industry must be intensified.

Research Methodology

The researcher relied on the descriptive and analytical approach that focuses on the data and information available from its official sources and discussing the different opinions of specialists according to an economic perspective based on theoretical foundations based on reality and foreseeing the future.

Search structure

To prove the hypothesis of the research, the research was divided into three main sections, the first was devoted to explaining the theoretical framework and some important concepts related to the gas industry and its role in life, and the second topic was devoted to discussing the quantities of proven reserves and the importance of that and the quantities of production and consumption at the global level. The third topic talks about the future prospects of this industry and the importance of liquefied gas and its role in the economic aspect.

The first topic / the concept and components of natural gas, its types, characteristics and uses

Natural gas is an important source of energy and a good competitor at the level of fossil fuels, as a result of the decrease in waste and pollution resulting from use, due to the low percentage of carbon in its components and its multiple uses in industry as a raw material such as (fertilizers and aluminum) for its uses in heating and cooling, and used in the agricultural sector, which led to a high Global demand rates.

First: The concept of natural gas and its components.

1. The concept of natural gas

A gas consisting of hydrocarbons with an organic basis, and it is colorless and has physical and chemical properties and consists of the union of a group of carbon molecules, and due to the high temperatures that contributed to the transformation of microscopic organisms and algae into different hydrocarbons, and during thousands of years, it constitutes (95%) of the Natural gas molecules, which are divided into five parts: (Abdullah, 36, 2006) [2].

Paraffinic materials

- Olefins.
- Acetylene.
- Nuffthenes.
- Aromatics.

Natural gas has characteristics that distinguish it over oil by its high degree of flammability, and consequently its calorific value, lower waste products resulting from combustion, and lower rates of corrosion for equipment that use gas compared to oil, in addition to the rapid decrease in environmental pollution.

2. Ingredients

Natural gas consists of paraffinic materials (methane, propane, butane, and ethane).

As well as on some gaseous impurities, including (nitrogen, carbon dioxide, sulfur dioxide, helium, and argon). The components of natural gas vary according to the state in which they are located, as (methane, propane, butane and ethane) are in a gaseous state, and at high temperatures and normal pressure, hexane and pentane are in a state. Liquid when the pressure and temperature are normal, and methane is the most constituent element, as it constitutes (20-90%) of the components of the gas, while propane and ethane constitute (1-20%). (Al-Shalji, Jawad, 121, 2007) [12].

3. Types of natural gas

Specialists classify natural gas into several categories.

According to the form of their existence in nature.

Free gas

It consists of two types: (Berkinger, 77, 2015) [10].

1. **Gas of private fields:** It is isolated from oil, and the proportion of methane gas is high, because the presence of oil is in a small percentage.

2. **Dome gas:** It is produced through the transformation of part of the oil in the oil reservoir by heat and pressure, and when oil production continues, it is formed in the form of a dome that rises above water and oil, and it needs a special technology that depends on the development of the producing country to extract and benefit from it, and this is related to the circumstances and factors economic, political and social.

Associated gas

This type of gas is present in oil-producing fields and is dissolved in crude oil, or mixed with it, and its production is linked to the rate of oil production. The countries of the Organization of Arab Petroleum Exporting Countries (OAPEC) are the main source of this type and its presence varies from one field to another. (OAPEC, 22, 2021) [8].

Shale Gas

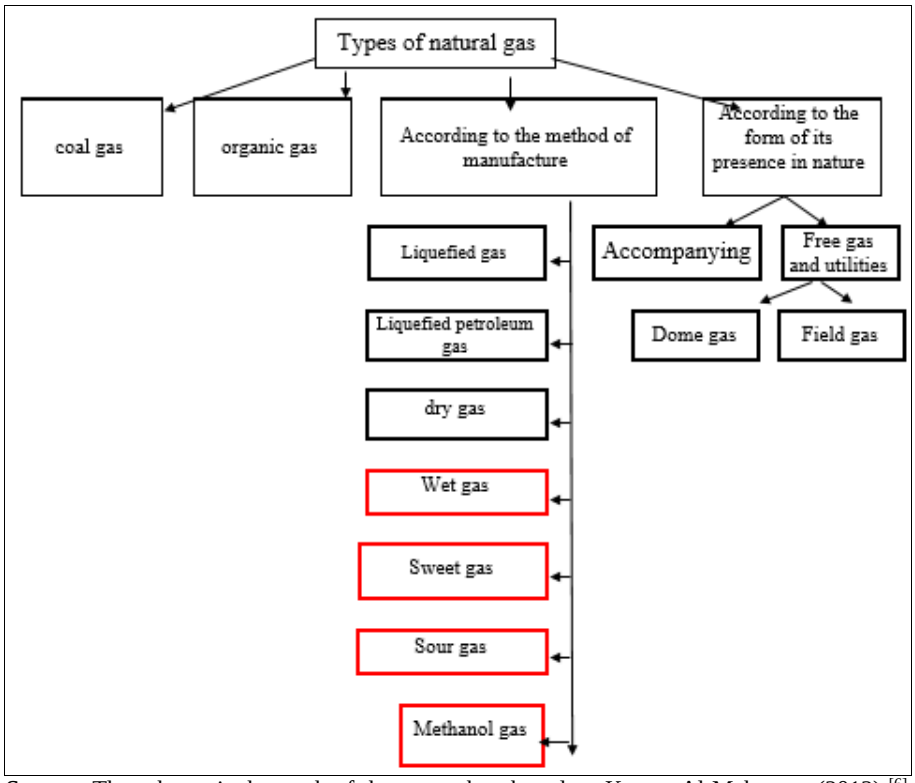
It is called schist gas, and it is an unconventional type and is found inside the rocks, and it needs a modern and complex technology to extract it. The United States is the least expensive and China is in the first place to produce this type

Classification on the basis of manufacturing and production method

(Nyman J, 45, 2018) [14] and it is divided into

- L.N.G (Liquefied Natural Gas).
- Liquefied petroleum gas.
- Methanol (gas liquids).

We can clarify the types of natural gas according to the following scheme



Source: The scheme is the work of the researcher, based on Kazem Al Mahzoom (2012) [6], The Refining Industry and the Distribution of Oil Derivatives, The Importance of Integration and Production, Afaq Total Magazine for the Middle East 2012 No. 2

Fig 1: Diagram showing the types of natural gas

We note from the above figure that there are many types of natural gas, and each type has characteristics and features that differ from one reservoir to another according to the conditions of formation. In most cases, natural gas is extracted in order to obtain multiple types through the distillation process, using cold and low temperatures, and relieving gas pressure. Using expanders (turbos) before distillation in a distillation tower to remove methane. (Al-Zaidi, 33, 2012) [7].

Properties of natural gas

Natural gas has some characteristics and advantages, which are as follows

1. Natural gas is considered one of the environmentally friendly fossil fuels, due to its low pollutants, and it is the most efficient and good alternative to oil, coal and other sources.
2. It enters into many industries as a raw material, especially large industries such as petrochemicals, chemicals, iron and steel.
3. Ease of use and storage capacity.
4. Relatively free of sulfur, which causes harm to companies that use oil that contains sulfur in varying proportions.
5. Variety and flexibility in transportation methods by ships, tanks and pipes.
6. It achieves economic resources and good returns for the producing countries, which contributes to the development process of the producing countries.
7. An important source of energy and is relied upon to operate power plants.

Important uses of natural gas: (American Arab Chamber of Commerce, 66, 2013).

1. An important source of energy
2. It is used for household purposes such as cooking and heating.
3. It is a good fuel for many fuel-intensive industries such as iron, steel, aluminum, electricity generation, refining and glass industries.
4. It began to be used as fuel for cars and some machines and equipment.
5. It is considered a raw material in industrial uses.

The second topic: reserves and production of natural gas and the factors affecting its determination

First, natural gas reserves

Types of reserve

The reserve is divided into

Proven reserves, which mean the amount of gas that can be exploited, invested and used in known economic and technical conditions, or they are the quantities that are discovered after conducting accurate exploration operations with all their details in terms of geological works. Geophysical surveys, drilling and exploration, ascertaining chemical and physical properties, and determining available quantities.

Or they are the quantities that can be extracted under the announced (prevailing) prices.

Therefore, it is the discovered quantities whose existence is confirmed by a degree of certainty, and the confirmed reserves of natural gas have risen globally, and Russia was recorded as the largest country in the proven reserves at the end of 2020, which amounted to (37.4) trillion cubic meters, followed by Iran with reserves estimated at (32.1) trillion meters. Then Qatar comes in third place with reserves amounting to (24.7) trillion cubic meters, while the fourth and fifth places are allocated to the State of Turkmenistan and the United States of America, with reserves amounting to (13.6) and (12.6) trillion cubic meters, and the world's reserves of gas rose to reach (188.1) trillion cubic meters by the end of 2020, to reach (179.9) trillion cubic meters in 2010.

It is worth noting that China, Venezuela and Saudi Arabia occupy the sixth, seventh and eighth place with reserves of (8.4), (6.3) and (5.9) trillion cubic meters, respectively. The United Arab Emirates ranks ninth with reserves of (5.9) trillion cubic meters, while the United Arab Emirates ranks ninth with reserves of (5.9) trillion cubic meters. Nigeria ranks tenth with reserves estimated at (5.5) trillion cubic meters.

Reserves Probable

It is the quantities that are likely to exist based on the exploratory data and information, which are based on geophysical and atmospheric information. (Abdul-Jalil, 32, 2013) [1].

Reserves Possible

They are the quantities that are expected to be obtained in the specified place as a result of similar conditions in the previously discovered sites, in which natural gas is produced, which means similarity with the geological and geophysical conditions and the similarity of rocks. The following table shows the size of the proven reserves in the countries of the world.

Table 1: Ranking of the world's countries according to natural gas reserves (billion cubic meters)

S. No.	Country	2016	2017	2018	2019	2020	% Change 2011
1.	Russia	50.67	50.508	49.571	49.154	48.938	-0.4
2.	Iran	33.721	33.810	33.899	33.988	34.077	-0.3
3.	Qatar	24.073	23.861	23.846	23.831	23.831	0.0
4.	Saudi Arabia	8.619	8.715	9.069	9.423	8.438	-10.5
5.	United State	9.119	12.408	13.437	13.437	12.958	-3.6
6.	Turkmenistan	9.979	10.161	11.335	13.950	15.365	-10.1
7.	China	6.554	6.394	6.539	6.468	7.235	-5.4
8.	Arab Emirates	6.091	6.091	6.091	7.726	7.726	-0.0
9.	Nigeria	5.475	5.627	5.675	5.761	5.750	-0.2
10.	Venezuela	5.740	5.707	5.674	5.674	5.590	-1.5
11.	Algeria	4.504	4.504	4.504	4.504	4.504	-0.0
12.	Total countries of the world	198.669	201.732	202.969	207.590	206.683	-0.4
13.	OPEC	72.056	72.261	72.665	74.771	73.737	-1.4
14.	OPEC%	36.3	35.8	35.8	36.0	35.7	-1.1

Source: The table is from the researcher's work based on Energy Journal, Energy Research Unit, Ahmed Ammar Report, 2022 Available online: http://attaqa.nat

It is noted from the above table that there are large quantities of gas reserves in the countries of the world, as the volume of the reserves in 2020 amounted to (206.683) billion cubic meters, which is a large amount that can be increased according to technical data and the growing exploration movement (36.74) percent in 2020, as the reserve volume of the organization's countries amounted to (73.737) billion cubic meters in the same year, while the group of European countries was in the second place, which owns 35% of the world's reserves, and Russia possesses the largest amount of reserves from Natural gas, which amounts to (48.938) billion cubic meters, followed by Iran with a reserve estimated at (34.077) billion cubic meters, and then Qatar with a reserve of (23.83) billion cubic meters, and with different countries in the world the size of the reserves, but these quantities are distributed to most countries The world and in varying proportions, as countries share this reserve in an unbalanced manner.

Second: Factors affecting reserves estimates

The volume of reserves that countries possess of natural gas is an important indicator for some investment decisions for the purpose of developing infrastructure and industries related to the gas industry. Through exploration and exploration that contribute to an increase in reserves, and decreases when consumption continues without discovering new reserves. (Abdullah, 46, 206) [2].

There are some factors that provide for the size of the reserve, including

1. The available data on the discovered gas field is one of the factors affecting the reserve. The more accurate the information about the type of field, the type of gas present, and the factors surrounding the field (pressure, temperature, type and nature of rocks and land) and the higher the accuracy of the information, the more accurate it is in estimating the existing reserve.
2. Estimates in the reserve vary according to the stage of assessment. There is a preliminary assessment before carrying out the drilling process and the periodic assessment that is carried out every year after conducting a survey and various measurements, and all of this affects the size of the reserve.
3. New discoveries encourage investments to continue the search to discover other areas and thus increase the reserve.
4. Technical means, equipment and the level of technology used affect the size of the reserve, as the more advanced the techniques and the advanced technological level increases the accuracy of the information and the speed in determining the places and the size of the reserves.
5. The competence and experience of workers in the field, as well as the ability to make decisions and manage successfully.
6. The various difficulties and various risks, and even what is related to the political and economic aspects affects the volume of the reserve.
7. Laws and legislation at the local and global levels and the protection of investments greatly affect the size of the reserve.

Third: The geographical map of natural gas and developments in production and consumption

The quantities of available gas vary from one country to another depending on the geological and reservoir conditions, and it must be noted that gas may be available in most parts of the earth, but in varying proportions.

However, some countries in the world are characterized by abundance in the volume of reserves and production, which is reflected in the increased use of gas because of its low prices as a source of energy as well as as a raw material in many industries, and the areas of gas presence can be divided economically and globally.

Table 2: Map of the distribution of natural gas reserves for the countries of the world 2020, (trillion cubic meters)

S. No.	the group	the reserve	Share of total
1.	Total Middle East	75.8	%40.3
2.	Total Cis	56.6	%30.1
3.	Total Asia Pacific	16.3	%8.8
4.	Total North America	15.2	%8.17
5.	Total Africa	12.9	%6.9
6.	Total south cent America	7.9	%4.2
7.	Total Europe	3.2	%1.7

Source: The table is from the researcher's work based on Energy Journal, Energy Research Unit, Ahmed Ammar Report, 2022 Available online. http://attaqa.na

It is noted from the table that the map of the distribution of reserves in the totals of the countries of the world is irregular, as it exceeds the group of the Middle East countries, which is the highest reserve, as the ratio is (40.3%) of the global reserves, followed by the independent countries of which Russia is included, and then the Asia-Pacific group in third place. The European group is at the bottom of the list, as the reserve owned by this group amounts to (1.7%) of the world's reserves, which makes its dependence on other groups from the countries of the world to supply an important source of energy sources as well as other uses.

Global production of natural gas

The process of extracting gas is somewhat similar to the process of extracting crude oil from wells, which may be associated or free gas. The transportation process is carried out to the places of collection, and then to refineries or filters and purification, and after passing the dry gas over a cooler that liquefies propane and collects butane in proportions The importance of the gas industry has increased globally for many reasons in terms of the specifications possessed by gas as an alternative such as fossil fuels, as well as to the high prices and pollutants of other sources represented by coal and oil. It is expected that natural gas production will rise to (130) trillion cubic feet annually during the period (2015-2040). The following table shows the current production of natural gas globally and its developments.

Table 3: Developments of natural gas production in some countries for selected years billion cubic meters

S. No.	The state	2010	2014	2018	2020	growth rate of 2019-2009
1.	USA	575	705	841	914	5.2
2.	Russia	598	591	669	638	2.4
3.	Iran	143	176	232	250	5.9
4.	China	97	8131	162	194	7.5
5.	Qatar	123	179	169	171	6.4
6.	Australia	53	65	126	142	1.8
7.	Saudi Arabia	83	97	112	112	4.1
8.	Norway	106	108	121	111	1.0
9.	Algeria	78	80	94	82	1.3
10.	Malaysia	65	72	77	73	1.8

Source: The table is from the researcher's work based on Energy Journal, Energy Research Unit, Ahmed Ammar Report, 2022 Available online http://attaqa.nat

It is noted from the table that the largest country in the production of natural gas is the United States of America, as its production in 2020 amounted to (914) billion cubic meters, and achieved a growth rate for the period 2009 - 2019 of (5.2%), followed by Russia, with production reaching (638) billion cubic meters for the same year, with a growth rate during ten years that reached (2.4%), and then Iran, with production amounting to (194) billion cubic meters, and a growth rate during ten years that reached (5.9%) as it was found that most countries achieved production growth rates In varying proportions, the highest growth rate was in China, which reached a production growth rate of (7.5%), during ten years from 2009-2019. The increase in gas production during the same period and worldwide reached (3.1%), while the group of European Union countries achieved negative growth rates during that period of (6.3%) due to the high production costs and competition with Russian gas, which can be obtained at lower costs. Which led to a decline in production and dependence on imports to cover the increasing needs. (M Emirates Center for Studies, 37, 2005).

Fourth: Gas consumption

The gas industry has witnessed continuous developments since its discovery until now, and although these developments increased the quantities consumed in the countries of the world due to the multiplicity of uses, and after it was a source of heating, it became an important source of energy and the operation of electrical stations, various equipment and means of transportation, and the entry of liquefied gas and other gases derived from natural gas in Various industries such as petrochemicals, chemicals, aluminum and others, as well as important medical and household uses, thus becoming an important and essential source in some important products in daily life.

The following table shows the volume of consumption in some countries.

Table 4: Global consumption of natural gas for the top ten countries in the world (billion cubic meters/year)

S. No.	The state	2010	2014	2018	2020	Growth rate 2020-2009
1.	USA	648	722	821	833	3.2
2.	Russia	424	422	454	411	1.1
3.	China	109	188	283	331	13
4.	Iran	144	173	219	223	5.2
5.	Saudi Arabia	92	97	112	112	4.1
6.	Canada	83	110	116	112	2.7
7.	Japan	89	124	115	104	1.6
8.	Germany	88	73	86	87	0.5
9.	Mexico	66	79	88	86	3
10.	Britain	98	70	80	72	-1.6
11.	UAE	59	63	71	69	2.2
12.	Italia	79	59	69	68	-0.5
13.	India	69	48	58	59	1.9

Source: The table is from the researcher's work based on Energy Journal, Energy Research Unit, Ahmed Ammar Report, 2022 Available online http://attaqa.na

It is noted from the table that the United States occupies the leading position in terms of the amount of consumption, due to the increase in uses of natural gas, and the volume of consumption for the year 2020 in the United States reached (832) billion meters

cubic / year, and consumption achieved a cumulative growth for ten years from 2009-2019 of (3.2%) and Russia comes in second place, as its share of consumption in 2020 reached (411) billion cubic meters, and China ranked third in terms of gas consumption, reaching (283) billion cubic meters in 2020, and China was the highest country in terms of consumption growth, as the rate of consumption growth during a decade extending from 2009 to 2019 amounted to (13%), which is a large percentage, which gives an impression of the development of gas uses in China. The consumption of the European Union countries amounted to (390) billion cubic meters in 2020, and the total consumption of gas by the countries of the world in 2020 was (3,823) billion cubic meters / year, and this quantity exceeded the consumption in 2010, in which the consumption of all countries of the world was (3160) billion cubic meters, and the consumption of some other countries ranges between 10-40 billion cubic meters annually, according to the development of the gas industry and its uses in those countries. (Abdul-Jalil, 23, 2013) [1].

Fifth: Challenges and obstacles to the production and consumption of natural gas globally.

The production and consumption of natural gas faces great challenges due to the gas industry's link to infrastructure, which requires great effort and high investments. Among these challenges are.

1. **The high costs of infrastructure for the gas industry**
   Fixed costs in projects related to the gas industry constitute a large proportion of the total costs, if they are compared with the variable costs, which are also higher than the costs of the oil industry, as gas needs accurate and multiple operations and safety means due to the high risks in gas production (Al-Shalji and Jawad, 11, 2007) [12].
2. **Difficulty of transportation operations and risks**
   Gas transmission operations in its various forms require high costs and special equipment, tools and facilities that differ from the tools and equipment used in other industries, for example, pipeline transportation requires the extension of complex networks and pumping stations, whether internally or externally, and this requires a political agreement as well as continuous maintenance and maintenance costs.
   There are problems associated with the monopoly of some countries in this industry, which makes it difficult for some countries to keep pace with the major and developed countries in this field, as well as ship transport operations that require specialized loading platforms and special ships only to transport gas. (Dooyum, 56, 2020) [15].
3. **Interstate conflict over energy resources**
   The issue of acquiring the largest amount of areas and locations of energy sources is a concern for many countries, which has led to the intensification of competition that has moved to the stage of armed conflict in order to acquire large areas, because there is a view that the state that owns energy sources possesses sources of economic power and dominance on the world.
4. **Modern and advanced technology and its monopoly**
   The world is witnessing continuous developments in various technical industrial fields, and among those industries is the natural gas industry. There are qualitative leaps in the use of modern technologies to treat gas and produce liquefied gas, and these inventions are monopolized by some international companies, which led to the high costs of importing those technologies.

Sixth: Effects of the liquefied gas industry in the world on the international trade of natural gas.

The proportion of liquefied gas production has increased remarkably in recent years, as well as its proportion in international trade, as the rate of commercial exchange of liquefied gas has more than doubled, and this technical development has helped in expanding the transportation industry with gas tankers, although the gas liquefaction industry started since the sixties The last century, and the beginning was in the United States of America and Algeria, and is the Asian market that consumes the most liquefied gas, and at the forefront of the consuming countries is Japan, South Korea and China. (OAPEC, 44, 2021) [8].

The increasing growth of global demand for gas during the past two decades helped the growth of liquefied gas trade. On the other hand, there was a role for the significant rise in oil prices in global markets, and technological developments in the gas industry, which led to the reduction of costs in gas

liquefaction operations.

First: The gas liquefaction industry

One of the most important problems facing the transportation and use of natural gas is the issue of volume and the space it occupies compared to oil. This problem can be overcome through liquefaction of gas, which contributes to reducing its volume to (60%) and thus the cubic meter of oil is equivalent to one and a half cubic meters of natural gas. GNL issue.

Liquefied gas in international trade

The interest in liquefied gas has increased in recent years, as the amount of liquefied gas exported in 2014 was estimated at (333) billion cubic meters, rising to (380) billion cubic meters in 2021, and the State of Qatar in the Arabian Gulf is the most exporting country, as its exports of liquefied gas reached in 2021 (143) billion cubic meters, and Malaysia comes in second place, with exports reaching (42) billion cubic meters in 2021, then Australia.

Table 5: The most important LNG exporting countries globally in 2021 billion cubic meters

S. No.	The state	Exports	
		2014	2021
1.	Qatar	103.4	143
2.	Malaysia	33.9	42.1
3.	Australia	31.6	39.9
4.	Nigeria	25.3	38.7
5.	Indonesia	21.7	32.3
6.	Trinidad and Tobago	19.3	25.8
7.	Algeria	17.3	22.2
8.	Russia	14.5	19.9
9.	total world	333	631

Source: The table is from the researcher's work based on the annual statistical report of the organization of Arab petroleum exporting countries opec 2021 website www.oapec.orq.orqg

From the above table, a significant increase in the countries' exports of liquefied gas is observed during the last seven years, and Qatar has continued to lead in the export of liquefied gas, as the growth in exports gives an indication about the high demand for the product of liquefied gas, and the existence of a market for liquefied gas, which indicates the importance of natural gas in the international trade market has increased, and it has become an important economic resource for producing countries, and countries have started developing their infrastructure and owning transport fleets and loading platforms, as well as establishing pipeline networks for transporting pipelines locally and abroad.

As for import, it is also increased because there is a direct relationship between exports and import of the same substance, as the exports of any country are the import of other countries.

Therefore, the import level of liquefied gas increased from (333) billion cubic meters in 2014 to (380) billion cubic meters in 2021. Japan is one of the most prominent and importing countries, as its imports of liquefied natural gas in 2014 amounted to (120.6) billion cubic meters, which rose to (132) billion cubic meters in 2021, followed by South Korea and China, with imports amounting to 63 and 36 billion cubic meters in 2021, followed by India in fourth place globally. Most of the importing countries are developed industrial countries in the manufacture of petrochemicals, chemicals, aluminum and other industries, as well as electric power (Sagramoso, 18, 2020) [16].

It is worth noting that liquefied natural gas has an important and promising future, and specialists expect an increase in the trend towards natural gas and it will occupy the second place after oil, and will overcome coal after climate changes and rising voices about environmental pollution and the imbalance in the ozone layer, and observers believe that gas consumption will reach in 2035 to 480 billion cubic meters worldwide due to the increased demand resulting from the following things.

1. Increasing population growth as well as rising levels of income, which are the main catalysts for increased demand.
2. The industrial and technical development that contributed to the entry of natural gas as a basic raw material from various industries.
3. Increasing demand for environmentally friendly energy sources that help reduce pollution as a result of the rising shouts against the use of coal.
4. Gas has good technical specifications with abundant reserves, low prices and ease of use.

The third topic: the future outlook of the natural gas industry in light of international cooperation between producers

One of the reasons that led to the increase in the consumption of natural gas is the low percentage of pollution, and thus reduces the damage to the environment, so it has become one of the best types of fossil fuels, and the volume of demand for it. It is likely to double by 2030, and therefore the economic and geopolitical importance will increase and will play an influential role in international relations, and through the expectations of the International Energy Agency (IEA) that sees that the growth in demand for energy will rise sources in general, but natural gas will be the most growing among those sources And natural gas prices will be more stable, which may lead to a disruption in the oil markets for the rise of natural gas as an alternative, especially with rising voices due to the objection related to pollution, environmental protection and the quest to reduce the effects of global warming, consistent with the efforts of gas producers to develop the stages of the natural gas industry, production and marketing And continuous coordination at the level of producing countries to develop appropriate policies that preserve rights for all.

First: The growing role of natural gas among global energy sources

In recent years, environmental conditions and protection have become a priority for international organizations, due to the environmental imbalance resulting from the disruption of the ozone layer due to the high rates of pollution due to the uses of polluting fossil fuels such as coal and oil, which prompted the trend towards using natural gas as an alternative to other sources, because it is a clean fuel with its enjoyment With the clean combustion feature, which makes the maintenance costs for the equipment used less, and because gas is also the most efficient fuel in terms of producing electric power when used in gas electric stations, which is the most important advantage that natural gas enjoys, as well as its use in water desalination plants, petrochemical industries, aluminum and fertilizers.

Thus, gas has played an active role in the energy ladder that drives the global economy, until it meets (25%) of the world's energy needs, and is expected to become the second most important source of energy in the coming years, which prompted the automobile and transportation companies to use it as fuel for their products, while increasing its uses. Household for heating, cooking, and more.

Natural gas enters the energy markets strongly at the regional and international levels, and specialized markets have been generated for it, both liquefied and gaseous, and most of the producing countries have organized special contracts to export gas and sell it in the markets, as well as contracts for exploration, production, transportation and storage, and companies operating in the oil industries and energy production companies have increased Investments to enter the gas industry as a result of the positive extrapolation of the future, and it is likely that the gas trade exchange between the producing countries and the consuming countries that are represented by the developed industrial countries will increase, which affects the increase in the proportion of natural gas to other sources of energy used globally, and in an upward way, and the European markets are the most consuming gas, especially the European Union countries, which must increase the import of gas to face the continuous growth of consumption and the development of investments towards the gas industry has become a necessity in most countries, whether producing or consuming. On the other hand, consuming countries develop import operations through The uses of modern technologies in the operations of loading and unloading, as well as the development of industries, management of the energy compass in equipment and machinery towards the use of natural gas, and the preparation of transport pipelines locally and globally, with the development witnessed by these projects, and the best example of this is the gas projects of Russia and Norway in the North Sea, and Qatargas projects Liquefied and Algeria, as well as gas pipelines from Azerbaijan. As for the demand in the system of Asian countries, Japan is the most important and most important, which is supplied with gas from Qatar, Malaysia and Indonesia, although there are projects to liquefy gas in Australia and Nigeria, and there are many major companies that have entered the market Gas is strongly as Gazprom, and this giant Russian company aspires to reach (981) billion cubic meters in its production for 2030 compared to the level of production in 2007, which reached (645) billion cubic meters, and also aims to reach exports at a rate of (440) billion cubic meters (Al-Zaidi, 24, 2012) [7].

The Russian gas pipeline network delivers the product to Europe, including the yamai 1 gas pipeline that passes through Ukrainian territory, as well as the Blue Stream pipeline, which heads towards Germany through the Baltic Sea, as well as the south stream, which extends From Russia to Bulgaria, and then to Romania, Hungary, Slovenia, as well as Greece and Italy (Van de Graaf, 2017 33) [18]. The United States of America has become at the forefront of gas-producing countries since 2009, and North America is the most consuming market for natural gas, which is now providing its needs for unconventional gas. Korea is second only to Japan in importing natural gas, and its gas consumption is growing at a rate of (10%) annually. Among the most prominent Arab countries in the gas industry are the State of Qatar and Algeria. Qatar is the largest producer of liquefied gas in the world. It is worth noting that one of the reasons that led to the increase in global consumption of gas is due to the decline in demand for nuclear energy in Japan, after the accident The Fukushima reactor in 2011 due to the earthquake that stopped the reactors in Fukushima, in addition to the Chernobyl accident and the intensification of controversy about the risks resulting from the use of nuclear reactors and the leaking radiation harmful to the health of humans and other organisms, in addition to the replacement of coal-fired plants for power plants to gas. (Berkinger, 34, 2015) [10].

Second: natural gas is environmentally friendly

The main factor that contributed significantly to the increase in the global demand for natural gas is the increasing global interest in environmental issues, especially after sensing the danger posed by the disruption of the ozone layer and the damages of fossil fuels and interest in nuclear energy and its uses. In electricity generation. But natural gas has increased the pace of interest and consumption because the first requires efforts, investments and a longer period of time, as well as the expected dangers from radiation and related to the use of nuclear energy. There are accidents that the world witnessed after the Japanese earthquake in 2011. On the other hand, the use of coal as fuel for stations is accompanied by a set of difficulties in terms of the percentage of carbon and pollutants in the atmosphere and their impact on the environment, while gas is characterized by low pollution of gases when burning, such as sulfur dioxide and nitrogen, When making a simple comparison, coal records carbon dioxide emissions (100) units, oil leaves (71) units, and gas combustion (57) units. With different numbers depending on the properties and uses of the gas, the Kyoto Convention on the Environment provides for the use and offsetting of the use of natural gas instead of gas. Coal, in order to reduce carbon emissions. (Proskuryakova, 122, 2021) [13].

Third: The role of the gas-producing and exporting countries meeting in the markets.

Some producing countries, after a meeting held in Tehran in 2001, announced the establishment of a forum comprising (12) gas-exporting countries: Russia, Qatar, Iran, Algeria, Egypt, Nigeria, Libya, Bolivia, Equatorial Guinea, topaco, Oman. Kazakhstan, the Netherlands and Norway. As an observer, these countries possess (72%) of the world's proven natural gas reserves, and their annual production reaches (40%) of the total gas produced in the world, and their production covers global consumption by (70%). The first summit of the forum countries will be held in the Qatari capital, Doha, and the governments of those countries represent their leaders at the summit to set a strategy for the activities of the forum and support the formation of this grouping.

The countries participating in the forum sought to reach moderate or fair prices for gas in global markets, taking into account the advantages of gas in terms of energy efficiency and environmental aspects. Common between gas producing and exporting countries, and the abolition of the forum gave an indication that this grouping is not a cartel, but rather aims to achieve a balance between producers and consumers, but between the producers themselves. (Al Mahzum, 43, 2012) [6].

Fourth: The golden age of natural gas: It is expected that

natural gas, according to the estimates of the International Energy Agency, occupies the second place in the energy ladder by 2030, surpassing coal, as the growth rate of gas demand is expected to rise by (60%) in 2035, and therefore it will be during this period (the golden age of gas), These expectations are based on a database that stems from China's economic, industrial and trade policy, and the high rates of economic growth, and the decline in demand for other sources such as nuclear energy and appropriate gas prices, and the characteristics of gas as well as the high reserves. All these and other factors prompted it to be expected to reach Gas production will reach (600) billion cubic meters in 2035, which leads to an increase in the proportion of gas from the demand for energy by (4%) by skipping coal, and the gap between gas and oil is narrowing, as the latter is growing at lower levels and based on the expectations drawn by the International Energy Agency, gas will remain It plays a key role in the energy market, as it is expected to increase the intensity of demand for it and its multiplicity of uses. For other industries such as petrochemicals, chemicals, aluminum, medical industries and others, and for the high reserve rates in the producing countries, especially Russia, Qatar and Iran. (Al-Soub, Fattouh, 56, 2011) [5].

Unconventional gases represent (45%) of these reserves, and China will be a major gas producer by 2035, especially from unconventional sources. It is worth noting that the global gas markets have witnessed in recent years a clear rise in trade exchange and production capacity of liquefied gas as well as non-traditional sources These changes in the natural gas market will continuously place China after the United States and Russia as the three largest users of gas and the largest importers of gas along with Japan and Germany. Other sources of energy such as pollution and harmful emissions of coal and oil, the dangers of nuclear radiation, the effects of befouls on food and solar energy efficiency, face an opportunity for gas to enter the golden age and that increasing dependence on natural gas worldwide will lead to a certain increase in prices.

It is expected that most of the increase in demand for gas will come from East Asian countries, especially India and China, which makes these countries among the largest importers and thus the process of using other energy sources will move to gas and transform the work and path of machines and engines towards the use of natural gas.

Conclusion and Recommendations

Natural gas has become an important economic commodity and has entered international competition politically and economically, production has increased and continuous growth in gas reserves. In light of this, the research reached conclusions and suggested some appropriate recommendations in this regard.

Conclusion

1. There is an increase in the future demand for natural gas due to the advantages and specifications it possesses, such as reduced pollution, high degree of flaming and reserves increases, which will change the global energy map and make gas in the second place, surpassing coal, competing with oil and nuclear energy.
2. The formation of the Gas Producing Countries Forum as an important indicator of the future of natural gas, amid a continuous increase in demand as a result of various industries, and through derived demand in addition to its uses as a source of energy in generating electricity and entering gas into multiple strategic industries such as petrochemicals, chemicals, aluminum, medical industries, and others.
3. The natural gas industry faces multiple challenges and obstacles, the most important of which are the high investment costs and the need for special infrastructure such as ports, marine and land transport fleets, treatment and storage plants.
4. The gas industry has promising future prospects that will achieve large and growing economic returns and make the gas-producing countries more revenue and will play a role in the sustainable development process in those countries.
5. The compass of the energy market is heading towards gas in a large and fast way, and with the transformation of many industries and uses of coal and nuclear fuel as a result of the expected and surrounding risks towards the gas industry, so the trade exchange between natural gas and liquefied gas producing countries and industrial consuming countries will be more popular and developed.

Recommendations

1. The necessity of paying attention to the gas industry in all its stages, and increasing investments to develop infrastructure in a way that is consistent with the increase in global demand for gas.
2. Investing in developing the technical side in the wide uses of natural gas in order to reduce production costs, develop processing operations, facilitate the transition from other sources to gas, intensify specialized scientific research efforts towards the gas industry and its development, and open up areas of scientific specialization in universities.
3. Organizing joint cooperation agreements between producing and consuming countries in order to create a market for gas trade characterized by stability and appropriate prices that preserve the rights of the parties, secure gas access to consumers and encourage joint cooperation in the field of gas industry.
4. Work to establish suitable ports and land and sea transport fleets, endeavor to reduce risks, spread occupational safety rules among operating companies, and establish local and cross-border pipeline networks to ensure safe and stable delivery of gas to consumers.
5. Reducing the waste of gas and not burning the associated gas in the producing countries, but investing it properly and expanding the base of exploration in order to increase global reserves and raise production capacity.
6. Finding an appropriate and stable pricing policy globally, ensuring a real price for natural gas, and activating the role of the gas-producing and consuming countries forum, for dialogue and discussion to address expected problems and increase coordination in order to reduce the expected negative effects such as harmful waste.

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