

Natural Gas and Its Use in Various Areas

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ABSTRACT: It is recognized that fossil fuel gases as well as natural gas may be found deep inside the earth's crust. Natural gas is mostly composed of methane, although it may also contain higher alkanes and trace quantities of carbon dioxide (CO₂), nitrogen, hydrogen sulphate, or helium, depending on the source. This paper includes all you need to know about natural gas, including its emissions from a variety of fossil fuels. A categorization of natural gases, as well as the usage of natural gas in various industries, are also included in this review article in the form of tables and graphs. Natural gas consumption is anticipated to rise fastest in India's industrial, power, fertilizer, and municipal gas industries. As a result of the lack of indigenous coal and the higher cost of replacing imported coal, the demand for natural gas in the electrical industry is expected to grow.

KEYWORDS: Fuel, Gas, Hydrocarbon, Natural, Vehicles.

1. INTRODUCTION

Naturally occurring hydrocarbon that is colorless and extremely combustible. Hexafluoro carbons are a kind of petroleum that is often found in crude oil. In addition to being utilized as a source of energy, natural gas is also a fuel for some automobiles. The chemical feedstock is critical in the production of polymers, as well as a wide range of other chemical products, such as fertilizers and dyes. Hydrocarbon-rich natural gas is generated in the earth's crust by biological material activities that generate pressure and heat to excessively fracture rocks. As a result of the microbial degradation of organic components, mineral salts are reduced. As it accumulates in the top layer of the earth's crust, very little of this gas is released into the hydrosphere or atmosphere. As a result, natural gas composition is determined by the source, deposit and geological structure of a given location It is seen in Figure 1 that the natural gas compositions comprise butane, methane and propane[1].

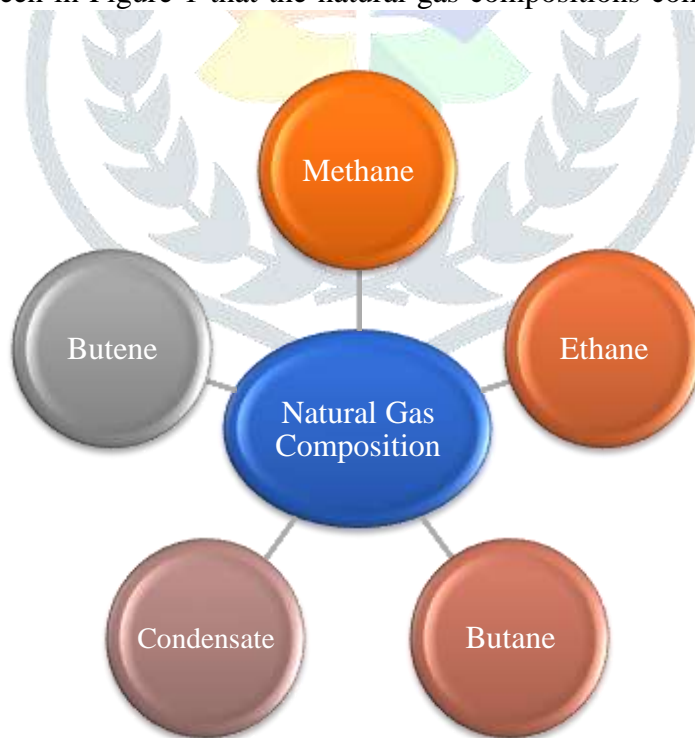


Figure 1: Natural Gases Composition Consist Hydrocarbons.

When natural gas is burned, it emits very little nitrogen, Sulphur, carbon (dioxides), and other reactive hydrocarbons (carbon monoxides). Burning oil or coal releases the ash particle into the atmosphere. It also highlights specific chemical emissions from the fuel of competition, including such nitrogen oxide, Sulphur

dioxide and natural gas emissions at high concentration levels. As a result of the high pressures in a reservoir, natural gas is commonly found dissolved in oil, or as a gas cap on top of the oil. When natural gas pressure is applied to an underground oil reserve, oil is forced to the surface. These gases are referred to as "associate gas", they are commonly referred to as the gaseous phase of crude oil and contain certain light liquids such as propane and butane[2]. Natural gas was largely acquired in the 19th century as a by-product of oil production. Similar to removing the cap from a soda bottle and letting out some carbon dioxide, these light gas carbon chains emerged from solution when the retrieved fluids underwent pressure decrease from the reservoir up to the surface. As a by-product of oil production, the gas was often seen as a danger, as well as a disposal issue in active oil fields[3].

Table 1: Many fossil fuels emit greenhouse gases that contribute to global warming (Natural Gas, Coal, oil).

Pollutants	Coal	Natural gas	Oil
Sulfur-dioxide	2,592.1	2	1,124
Carbon-dioxide	209,001	118,002	165,000
Carbon-monoxide	208	41.1	34.2
Particulate	2,745.3	9	85.6
Mercuray	0.018	1	0.008
Nitrogen-oxides	459	93.1	450

Figure 2 depicts a graphical comparison of greenhouse gases emitted by various fossil fuels, with the maximum emission occurring from carbon dioxide emitted by coal and the lowest emission occurring from mercury emitted by oil.

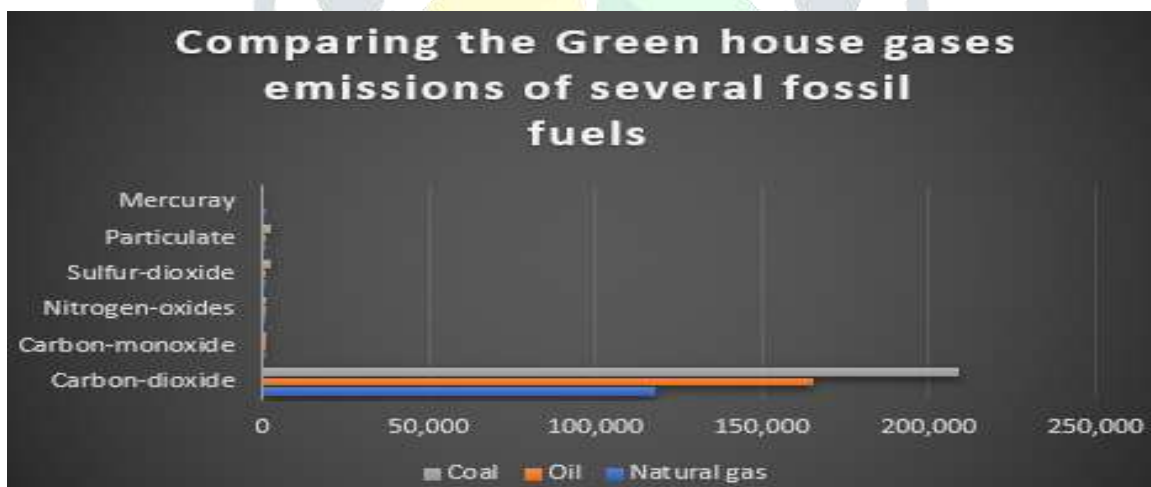


Figure 2: A Comparison of Greenhouse Gases Emission from Several Fossil Fuels.

2. CLASSIFICATION OF NATURAL GAS

As seen in Figure 3, natural gas is classified as follow:

2.1 Conventional Gases:

Oil-associated conventional gases can be found in the deep reservoir, as well as those that are associated with little or no crude oil.

2.2 Associate Gases:

In the reservoir rocks, related gas coexists with oil reserves. As an example, dissolved gases in oil or gas caps gases over oil reservoirs can be employed (casing heads gas). To substitute methane with a higher molecular weight paraffinic component, associated gas is employed. Carbon-containing natural gas liquid (NGL), often known as natural gasoline or gas condensate. Fuels such as natural gasoline, sometimes known as condensates, are plentiful (rich gases)[4].

2.3 Associated Gases That Aren't:

It is generated from a natural deposit that includes little to no crude oil or higher boiling hydrocarbons (gas liquids) than methane, and is also referred to as dry gas. In methane, this gas appears to be more common than in higher molecular weight condensate and hydrocarbons. It is also possible to produce non-hydrocarbon emissions, such as hydrogen sulphate as well as carbon dioxide. If the raw gas was associated or not, methane would be produced in a pure condition following processing.

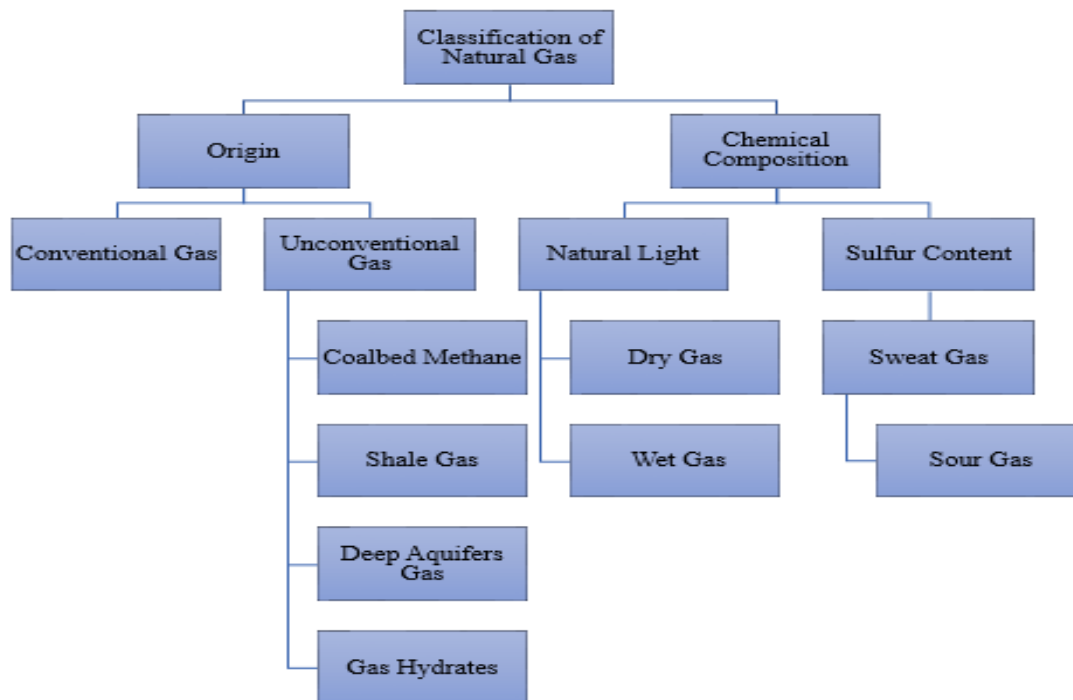


Figure 3: Chemical composition or origin classification of natural gas.

2.4 Usage of Natural Gas in Diverse Industries:

This industry uses natural gas for process heating, in combined heat or power systems, as a raw material to generate chemicals, fertilizer, and hydrogen as well as lease fuel and plant fuel... Natural gas is also used as a fuel in combined heat and power systems by some business consumers. Until very expensive pipeline or storage facilities were built to transfer the gas to consumer markets, the huge quantities generated could not be utilized. Most natural gas linked with oil before the early 20th century was either discharged or burnt off at oil fields. Many countries across the world are working to eliminate gas venting and production flaring as well as replace them with other financially viable, beneficial alternatives. Industrial, residential, electrical, and commercial uses for natural gas are only a few examples. Natural gas is used by a variety of industries, as seen in Table 2.

Table 2: Utilization of Natural Gas in Various Sectors.

Use of Natural Gas in different Sector	Value in Percentage
Residential	21.2
Industrial	31.3

Electric Power	34.1
Commercial	13.2
Vehicle Fuel	0.16

A breakdown of natural gas usage in several sectors (industrial, domestic, electrical and commercial and car fuel) may be seen in Figure 4. Natural gas is used a lot for electricity and a lot less for vehicle fuel.

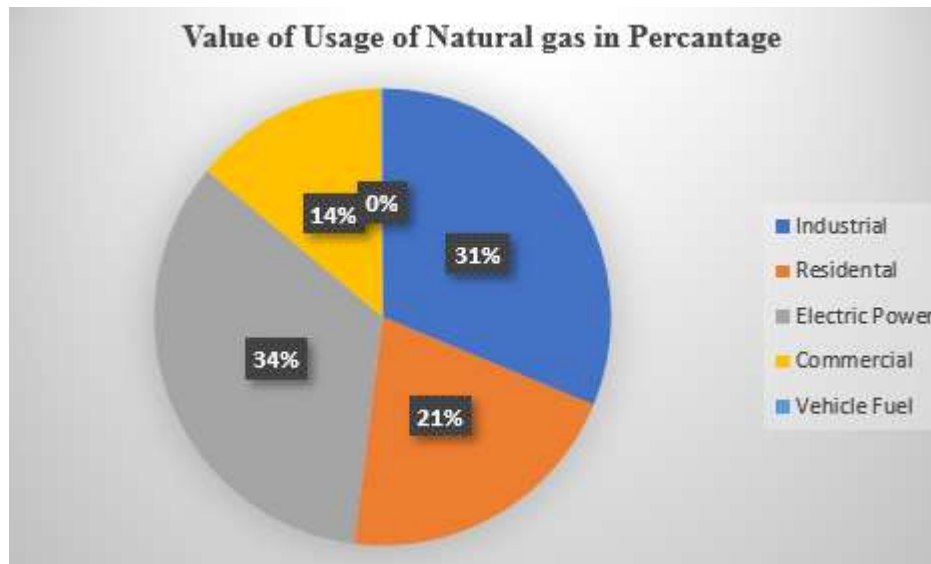


Figure 4: Graphical Representation Usage of Natural Gas in Different Sector.

2.5 The use of natural gas in various sector in details are given below:

2.5.1 Natural gas for industrial purposes:

Various industrial processes rely on natural gas. Approximately 32 percent of natural gas use in the United States was accounted for by industry in 2013. Natural gases are used as both a raw resource and a heat source. Everything from antifreeze to insecticides to clothes to medical goods contains natural gas. Acetate acid and propane are also made from it. It is also utilized in the manufacture of methanol and ammonia. To dry, melt, glaze, or bake a product, heat is often required. For example, the use of natural gas as a source of heat, steel, brick, mortar, glass, tiles, paper, ceramics, agriculture, and other resources. A number of commercial facilities also burn natural gas for incinerating waste materials[5].

2.5.2 Gasoline for Vehicles:

CNG is a safer and more cost-effective alternative to petroleum and other types of automotive fuels. Natural gas compressed. By the end of 2014, China, Iran, Argentina, Pakistan, Brazil, and India had sold more than 20 million natural gas automobiles globally[6]. Compared to petrol engines, the contemporary diesel engine has a similar energy efficiency. Natural gas operations are hampered by the low compression ratio of diesel or gasoline used in natural gas operations. A compressed natural gas engine has a greater compression ratio due to the higher octane fuel number of 121 to 131.

2.5.3 Electricity Generation:

The usage of natural gas for power generation is on the rise nowadays. Gas turbines in natural gas power plants create electricity by burning direct fuel gas exhaust. Natural gas is mostly used in the production of electricity. More than 26 percent of the state's power comes from natural gas. Energy authorities estimate that by 2035, 47 percent of additional grid generation capacity will come from gas [5].

2.5.4 Cogeneration and Heating:

While natural gas is utilized in both domestic and industrial uses in the United States, it is also used to heat homes and cook food. In the United States, approximately half of all households' utilized natural gas to heat their homes in 2013, and 70.01 percent of new buildings were constructed using thermal gas. The efficiency of a home oven can reach up to 90.01 percent. The most cost-effective method to minimise our natural gas usage is to improve the quality of our buildings.

2.5.5 Residential:

Using natural gas as a house heating and cooking source, it can reach temperatures of over 1100 degrees Celsius. The majority of industrialized nations deliver it to households through pipes, where it is used for a variety of applications, including stoves and ranges, gas-heated clothes dryers, central heating or cooling or heating equipment, water heaters and boilers, among others. Europeans and Americans alike rely on natural gas for a variety of purposes [7].

3. LITERATURE REVIEW

Listed below are a few natural gas researchers and their researches on the subject. A study by S. Faraway et al. on natural gases are combinations of natural gas hydrocarbons that exist under the earth's surface. Natural gas (NG) is a clean fossil fuel that may be used for transportation, consumption, and storage. In addition to methane, NGs may also contain additional chemicals, depending on their source. Other gas components can be extracted using different gas disposal methods. There is a comparison made between the prices of exploration and transportation for natural gas and oil and charcoal in the paper, which highlights gas's benefits to both customers as well as producers, as well as its environmental benefits. Natural gas infrastructures are more expensive since they are delivered via pipelines, whereas other energy sources, such as coal and oil, employ more adaptable train, truck, and ship networks [8].

Fang-Yu Liang et al. studied Customers, manufacturers, as well as the environment can profit from different aspects of gas, such as exploration and transportation. Pipelines, on the other hand, limit the general usage and expense of natural gas infrastructure, whereas other energy sources like oil and coal have a more adaptable network that uses trains, trucks, and ships to transport their energy. It's all about the natural gas infrastructure, which is a big deal. As a result of the oil and coal lobbying as well as the lack of action by the parliament on a comprehensive climate change strategy, these industries have less motivation to take use of natural gas, despite its various advantages. In addition, the report discusses legal changes to encourage the usage of natural gas in the future [9].

Zhengwei Nie et al. studies Methane, one of the most important natural gas components, was selected because of its potential to expand the global energy industry. The method for methane storage, the adsorption of natural gas (ANG), and research have been the most important promises over the past two decades. Storage of methane gas in natural gas vehicles using low pressure tanks is a reliable and cost-effective option using ANG. Ang compatibility tanks and associated ANG technologies are examined as well as the state-of-the-art adsorbent and adsorption theory. The patent literature was researched and debated. They hope it will be a useful tool in showing off both ANG technology's strengths and shortcomings, while also predicting future growth patterns and important challenges to be resolved [10].

4. DISCUSSION

Fossil fuel gases and natural gas are known to exist deep within the earth's crust. However, depending on its source, natural gas may also contain higher alkaloids and trace amounts of carbon dioxide (CO₂), nitrogen, hydrogen sulfite or helium. All the information you need to know on natural gas, including its emissions from a range of fossil fuels, may be found in this document. Naturally occurring hydrocarbon that is colorless and extremely combustible. Hexafluoro carbons are a kind of petroleum that is often found in crude oil. In addition to being utilized as a source of energy, natural gas is also a fuel for some automobiles. The chemical feedstock is critical in the production of polymers, as well as a wide range of other chemical products, such as fertilizers and dyes. Natural gas is a topic that has generated a lot of reviews and research articles. The researcher felt that he explained them well, although there are some gaps in his explanation. As a result, this study covers all of the important aspects of natural gas, such as its nature as a hydrocarbon mixture, how its

emissions from various fossil fuels (oil, coal, natural gas), and greenhouse gases. For example, in this article, we describe in detail the classification of natural gases and how they are used in a variety of different sectors such as industry, residential, commercial, and even as a car fuel (basic of the origin or chemical composition further divided into different categories).

5. CONCLUSION

Fossil fuel gases and natural gas have been found in the earth's crust at depths of thousands of meters. Gases can also contain larger levels of alkaloids, carbon dioxide (CO₂), nitrogen, hydrogen sulfite or helium, depending on the source. This article contains all the information you need to know about natural gas, including its emissions from a variety of fossil fuels. Fossil fuel gases, as well as natural gas, are known to exist deep inside the earth's crust. However, depending on its source, natural gas may also contain higher alkaloids and trace amounts of carbon dioxide (CO₂), nitrogen, hydrogen sulfite or helium. Work on natural gas is a priority of this project, so that it can buy and utilize natural gas. The different greenhouse gases and their emissions from diverse fossil fuels are shown in a table with a graphical representation. Also included in the study paper is a description of natural gas categorization, as well as the usage of naturally occurring gases in different industries, as well as percentage figures in table and graph form. Most of India's future natural gas consumption is expected to come from businesses such as industrial, electricity, fertilizer, or urban gas.

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