

An Overview of Natural Gas and its Usage in Different Sector

Dr. Kishore Kumar, Dr. Kola Sampangi Sambaiah

Department of Electrical and Electronics Engineering, Faculty of Engineering and Technology, Jain (Deemed-to-be University), Bengaluru, India

Email Id- k.kishore@jainuniversity.ac.in

ABSTRACT: Natural gas are the gases which is finds in the deep beneath of the earth surface and it is also known fossil gases; occasionally just gases. The natural gas consist mainly of methane's, but usually including variable amount of the others higher alkane, as well as sometimes small percentages of the carbon dioxide (CO₂), nitrogen, hydrogen-sulfide, or the helium. This paper gives all basic about natural gas like what is natural gas how its obtain and greenhouse gases emissions from several fossil fuels values is provided in table with graphical representation .Classification of natural gases also provided on this review paper as well as usage of Natural Gas in different Sector in full description with values in percentage in table and graphical form. The segments of industrial, power, fertilizer, and city gas delivery (CGD) are projected to accounts for majority of potential natural gases demand growth in India. The power sector's natural gases demand is projected to be powered not only by a lack of domestic coal and the increasing cost of its replacement, imported coal, but likewise increase domestic gases production as well as power sectors reforms.

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

INTRODUCTION

Natural gases are mixtures of the gases which is rich in hydrocarbon[1] and the natural gases are formed in earth crust as results of the transformations of organics matter cause of pressure and heat of the overlying rocks. The gases hydrocarbon may also produce as results of the microbial decompositions of the organic substance and cause by reductions of minerals salts. Few of this gas is release into hydrosphere or atmosphere while rest accumulate in upper layer of earth crust. The compositions of the natural gases varies depend on amount of factor such location origin, of deposit and geological structure. The natural gases compositions have, Ethane, butane, methane, and propane condensate as shown in Figure 1.

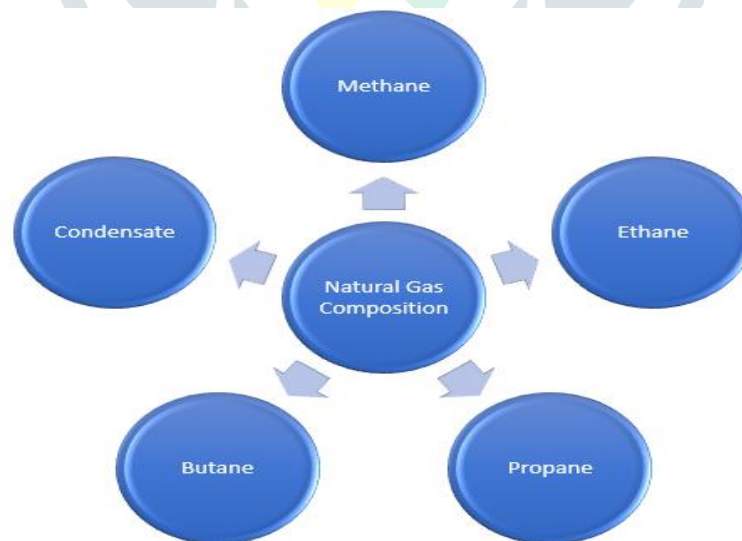


Figure 1: Natural Gases Composition Consist Hydrocarbons.

Natural gases mainly consist of saturate aliphatic hydrocarbon such as methane. Components like carbon dioxide (CO₂), hydrogen sulfide, helium and nitrogen constitutes unimportant proportions of the natural gases compositions. Natural gases are cleanest of the all fossils fuel and main product of combustions of the natural gases are carbon dioxide as well as water vapor. The combustions of the natural gases release small amount of

nitrogen, sulfur, carbon (dioxides) (Carbon monoxides, others responsive hydrocarbon and almost no particulates matter. oil as well as Coal are compose of the complex molecule) and when combust, they releases higher levels of harmful emission like nitrogen oxides as well as sulfur dioxides and natural gases releases the ash particle into environment, the Table 1 summarize different chemicals emission of the competition fuel.

Table 1: Greenhouse Gases Emissions from Several Fossil Fuels (Natural Gas, Oil, Coal)

Pollutants (pounds/billion british thermal units of the energy inputs)	Oil	Coal	Natural gas
Carbon-monoxide	34	209	41
Carbon-dioxide	165,000	209,000	118,000
Sulfur-dioxide	1,123	2,592	2
Nitrogen-oxides	449	458	93
Mercuray	0.008	0.017	1
Particulate	85	2,745	8

The Figure 2 show the comparison of greenhouse gases from several fossil fuels graphically and this graph show the maximum emission occurs from carbon-dioxide from coal and minimum emission occurs from mercury which is emit by oil .

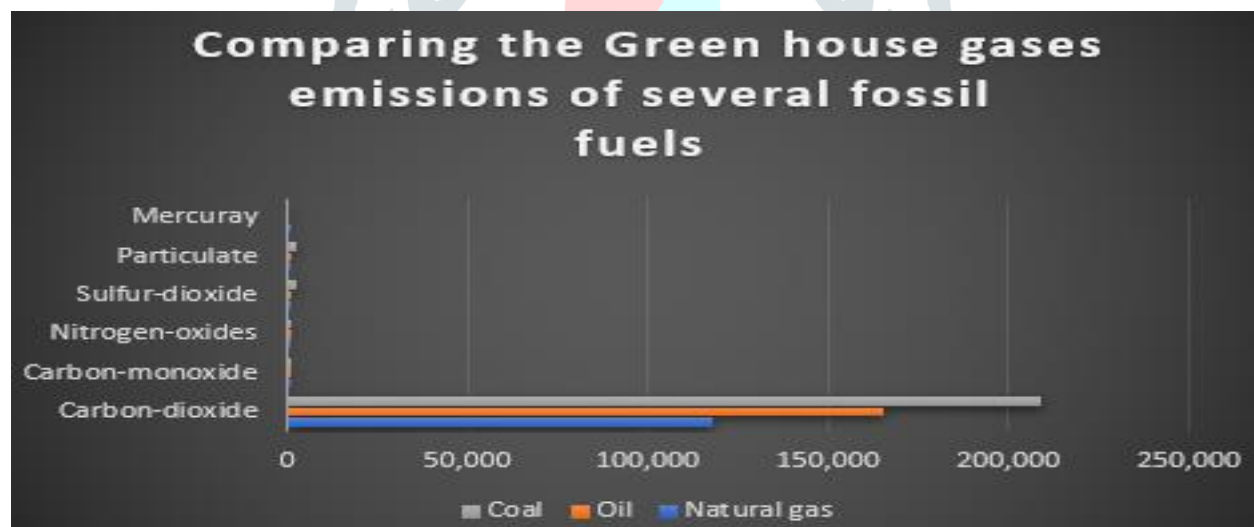


Figure 2: A Comparison of Greenhouse Gases Emission from Several Fossil Fuels.

CLASSIFICATION OF NATURAL GAS

The classification of natural gas are shown in Figure 3 and there description are given below:

1. Conventional Gases:

Conventional gases occur in the deep reservoir which are either associate along with crudes oil or contains small or the no crudes oil.

1.1. Associate Gases:

The associate gas coexist in the reservoir rocks with the oil reservoirs. It can be used in a variety of ways, such as the dissolved gases in the oil or the as the gas caps gases above oil reservoirs (casing heads gas). Associated

gas (also called wet gas) is use lower in methane and higher in the higher molecular weights paraffinic constituent. Natural gas liquid (NGL), which contain (Carbon constituents commonly referred for natural gasoline's or gases condensate. Natural gasoline's or gas condensates and are contained in high quantities in the gas stream (rich gases).

1.2. Non-Associate Gases:

Non associate gas (also known dry gas) is formed from a natural formation that usually contains little to no crudes oil or the higher boiling hydrocarbon (gas liquid) than that of methane. This gas seems to be higher in the methane and minor in higher molecular weight condensate and hydrocarbons materials. Non-hydrocarbon emissions, such as hydrogen sulfide as well as carbon dioxide, can also be present. It may remembered that, regardless of whether the raw gas state was associate or non-associate, methane would be generated in a pure state after processing.

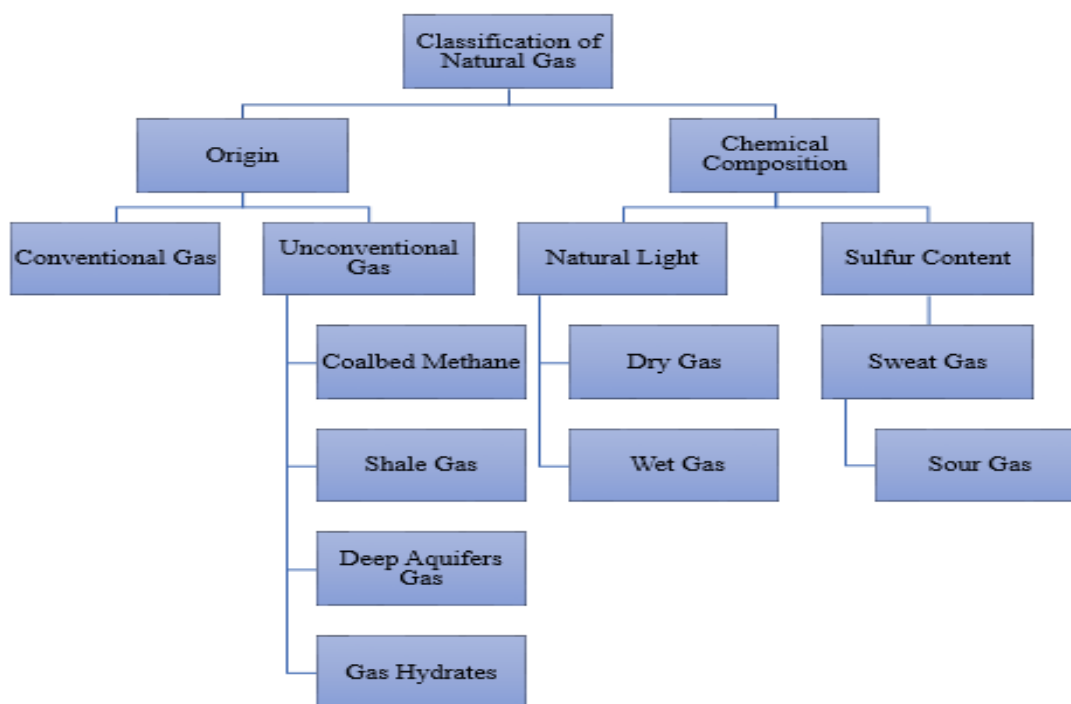


Figure 3: Classification of Natural Gas based on Origin and Chemical Composition.

2. Unconventional Gas:

Numerous types of unconventional gases are founds such as, coal bed methane, shale gas, gas hydrates and gas hydrates deep aquifer gas.

2.1. Shale gas:

Shale gases found in impermeable sandstone, low permeability shale, sandy siltstones, dolomite, limestone, chalk reservoirs and carbonates. The methane produce from that reservoir is not associate with oils. Shale gas can be originated from biogenic thermo genic, or mixture between pathways. This is in case of the Upper Devonians New Albany's Shale's in the shallow aquifers and Illinois Basin, Canada southwestern Ontario.

2.2. Coalbed Methane:

Coalbed methane (also known as coal mines methane) is produced during coalification processes and is present in coal seams. The activity of increasing pressure and temperature in submerged organic matter that is eventually converted into coal produces thermo genic coals bed methane. In thermally immature coals, bacterial processes produce another form of methane called biogenic coal- bed methane. The main constituents

of gas produce from coal bed is the methane, with slight amount of carbon dioxides, ethane, hydrogen sulfides, sulfur dioxides, and nitrogen

2.3. Deep Aquifers Gas:

Throughout gas movement through aquifer for reservoir rock, deep aquifers gas is discovered; aquifers are then largely filled with methane. Since methane has a poor solubility in the water, the volume of gas in the aquifer is highly determined by temperature, salinity, and strain.

2.4. Gas Hydrates:

All gases can form hydrates under various temperature as well as pressure conditions. The nucleation stage is accompanied by crystal growths from nuclei to form hydrate crystal. A nucleation seeds are formed in the 1st step, and it is unstable before it reach their critical scale. Seeds of a given size are used to represent nuclei. The incubations time is the amount of time it takes for the nuclei to develop. If the nuclei have been formed, gas-hydrate crystal growths will begin. Natural gas hydrates are shaped and dissociated by a variety of conditions, including gas chemistry, pressure, temperature, salinities of the water source, and quality of porous mediums by which that form. In shallow sedimentary basin, methane hydrates are primarily created by microbial reductions of carbon-monoxide organic matter. A mixed root may be obtained in some situations.

USAGE OF NATURAL GAS IN DIFFERENT SECTORS

There are many sector where the natural gas use such as Industrial, Residential, Electric Power, Commercial etc. some of these sector who uses natural gases with their value of usage in percentage are given in Table 2.

Table 2: Usage of Natural Gas in Different Sector.

Use of Natural Gas in different Sector	Value in Percentage
Industrial	31
Residential	20
Electric Power	34
Commercial	13
Vehicle Fuel	0.15

The value of usage of natural gas in different sector (Industrial, Residential, Electric Power, and Commercial and vehicle fuel) is shown graphically in Figure 4 and this graph show the natural gas is use in large amount in electric power sector and very less amount in the vehicle fuel.

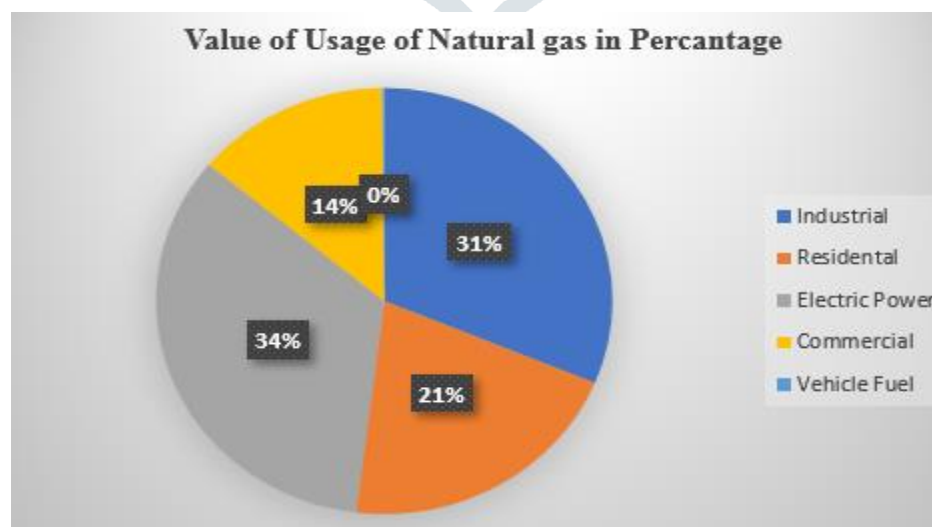


Figure 4: Graphical Representation Usage of Natural Gas in Different Sector.

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

1) *Industrial Uses of Natural Gas:*

Natural gases are used in the number of different industrial process. Industry accounted for around 32% of total natural gases demand in United State in 2013. Natural gases used as a raw material as well as a heat source. Antifreeze, plastics, pesticides, garments, and pharmaceuticals all contain natural gas as an element. It is also used to make methanol, ammonia, ethane, butane, acetic acid, and propane, among other chemicals. To dry, melt, glaze, or bake a product, many manufacturing processes require heat. Steel, glass, bricks, mortar, tile, ceramics, agricultural goods, paper, and other resources all use natural gases as heat sources. In several commercial plants, natural gases are also used for the incinerations[2].

2) *Vehicle Fuel:*

CNG (Compressed Natural Gas) is safer as well as less expensive alternatives to petroleum and other vehicle fuels. At the end of 2014, China, Iran, Argentina, Pakistan, Brazil, and India had sold over 20 million natural gas vehicles worldwide. The energy efficiency is similar to that of gasoline engines, but it is smaller than that of modern's diesel engine. The poor compression ratio of gasoline or diesel vehicle converted for runs on natural gas suffers, resulting in cropping of the delivered powers while operating on the natural gases. Compressed natural gas specific engine, however, uses higher compression ratios because of this fuel's greater octane numbers of 121 to 131[3].

3) *Electricity Generation:*

The fast growing usage of the natural gases today's for generations of the electric power. Natural gas power plants typically generate electricity in the gas turbine, directly using hot exhaust gas from the fuel combustions. The main usage for the natural gases is to produce electrical power. Natural gases are sources of the greater than 26 percent of nation-state electricity. According to the Energy Information Administration, in the year 2035, 47 percent of the new producing capacity added to grids will come from the natural gas[4].

4) *Cogeneration and Heating:*

Industrial and Residential applications of natural gas account for more than a third of overall use in the United States, while gases are used in homes for room as well as water heating as well as cooking. In 2013, natural gas was used for heat about half of all homes in the United States, and 70.01 percent of new homes were constructed with gas heating systems. Home furnaces can achieve efficiencies of up to 90.01%. Building quality improvements are commonly regarded as the most cost-effective ways to reduce natural gas consumption. According to one report, an ambitious initiative to increase building performance by high-efficiency furnaces, water heaters, insulation, and other appliances over the next fifty years might save 235 trillion cubic feet of the natural gas[5].

5) *Residential:*

Natural gas can reach temperatures of over 1100 degrees Celsius when dispensed in a residential environment, making it an efficient domestic heating and cooking material. It is delivered to households by pipelines in most of the developing world, where it's used for a variety of uses such as ovens and ranges, gas heated clothes dryers, central heating and cooling or heating, water heaters, furnaces, and boilers, are types of heaters used in residences and other structures. Natural gas is used widely in both Europe and North America.

LITERATURE REVIEW

The few researchers and their researches on natural gas are given: S. Faraway et al. studies natural gases are naturally occurring's gaseous hydrocarbons mixtures that form under surfaces of the earth. Natural gases (NGs) are clean fossil fuels and are reliable sources of energy as they are shipped, used, and stored. Methane is the principal component of the NGs, but it can also contain other substances depending on its source. Other than hydrogen, different gas disposal systems can be used to extract constituents. Because of the value of NGs

as fuels and growing global demands for it, their paper examines origins, structure, and refining of NGs, they compare the costs of different components of the natural gas industry, such as exploration and transportation, to those of the oil and coal, and highlight the advantages of natural gas and its benefits for the customer, manufacturer, and climate. They discuss the main problems that have hampered the widespread usage of natural gas, like the facts that natural gas infrastructures are more expensive because it's delivered through pipeline, while other energies source, like coal and oil, have more versatile networks that uses train, truck, and the ship[6].

Fang-Yu Liang et.al compare the cost of different component of natural gases industry, like exploration as well as transportation, to those of the oil and coal, and highlight the advantages of the natural gases and their benefit for customer, manufacturer, as well as climate. They discuss main problems that have hampered the widespread usage of natural gases, like facts that natural gas infrastructure is more expensive because it is delivered through pipelines, while other energy sources, such as oil and coal, have more versatile networks that use train, truck, and ship. Furthermore, strong lobby of oil as well as coal companies, as well as legislative inaction on passing a comprehensive climate change bill, dampen incentive for that sectors to capitalize in the natural gas, considering its many advantages. They also address legislative changes to encourage increased natural gas usage in future[7].

Anatolijs Borodinecs et.al studies because of their various advantages, like high reliability, comparatively low carbon-monoxide emissions, automation capabilities, as well as suitable fuel supply, and a readily accessible natural gas delivery network, natural gases heating system have historically been very common in the private sectors in the Latvia. The study's key purpose is to run a comprehensive simulation of hybrid gases system energy production in the Latvian environment and determine future energies savings.

Zhengwei NIE et.al studies Natural gases, whose primary constituents is a methane, has considered compelling options for expansion of the global energy market. Most promise methane storages system, adsorb natural gases (ANG), and has been a hot topic of research for past 2 decade. ANG is a reliable and the cost-effective ways for stores methane gas for the natural gases vehicle at a reasonable energy densities when running at low pressures, allow for conformable storage tanks. Their paper reviews state of the art developments on adsorbent, adsorptions theory, ANG conformable tank as well as related technology on the ANG vehicle as stated in the science literature. The search of the patent literatures was undertaken as well as discussed. Their review's aim is to show both the successes and shortcomings of ANG technology base vehicles, and to predict future growth patterns and crucial issues to be resolved [8].

DISCUSSION

After study and researches the various review and research paper on topic natural gas we found the researcher explain in good manner but some pints are missing their review or research paper. This review gives all basic about natural gas like meaning of the natural gas(Natural gases are mixture of the gases that're rich in hydrocarbons) how its obtain and greenhouse gases emissions from several fossil fuels (oil, natural gas, coal) values is provided in table with graphical representation. .Classification of natural gases (on basis of origin and chemical composition which is further divided into different categories) also provided on this review paper as well as usage of Natural Gas in different Sector (such as Industrial, Residential, Electric Power, Commercial and Vehicle Fuel) in full description with values in percentage in table and graphical form.

CONCLUSION

This paper focuses on natural gas so that what is natural gas and how its acquire and further use The different greenhouse gases and their emissions from multiple fossil fuels values is given in table with graphical representation. Classification of natural gases also presented on this analysis paper as well as use of Natural Gas in various Sector in complete definition with values in percentage in table and graphical form . The segments of industrial, power, fertilizer, and city gas delivery (CGD) are projected to the account for majority of potential natural gas demand growth in India. The power sector natural gases demand is projected to be powered not only by a lack of domestic coal and the increasing cost of its replacement, imported coal, but likewise increase domestic gases production as well as power sectors reforms.

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