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Technology Used for Reducing Green House Emission

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ABSTRACT

A technology on replacement methane (CH4) carbon dioxide (CO2) and natural gas hydrate (NGH) is explained. Additionally, both theoretical and experimental work serve to demonstrate the technology. Additionally, when paired with the primary CH4 emission pathway from the coal sector, the decreasing emission technology of coalbed methane(CBM) based on hydration is narrated. The formation and dissociation technique of CH4 hydrates are elaborated. The process of hydrate formation of CBM with different methane concentrations is investigated using self- developed experiment apparatus. The findings demonstrate that under the right circumstances, CBM hydrates are likely to develop. The study of experimental data and findings in earlier literature shows that lowering greenhouse gas (GHG) emissions is a good idea. such as CO2 and CH4 on hydrate technology.

INTRODUCTION

The content of greenhouse gases (GHGs) has been increased with the double of the world population and human activities. The immediate future of human growth is threatened by the effects of global warming, which are already having a considerable impact on the climate and other associated issues (such as agriculture, forestry, tourism, and fishery). Therefore, it is important to research GHG emission reduction. Methane (CH4) and carbon dioxide (CO2) are major GHGs that make the key contribution to the global warming, and their efficiencies for temperature rise account for a greater proportion of about 63% and 15% respectively. Therefore the reduction of CO2 and CH4 is a key way for control on greenhouse effect. GHGs can be recovered using petrol hydrates when the right circumstances exist. Gas and water molecules combine to form crystalline substances known as gas hydrates.

The hydrogen bonding of water molecules to create cages, which are stabilised by the presence of tiny guest molecules like methane, carbon dioxide, and ethane, results in the formation of the hydrate lattice. The goal of hydrate research is to reduce CO2 and CH4 emissions using hydrate technology.

The industrial waste gas CO2 sequestration by gas hydration, namely greenhouse gas CO2 reacting with H2O to form carbon dioxide hydrate is an effective alternative for the reduction of carbon dioxide emission to the atmosphere. At present, it is an investigative focus that CO2 geologic sequestration and exploitation of natural gas hydrate (NGH) are carried out at the same time. NGH forms under conditions of low temperatures and high pressures and exists naturally below the ocean floor or in the permafrost zones . By some estimates, the energy locked up in NGH deposits is more than twice the global reserves of all conventional gas, oil, and coal deposits combined

.Therefore, NGH as a kind of gas hydrate is expected to replace fossil fuel as new energy source of 21st century. But it still can not be recovered with a consummate method at present, because methane as a main composition of NGH is a greenhouse gas, and release of even a small percentage of total amount of NGH can have a serious effect on Earth's atmosphere. One method for CH4 recovering from NGH that has been proposed is by replacement with CO2 . Injection of CO2 into hydrate reservoirs that already contain NGH, will therefore naturally convert the in situ hydrate into CO2 hydrate while at the same time releasing the trapped natural gas. Not only does this method supply a way for CH4 recovery, but it also supplies a way for long-term storage of CO2 at the same time. So, it is an environmentally-benign technique to recover natural gas resource

LITERATURE SURVEY

To meet the demands of an expanding worldwide population for food, fibre, and fuel, fertiliser nitrogen (N) use is increasing internationally. In order to safeguard water resources, reduce greenhouse gas (GHG) emissions, maintain soil resources, and promote a thriving economy, fertiliser users are being urged to manage their fields more effectively. In conjunction with other cropping and tillage practises, this research explains the impacts of N source, rate, timing, and placement on greenhouse gas emissions. It was determined that the main strategy to reduce GHG emissions while still fulfilling production demands was to implement intensive crop management practises that enhanced efficient and effective nutrient uptake while producing high yields. Numerous investigations found

The agriculture sector is one of the leading emitters of greenhouse gases in Bangladesh, owing to increasing mechanization, changing population patterns and increasing cultivation of irrigation intensive crops like rice. The objective of this research is to analyze how population trends, energy use and land use practices impact the emissions of three greenhouse gases from the agriculture sector in Bangladesh. The gases studied are carbon dioxide, methane and nitrous oxide. The Stochastic Impacts by Regression on Population, Afuence, and Technology (STIRPAT) model and ridge regression are used to analyze the drivers of emissions covering the period . Explanatory factors of emissions are the total and rural population, afuence, urbanization, fertilizer intensity and quantity, carbon and energy intensity, irrigation, rice cultivation, cultivated land and crop yield. The fndings reveal that the country's total population has a negative efect, and the rural population has a negative, nonlinear impact on the emissions of GHGs can be recovered using petrol hydrates when the right circumstances exist. Gas and water molecules combine to form crystalline substances known as gas hydrates.

Divergent repercussions are triggered in all economic sectors by the rapid expansion of the negative effects of climate change. Experts established that greenhouse gas emissions were a key driver for the climate shifts. Numerous social, economic, and ecological problems have resulted from this. By advancing innovation and information technology, these problems might be resolved.

This study set out to test the claim that advancements in information technology and innovation led to a decrease in greenhouse gas emissions. The author employed the OLS, FMOLS, DMOLS, Dicky-Fuller, and Phillips-Perron tests as well as other methodologies. The World Economic Forum, World Data Bank, and Eurostat reports for the Visegrád countries (Hungary, Poland, Czech Republic, and Slovakia) for the years 2000–2019 serve as the basis for the research.The IMO had adopted the proposed amendment adding to the MARPOL Annex making it mandatory the EEDI (Energy Efficiency Design Index) for new ships as well as the SEEMP (Ship Energy Efficiency Management Plan) for all ships. This was eventually for reducing GHG emissions from international shipping vessels, and has been effective since the 1st of January 2013 for ships weighing 400GT. Notably, at the 70th MEPC, the plan to develop a roadmap for the comprehensive IMO strategy on reducing GHGs from ships was approved, and as such, the plans including its shortterm, mid-term and long-term measures .

3.1 BLOCK DIAGRAM

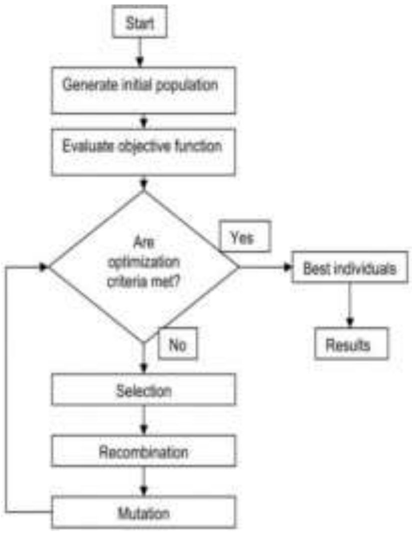


Fig 3.1 block diagram of a system

Figure 3.1 shows the block diagram is a The building block of all living things is the cell, which contains a set of chromosomes, which are strings of DNA, each of which contains genes that encode a specific protein. During reproduction, first occurs crossover, where genes from parents create a new chromosome in some way. However, the newly created offspring can be mutated. Mutation occurs when the elements of a gene change. Genetic Algorithm (GA) is a search technique that mimics the mechanisms of natural selection.

CARBONSEQUESTRATION

Carbon sequestration is divided into two major subdivisions: biologic and geologic. Biologic carbon sequestration is beneficial for more long- term carbon reduction goals, since it utilizes the natural processes of plants, soil, and other biomasses, and their removal and storage of atmospheric CO2 (Climate Change Connection, 2016). The main ways that biological carbon sequestration can be increased by human means are the preservation and increase of plant growth, especially trees and forests. Alternatively, the United States "LandCarbon" program investigates major terrestrial and aquatic ecosystems across the country to evaluate the natural effects of biologic sequestration, in hopes of using data to further understand potential areas of improvement.

Geologic Carbon Sequestration

However, for our purposes, we will be focusing more on geologic carbon sequestration and how it is implemented. Geologic carbon sequestration is the storage of emitted CO2 in deep geologic formations, thus preventing its "release to the atmosphere and contribution to global warming as a greenhouse gas".

Compared to most biologic carbon sequestration methods, which are more long-term, geologic sequestration has a more immediate effect, especially for CO2 emissions from man-made structures. One common method of geologic carbon sequestration is called enhanced oil recovery, where CO2 is pressurized into a liquid state and injected underground . Enhanced oil recovery is advantageous because it actually benefits oil production—the injected CO2 displaces trapped oil/gas, and also extends the amount of oil/gas recovered from oilfields. This is which shows a few different ways CO2 is emitted, as well as the details of more specific types of trapping (such as residual trapping and buoyant trapping).

Energy Sources

Another solution for carbon reduction is to change the energy sources used. While sequestration and CCS focus on capturing any emitted carbon, policies concerning energy sources target the actual production of carbon, especially through carbon- neutral and carbon-free energy sources. Carbon- neutral energy sources are where any CO2 resulting from production is "neutralized" or balanced out, often through renewability or capture. One example is biomass energy, which utilizes organic material from plants, animals, etc. for thermal power plants (Tanuma, 2017). Another example is the "power to gas" technology, which utilizes energy-storage technology to produce synthetic fuels (such as hydrogen, methane, etc.) that absorb excess renewable power. The production of such renewable fuels is essential for many sectors, especially transportation and household sectors (Wulf, 2018). On the other hand, carbon-free or net-zero energy sources are defined as having no CO2 emissions through their energy production. Carbon-free is often attained through the use of wind (turbine) energy, solar energy, hydroelectric power, and other renewable sources. However, since most of the technologies required for drastic energy source changes are still being developed and perfected, carbon reduction via renewable energy sources should be considered a positive long-term goal, not an immediate or wide-scale solution.

Evolution of Carbon Emission and Policies The reduction of carbon emissions, and greenhouse gas emissions in general, has been a global issue for several decades, as emission levels continuously increased over time. As the concern over greenhouse gas emissions started gaining attention worldwide, various methods to reduce and combat emissions were researched and implemented, including carbon reduction policies and technologies. The administration of these actions has led to a sligh improvement in greenhouse gas emissions, although more action is necessary in order to significantly reduce emissions. Figure 3.1.1 shows an exponential increase in the amount of carbon emissions from fossil fuels; Figure 3.1.2 shows that the global per capita in carbon emissions is also increasing. Despite the Kyoto Protocol in 1992 that was implemented to combat greenhouse gas emissions, these graphs show that carbon emissions still increased without slowing.

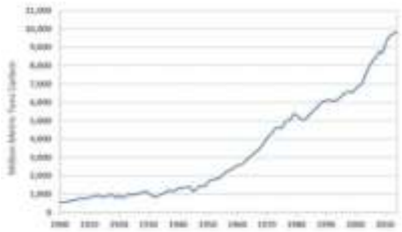
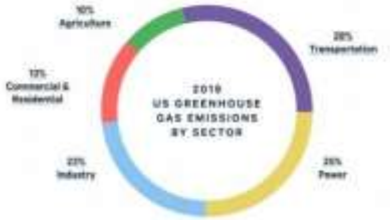


Fig 3.2 Global carbon emissions of fossil fuels However, there has been slight improvement. For example, as seen in total emissions in the United States increased by 1.8 percent overall between 1990 and 2019. However, starting from the highest peak in 2007, total emissions have begun decreasing and have gone down by 12 percent. Although the overall change in emissions is still positive, a downward trend has emerged, as we can see in the green line . The same change is true for the net emissions . Note that the net emissions are determined by subtracting the amount of gas absorbed by carbon sinks—things like plants or soil, which absorb more carbon than they emit—from the total emissions. The carbon sink value is calculated using the Land Use, Land-Use Change, and Forestry (LULUCF) Carbon Stock Exchange. Overall, there is a large reduction in carbon through LULUCF, despite the presence of small amounts of CH4 and N2O emissions that contribute positively to greenhouse gas emissions. This article examines the reasons behind the decrease in emissions after 2007. Specifically, the article demonstrates that "between 2018 and 2019, the decrease in total greenhouse gas emissions was largely driven by the decrease in CO2 emissions from fossil fuel combustion as a result of a 1 percent decrease in total energy use and reflects a continued shift from coal to less carbon-intensive natural gas and renewables in the electric power sector"



As the global attention turns toward reducing carbon emissions, many nations and organizations are putting effort into developing methods of carbon reduction. Already, the world is on the path to moving toward such a goal, from the Kyoto Protocol in 1992 to the Paris Agreement in 2016, as well as annual Climate Change Conferences hosted by the United Nations. Moreover, as of December 2020, there have been 127 countries, 823 cities, 101 regions, and 1,541 companies that have pledged to decarbonizing their processes by 2050 (DataDriven EnviroLab and NewClimate Institute, 2020).

These entities will strive for their goal through the potential methods described above. CH4 is the second most important of the greenhouse gases after CO2. Around 375 Mt/a of the 535 Mt/a total annual CH4 emissions believed to be caused by human activity, with coal production accounting for the majority of these emissions. It is important to research coalbed methane (CBM) reduction in mines. In underground mining, the ventilation system and mine gas drainage system each contribute about 70% and 20% of the CH4 that is released into the atmosphere. As public knowledge of coal mine safety and environmental protection has increased, the exploitation and utilization of CBM resources has been became research hot point. CBM is one of the main resources of energy as well as a chemical feedstock. However, gas markets are normally far away from gas reserves. So, the processing and utilization of CBM have been restricted by the high cost and difficulty of storage and transport low concentration CBM by the conventional means. When referred to standard conditions, 1m3 solid hydrate contains up to 200m3 of natural gas depending on pressure and temperature. Such the large volume of NGH can be utilized to store and transport a large quantity of natural gas in a stable condition, and the transportation cost is less than the liquefied transportation . So, one new method for recovery and utilization of mine CBM is proposed by author's research group based on gas hydrate technology through analysis for the solid transportation of natural gas. Firstly, CBM hydrate is formed from CBM in the presence of liquid water provided the pressure is above and the temperature is below the equilibrium line of the phase diagram of the gas and liquid water. Secondly, the hydrate is transported by refrigerated vehicle to market. Thirdly, the hydrate is melted back to gas and water by the injection of hot water at the market, and the decomposition CBM is used after appropriate drying. The principle flow diagram of the proposed process for recovery and utilization of CBM is shown in Fig.4.1.

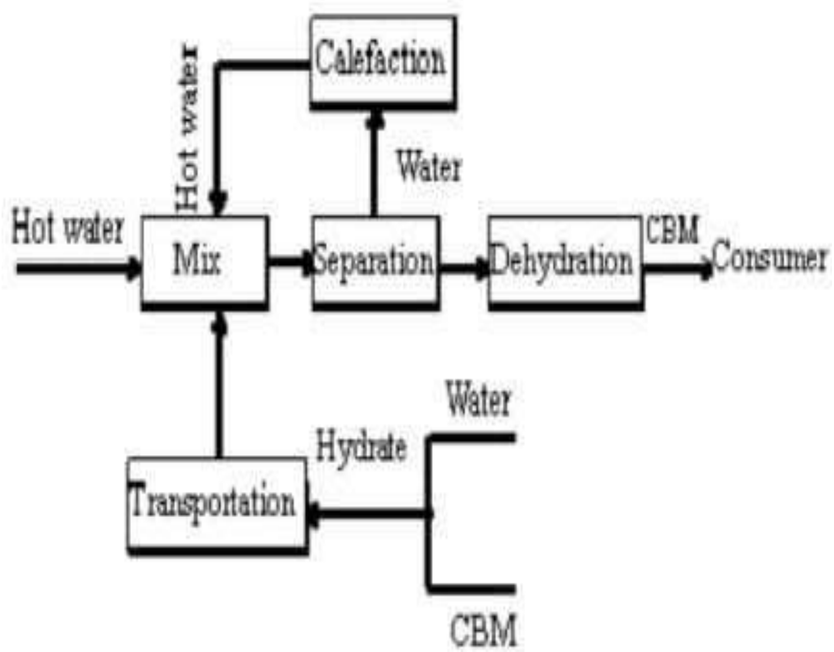


Fig 4.1 Schematic of the proposed process for recover and utilization of CBM

APPLICATIONS

[1] The green house technology has also tremendous scope In horticultural sector, especially for production of hybrid seeds, high value vegetables, ornamental plants, medicinal plants, cut flowers and fruits.

[2] Used to protect the plants from the adverse climatic conditions such as wind, cold, precepitation, excessive radiation, extreme temperature, insects and diseases.

ADVANTAGES

[1]. Improve Air Quality and Save Lives.

[2]. To slow climate change could prevent millions of premature deaths.

[3]. Reduce the global warming effects.

[4]. Improved crop quality and yields.

[5]. Fewer threats to crops.

CONCLUSION

The extensive development of economy causes pressure from greenhouse gases mitigation, and the technologies to efficiently capture, recover and separate, must be developed. The analysis of the experimental data and results in the former literature indicates that the reducing emission of greenhouse gas such as CO2 and CH4 on hydrate technology is feasible. This new technique is of more advantages and great potential use in the future, although it is immature up to now.

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