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Biomass Processing Compressed Bio-Gass (CBG) Plant

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ABSTRACT: This article discusses compressed biogas (CBG) and its potential in India. India currently has an estimated CBG potential of 32,444.4 billion tonnes, but only 0.06% of CBG is currently produced on an annual basis out of a total estimated CBG potential of 4,444 years.Research into the purification and use of biogas as vehicle fuel and power generation is of public interest.India has a huge number of CBG plant installations available. 1. Biomethane can be used as a fuel for natural gas power plantsas well as for gas supply systems and fuels for vehicles. 2. Production of electrical and process chemicals. threeCan be used in dual fuel mode with diesel fuel for ignition. The engine needs to be modified to run on pure biogas/biomethane. 4. Gasoline or petrol engines require little or no modification to run on biogas or biomethane. 5.It can be used as an open or combined cycle plant for electricity and heat production. Micro, small, medium and large turbines are available depending on fuel source and application. 6. Cogeneration is the simultaneous production and use of heat and electricity from the same fuel source. 7.Triple power generation is the simultaneous production of electricity along with heating and cooling.

KEYWORDS: Availability of raw materials - cow dung and rice straw Need to increase farmers' income Encouraging organic farming

I. INTRODUCTION

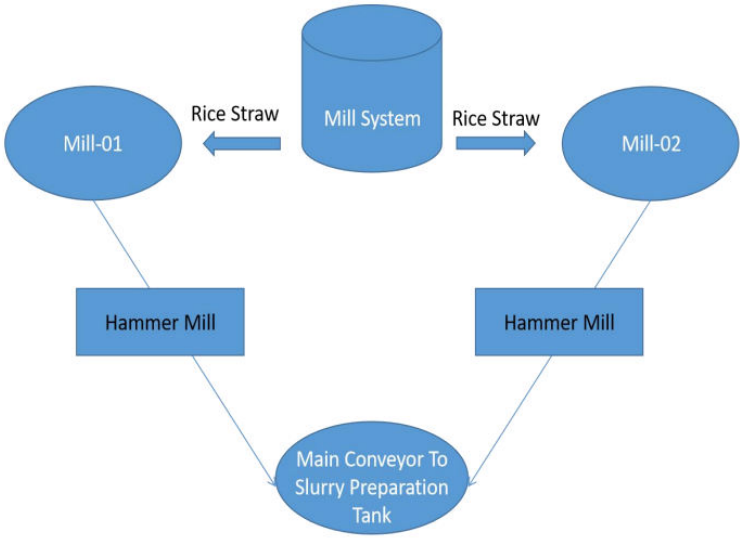
India is one of the fastest growing economies in the world and its energy consumption is expected to grow rapidly. The Ministry of Petroleum and Natural Gas estimates India's total reserves to be 763 million metric tons of crude oil and 1.488 trillion cubic meters of natural gas. India currently imports about 77% of its crude oil needs and about 50% of its natural gas needs, so the government has set a target to reduce these imports by at least 10% by 2022. The goal is to increase the share of gas in India 'energy mix compared to the current six. From 5% to 15% by 2022. 2. Your Excellency Prime Minister outlined the four pillars of India Energy Vision: Energy Access, Energy Efficiency, Energy Sustainability and Energy Security. Government of India has also set a target of "doubling farmer income by 2022". three. Waste/biomass sources such as agricultural waste, cow dung, sugarcane press sludge, municipal solid wasteBiogas production via anaerobic digestion process. Biogases purified from hydrogen sulphide (H2S), carbon dioxide (CO2) and water vapor, and is compressed into compressed biogas (CBG) with a methane content (CH4) greater than 90%. 4. CBG has similar calorific value and other properties to CNG, so it can be used as an environmentally friendly renewable automotive fuel. Therefore, considering the abundant biomass in the country, it can replace LNG in the automotive, industrial and commercial sectors. 5. CBG treatment of agricultural waste, livestock manure and municipal solid waste on an industrial scale is expected to have the following advantages. ∟ Declining natural gas and crude oil imports. ⌟Use agricultural residue, livestock manure and MWS to produce CBG andto achieve emission and pollution reduction.⌟ Incentives to meet national commitments to meet climate change targets. ∟ Provides a buffer against energy security concerns and crude oil/oil price fluctuations. ⌟ Contribute to Swachh Bharat's mission through responsible waste management.⌟ Reduce pollution and carbon emissions. ⌟ Provide farmers with an additional source of income, employment in rural areas and improving therural economy

II. METHODOLOGY

The study included a review of peer-reviewed articles and official reports onbiogas sources, production processes and applications. The literature used was publishedtimes between 1932 and 2022, providing a clear picture of the past and status of biogas technology and itsapplications. Sustainability aspects of biogas energy were considered, including social, institutional, technological, economic and environmental aspects at both local and international levels. An overview of thepolicies and regulations at national and international levels is provided. Based on literatureand the requirements for sustainable energy transformation, the role of biogas is clearly defined now and in the future. The biogas feedstock, feedstock preparation, conditions for optimal production and composition of biogas andbiomethane are presented. Also presented are biogas upgrading technologies, including process quality and sustainability. Finally, the current and future applications of biogas are also presented as sustainable energy options in the energy transition.

III. MILLING AND CONVEYING SYSTEM

There are two milling systems Mill-01 and Mill-02 respectively. mill-01 has BC-1401A, rice straw is loaded into L-1401A bybale integrated motor crushing rice straw. ⌟ Shredded rice straw is collected in BC-1402A. ⌟ The collected rice straw is then put into the hammer mill. ⌟ Rolled products are transported to the Main Conveyor by BC-1403.⌟ A cow dunk can also be added to the BC-1403 conveyor belt. ⌟ This main conveyor belt conveys the material to the biomass slurry section



IV. BIOMASS SLURRY PREPARATION

The rice straw comes from milling after that they are come in drain sump which is denoted by M-1402. The mixing is start with cooling water, raw water and some filtrates. After that the rice straw are comes in slurry preparation tank, inside in motor agitator are present with heater. After that start re-circulation the temperature is maintain stop re-circulation and is passes to- words the dig-esters for making culture. The biomass slurry is transfer to per-treatment tank. And the cow dunk slurry transfer to the anaerobic Digester. These are the main principle of biomass slurry preparation.

V. DIGESTERS

Biogas: Biogas is composed of methane (CH4), which is the primary component of natural gas, at a relatively high percentage (50 to 75 percent), carbon dioxide (CO2), hydrogen sulfide (H2S), water vapor, and trace amounts of other gases. The energy in biogas can be used like natural gas to provide heat, generate electricity, and power cooling systems, among other uses. Biogas can also be purified by removing the inert or low-value constituents (CO2, water, H2S, etc.) to generate renewable natural gas (RNG). This can be sold and injected into the natural gas distribution system, compressed and used as vehicle fuel, or processed further to generate alternative transportation fuel, energy products, or other advanced biochemicals and bioproducts.

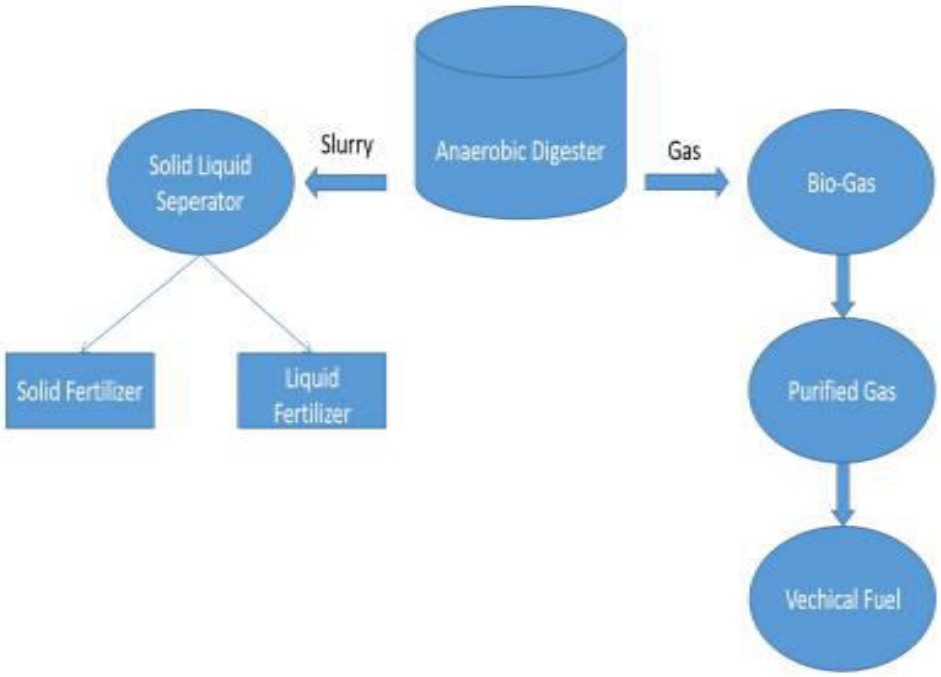
Digestate: Digestate is the residual material left after the digestion process. It is composed of liquid and solid portions. These are often separated and handled independently, as each have value that can be realized with varying degrees of post processing. With appropriate treatment, both the solid and liquid portions of digestate can be used in many

beneficial applications, such as animal bedding (solids), nutrient-rich fertilizer (liquids and solids), a foundation material for bio-based products (e.g., bioplastics), organic-rich compost (solids), and/or simply as soil amendment (solids), the latter of which may include the farm spreading the digestate on the field as fertilizer. Digestate products can be a source of revenue or cost savings, and are often pursued to increase the financial and net-environmental benefit of an AD/biogas project.

VI. GAS PURIFACTION SYSTEM

What Is the Biogas Purification Process? Biogas purification can take several forms. Here are a few of the most common: Water Scrubbing CO2 and H2S are more soluble in water than CH4. Before contact, the biogas is compressed under pressure. Methane, or at least the lion's share of it, rises to the top of the solution where it is then collected. The liquid remainder undergoes treatment in a flash tank that recovers any leftover methane. Pressure Swing Adsorption The unwanted gases are adsorbed by a vessel under high pressure. This biogas purification technology collects CH4 at the top after which pressure is lowered thereby releasing the CO2, N2 and O2. Think fly paper that will stick and unstick on command. Amine Solvents AT the start of purification biogas is run through a column containing amines, i.e. derivatives of ammonia that, as solvents, capture the CO2 and absorb it. After the purified CH4 is separated, the CO2-saturated solvents are steam-flushed at a high temperature to be used again. Membrane Permeation Methane gas has a low permeability while the accompanying gases have high permeability. Use of a membrane under specific pressure conditions allows the less desirable gases to pass through as the methane is restricted and collected at the end of a cylindrical column.

VII. PRODUCT FROM BIOGAS OVERVIEW



VIII. CONCLUSION

Biogas technology is a promising venture globally mainly because of the existence of mature production technologies and applications as well as promising future technologies. Biogas technology is viable and sustainable due to the abundant supply of cheap feedstocks and availability of a wide range of biogas applications in heating, power generation, use as fuel, and raw material for further processing and production of sustainable chemicals including hydrogen and carbon dioxide and biofuels. The flexibility of biogas production in terms of size from small-scale to large-scale industrial size digesters and a wide range of feasible feedstock allows to produce biogas anywhere globally. Biogas production and use is growing globally and is promising to be a leading economical alternative to produce

renewable bioenergy. Biogas is a versatile fuel as it generates less greenhouse gas emission, it is renewable as it is generated from renewable sources, and its production can be used to treat and reduce the organic waste quantity for disposal while disinfecting pathogens in biomass and has a wide portfolio of energy applications in electricity, heat, and cooling applications. Biogas yield from biomass can be increased by appropriate pretreatment of the substrate and monitoring of digestion parameters like C/N ratio, temperature, and substrate dilution. Various biogas to many electricity conversion technologies are available, but trigeneration and combined heat and power show higher conversion efficiencies while fuel cells have the highest level of system reliability. Other technologies identified and proposed include small gas turbine and microgas turbine diesel engines, gasoline engines, Stirling engines, fuel cells, biomethane conversion, biofuel processing, and hydrogen production. Biogas as a fuel presents significant opportunities for direct and indirect use in electricity and heat production in the sustainable energy transition. By application in power generation and fuel production, biogas acts as a substitute for fossil fuels in electricity generation and thermal applications. Through grid electricity generation and supply, biogas has a special role to play in decentralized generation and where investors are both producers and consumers also called prosumers, and hence, biogas energy has a significant role to play in the economic sustainability of the global energy transition.

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