Bio CNG from ligno-cellulosic waste for deployment under the National SATAT program

What is Bio CNG?

Bio-CNG is the purified and compressed form of biogas with more than 90% of methane content. The purification of biogas is essential to increase its energy potential. It is clean renewable fuel with calorific value and other properties similar to CNG. Hence Bio-CNG(CBG) can replace CNG in industries, automobiles, and domestic & commercial use.

Properties of Bio-CNG

In comparison of both, which has a methane content of 92–98% and a carbon dioxide content of 35–45%, biogas has a methane content of 55–65% and a carbon dioxide content of 2–8%. Bio-CNG has roughly 52,000 kilojoules (kJ) per kg or about 167 per cent more calories per weight than biogas. Due to its high methane content, calorific value, low moisture, hydrogen sulphide, and impurity content, bio-CNG is the finest fuel for vehicles and power plants. Additionally, due to its low emission levels, It is a more environmentally friendly fuel than biogas.

What is required to produce Bio-CNG?

It is produced through the decomposition of biogenic waste in the absence of oxygen. Biogenic waste is a broad term used for waste generated by plants and animals. The biomass is cleaned/scrubbed to get the desired quality of Biogas.

The following are the substrates of Bio-CNG generation: animal waste, plant waste and municipal solid waste.

Sources of animal waste:

- Dairy Farms
- Poultry Farms
- Other Animal Husbandry

Sources of plant/ farm waste:

- Paddy Straw
- Fodder Crop
- Napier Grass
- Solid Organic Waste

Rice straw, a substantial substrate for Bio-CNG production.

The need for producing non-conventional energy is rising significantly, particularly with biomass resources. The production of energy from these resources is based on non-polluting and inexhaustible energy production. In today's world, one of the most common sources of bioenergy is rice straw. Rice straw represents a substantial substrate for biofuel production. Using rice straw does not affect the food chain as it is an inedible component. Therefore, utilizing this waste for energy production is essential in achieving renewable energy goals. Use of rice straw for biogas generation can generate a positive net energy balance.

GPS Renewables leveraged technology for enhanced anaerobic digestion and biogas generation from rice straw developed by MACS-Agharkar Research Institute.

MACS-Agharkar Research Institute (MACS-ARI), Pune is an autonomous institute of DST, Government of India. ARI has the know-how for the technology related to the enhanced anaerobic digestion and biogas generation from rice straw.

GPS Renewables (GPSR) is India's premier Full Stack Clean Fuels Technology & Engineering company, specialising in RNG/CBG, 2G Ethanol, and Green Hydrogen.

Arrangement between MACS-ARI and GPS Renewables

MACS-ARI and GPSR agreed to carry out collaborative work on improvement, demonstration, and 1. scaling up MACS-ARI's technology to make commercially viable products/ processes. ARI and GPSR signed the technology transfer and collaboration agreement on 18th Nov 2022.

TechEx.in- Technology Transfer Office and its role

TechEx.in is a regional technology transfer office based in western part of India. It aims to help technology developers and technology commercialisation entities find each other, forge partnerships and advance the technology closer to the market in a win-win partnership.

TechEx.in has played an important role in finalizing the term sheet for know-how transfer, deal structuring, and agreement drafting.

Impact

Technology transfer for biogas generation from ligno-cellulosic straws/ stems was important for GPS renewables's efforts in converting agro-based waste into bio CNG. GPS Renewables is India's leading Full Stack Renewable Fuels company providing end-to-end solutions for the development, production, and distribution of green fuels with a focus on Biogas, BioCNG, Ethanol and Green Hydrogen.
MACS-ARI and GPSR is conducting breakthrough research with the objective of developing resource-efficient 'Bio-based Pre-treatment Systems' for BioCNG production. These systems are proposed to use anaerobic fungi for efficient breakdown of lignocellulosic biomass.
New knowhow acquired by GPSR from MACS-ARI have further strengthened GPSR's product portfolio for clean fuel having a long lasting climate impact that will help in crafting a green future.
GPSR is currently associated with projects of Reliance and Indian Oil Corporation at Barabanki, UP.

Step towards achieving National Mission: SATAT Program

National SATAT program: The SATAT Scheme (Sustainable Alternative Towards Affordable Transportation) is an initiative by the government of India with the objective of setting up Compressed Biogas production plants, and make it available for market use for automotives by inviting expression of interest through potential investors. SATAT' scheme on Compressed BioGas (CBG) encourages entrepreneurs to set up CBG plants, produce & supply CBG to Oil Marketing Companies (OMCs) for sale as automotive & industrial fuels.
https://satat.co.in/satat/#/

Relevant news coverage:

1) https://www.thehindubusinessline.com/companies/ioc-to-form-jvs-with-everenviro-gps-renewables-to-set-up-cbg-plants/article67361467.ece
2) https://www.thehindubusinessline.com/news/biomass-industry-in-india-is-finally-on-the-move/article67254628.ece

References:

1) https://nugreenenergy.in/bio-cng.php
2) https://nexgenenergia.com/bio-cng