



Benefits of Biogas

For Prelims: Biogas, Sustainable Development Goals, compressed biogas (CBG), liquefied biogas (LBG), hydrogen and methanol, Sustainable Alternative Towards Affordable Transportation (SATAT).

For Mains: Significance of Biogas.

Why in News?

Countries around the world are turning to [biogas](#) and biomethane to enhance their energy security.

What is Biogas?

▪ About:

- **Biogas**, a renewable fuel produced using the **anaerobic digestion** process from organic feedstock, is primarily composed of methane (50-65%), carbon dioxide (30-40%), hydrogen sulfide (1-2.5%) and a tiny fraction of moisture.
- It contributes to all 17 of the United Nation's [Sustainable Development Goals](#) and can also be converted to produce numerous sustainable transportation fuels.

▪ Variants:

- **Compressed Bio Gas (CBG):** The upgraded or high-purity biogas (after removal of unwanted components like carbon dioxide, hydrogen sulphide and moisture) compressed at 250 bar pressure results in a fuel called **compressed biogas (CBG)**. This has properties similar to **compressed natural gas (CNG)** and could be directly used to power CNG engines.
 - **Drawback:** Its existence in the gaseous form, which demands bigger volumes for transportation. Therefore, it is considered more suitable to power small-sized vehicles, though heavy engines have been used for short-distance driving.
- **Liquefied Bio Gas (LBG):** If the biogas-derived methane is liquefied by cooling it at -162 degrees Celsius, the fuel thus obtained is **liquefied biogas (LBG)**. It has a higher energy density that lowers storage space requirements.
 - At atmospheric pressure, the energy density of liquid methane is roughly 600 times more than that of gaseous methane and 2.5 times greater than that of methane at 250 bar.
 - **Advantages:** It can become a viable **alternative fuel for heavy-duty road transportation** since it has a comparatively high energy density.
 - It is becoming attractive to the shipping industry in addition to being utilised in heavy-duty vehicles.

▪ Applications:

- Biogas can be converted to produce numerous sustainable transportation fuels.
- In addition to being used directly as fuel, biomethane can also be **transformed into other fuels such as hydrogen and methanol**. The primary method for producing hydrogen encourages the reforming of light hydrocarbons, particularly methane, which makes up a significant portion of biogas.
- Gasification is performed by limiting the amount of oxygen and steam present in the

reaction and heating the bio-methane to high temperatures (usually over 600°C).

- **Syngas**, a mixture of hydrogen and carbon monoxide, is created as a result of this process. The hydrogen produced after the removal of carbon monoxide could be used in fuel cells to generate power.
- Methanol can also be generated from syngas. **Methanol** is an effective fuel; it emits less particulate matter and nitrogen oxide (NO_x) than gasoline. It can be used also as a transportation fuel by blending or entirely replacing gasoline. It's more affordable than LNG.

What is the Indian Scenario regarding Biogas and Methanol?

- CBG is the only transportation fuel from biogas for which commercialisation efforts have been made.
- Currently, LBG, hydrogen and methanol are not produced from biogas in India. The main reasons are:
 - Unavailability of biogas in bulk for such derivatives,
 - Absence of infrastructure to generate and market these fuels,
 - Deficiency of modified automobile engines as well as the lack of effective. Research and development push to improve process economics.
- **Government Initiatives:** The Indian government has been encouraging private businesses to set up CBG plants and provide CBG to oil marketing companies for sale as automotive and industrial fuels under the **Sustainable Alternative Towards Affordable Transportation (SATAT) scheme** launched in 2018.
 - Further, the Indian government and **Niti Aayog** have outlined roadmaps to hasten our transition towards green fuels and promote LNG, hydrogen and methanol.

Source: [DTE](#)

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