Biogas Energy

For Prelims: fossil fuels, climate change, methane, Greenhouse Gas, dengue fever, malaria, air pollution, renewable sources, water pollution, deforestation, carbon dioxide, SDG

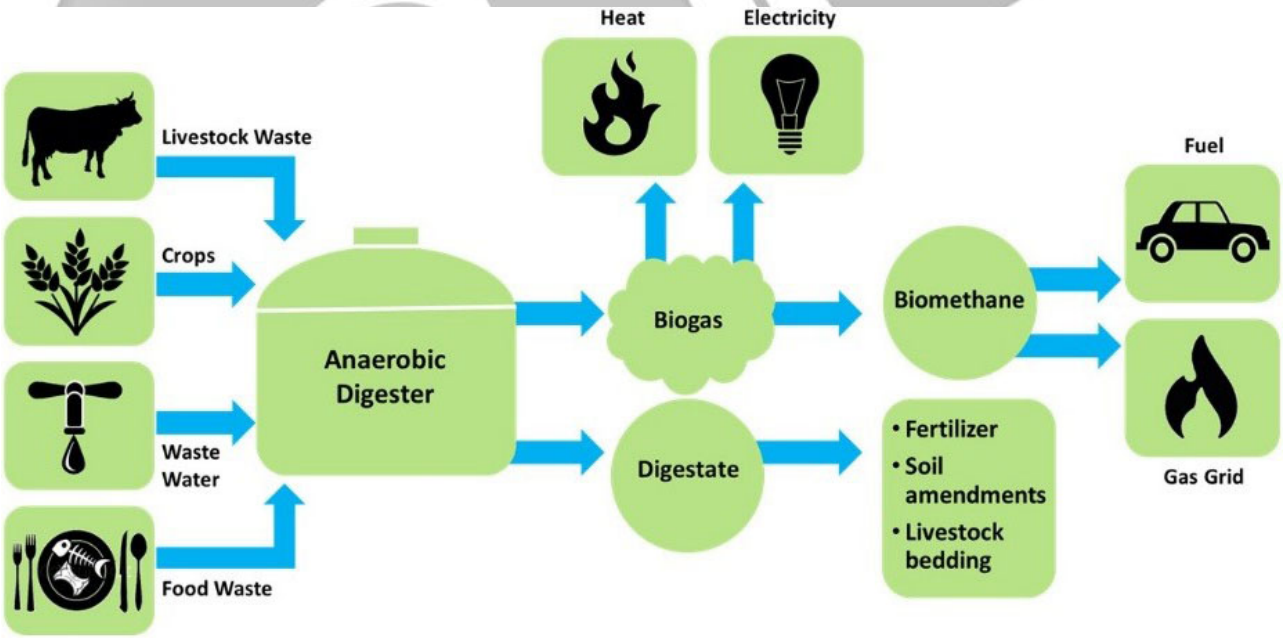
For Mains: Biogas Energy and its significance

Why in News?

Recently, the Noida authority announced that they might shift the plant to another location that was supposed to be the site for a Sewage Treatment Plant (STP) after residents protested against the setting up of an **Automatic Compressed** Biogas **(CBG) plant.**

What is Biogas?

- It mainly comprises **hydro-carbon which is combustible** and can produce heat and energy when burnt.
- Biogas is produced through a **biochemical process** in which certain types of bacteria **convert the biological wastes into useful bio-gas.**
- Since the useful gas originates from a biological process, it has been termed as bio-gas.
    - **Methane gas** is the main constituent of biogas.



What are the Issues Related to Biomass?

- **Pollution:**

    - Pollution caused by **burning wood,** fossil fuels **and other materials** (like refuse-derived fuel utilised in waste-to-energy plants) to produce energy for cooking, heating and lighting is **one of the major roadblocks to improving health and quality of life for people.**
    - Pollutants emitted due to the burning of fossil fuels and biomass not only affect the health of people but are **also responsible for** climate change.
- **Waste Generation:**
    - Every year, **India generates almost 62 million tonnes of Municipal Solid Waste (MSW)**, roughly half of which is organic in nature.
    - This **organic fraction of MSW decomposes to produce** methane, when disposed improperly like in landfills.
    - **Disposing of organic wastes in landfills or burning trash** is an environmental as well as health hazard. Apart from causing Greenhouse Gas (GHG) **emissions,** such unscientific waste disposal leads to diseases like dengue fever **and** malaria.
- **Caused Health Hazard:**
    - **Many chronic illnesses like asthma, emphysema, cancer and heart disease** have also been linked to **air pollution** by numerous studies.

What is the Significance of Biogas Adoption?

- **Pollution Free Cities:**
    - The biogas solution can **help make our cities clean and pollution-free.**
        - Leaching of toxic substances from landfills contaminates the groundwater.
        - Decomposing organic matter releases huge amounts of methane into the environment, causing air pollution and global warming as methane is a very potent GHG.
- **Handling Organic Waste:**
    - Installing large-scale municipal biogas systems **can help cities handle organic waste efficiently to overcome the environmental and socio-economic challenges** posed by overburdened landfills.
    - Municipal waste can be **fed into these plants to create clean and green fuel**, along with biofertilizers, while keeping the cities clean and hygienic.
- **Helpful for Women:**
    - Switching to biogas **could be good for women** because they won't be exposed to **harmful smoke and pollution.**
        - Over **four million people die every year** all over the world due to high levels of indoor air pollution caused by the burning of fossil fuels and biomass.
        - The **female members of a household are affected by indoor pollution** as they spend more time inside the house.
- **Will Transform Energy Dependence:**
    - Biogas **can play a critical role in transforming the energy dependence** of rural and agricultural communities, which majorly depends on burning wood, dung, charcoal, coal and other fossil fuels for their energy needs.
        - Only 26.53% of the total power generated in India is from **renewable sources.**
        - The high dependence on non-renewable sources is the leading cause of the long-standing energy problems in the country.
- **Addresses Handling of Livestock Manure:**
    - Installing biogas plants at the **micro- and macro-level can address the critical issues of handling livestock manure and agricultural wastes,** deteriorating soil quality, water pollution **and** deforestation.
- **Reduces Carbon Dioxide Emissions:**
    - A fully functional biogas digester, for every tonne of feedstock processed, **can reduce approximately 2.83 tonnes of** carbon dioxide **emissions in a year.**
    - Using biogas digesters to convert organic waste into clean energy **can significantly contribute to countering challenges like pollution, climate change, livelihood inequalities** and health in individual households as well as entire communities.
- **Will Improve Soil Quality:**
    - The **digestate**, a by-product generated in the biogas plants, can be used as a biofertilizer as it is rich in organic content and revitalises the soil.
        - The digestate is rich **in micro- and macro-nutrients** required by the plants and

can **replace the synthetic fertilisers** that deteriorate the soil quality over time.

- **Reduce Gender Inequalities:**
  - Biogas can also **help in reducing gender inequalities** and empowering women, which, in turn, will improve the quality of lives.
  - As rural households gain access to biogas as cooking fuel, **women and girls** do not need to spend time collecting firewood and other fuel and can utilise this spare time for **education, acquiring new skills, and community work.**
  - Acquiring new skills will eventually **enable them to have access to new employment and business opportunities** that help them to be financially independent and have more decision-making power in the household.
- **Can be Helpful in Achieving SDG Goal:**
  - Biogas can **significantly contribute to achieving several UN-mandated** Sustainable Development Goals (SDG) such as zero hunger, good health and wellbeing, gender equality, clean water and sanitation, sustainable, affordable and clean energy, decent work and economic growth, reduced inequalities, sustainable cities and communities, and climate action.

What are the Related Initiatives taken by the Government?

- **SATAT :**
  - SATAT stands for **Sustainable Alternative Towards Affordable Transportation.**
  - It is an initiative 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.

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Q. Consider the following: (2019)

1. Carbon monoxide
2. Methane
3. Ozone
4. Sulphur dioxide

Which of the above are released into the atmosphere due to the burning of crop/biomass residue?

(a) 1 and 2 only
(b) 2, 3 and 4 only
(c) 1 and 4 only
(d) 1, 2, 3 and 4

Ans: (d)

- Crop residue and biomass burning (forest fires) is considered as a major source of Carbon Dioxide (CO_2), Carbon Monoxide (CO), Methane (CH_4), volatile organic compounds (VOC), and Nitrogen Oxides (NOX). Burning of rice crop residue releases Suspended Particulate Matter, SO_2 , NO_2 and O_3 in the atmosphere.

Source: DTE