Tackling Methane Emission

This editorial is based on *"Don't Ignore Methane, The More Potent Greenhouse Gas"* ***which was published in Hindustan Times on 14/04/2022. It talks about the sources and impacts of methane emissions.***

For Prelims: Methane Emissions, Global Methane Pledge, COP26 in Glasgow, UN Food Systems Summit, UN's Koronivia Joint Work on Agriculture initiative, Harit Dhara Initiative

For Mains: Methane Emissions - Impact, Agriculture and Methane Emissions, Initiatives to Curb Methane Emissions

Methane is a rapidly accelerating part of the climate problem. It is the **primary component of natural gas**, and it **warms the planet more than 80 times as quickly** as a comparable volume of atmospheric CO_2 over a comparable amount of time

Methane receives much less attention than carbon dioxide, but it's **recently been in the news due to the** conflict in Ukraine and due to new research on **leakage of the gas in the Permian Basin** — a fossil fuel-rich part of the United States (US).

Although methane is rising in the atmosphere, there's no consensus among scientists on how much methane is coming from various sources.

Why is Methane More Harmful?

- Methane is an invisible gas that can **significantly exacerbate the climate crisis**. It is a hydrocarbon that is a major constituent of natural gas **used as fuel to run stoves, heat homes**, and also to power industries.
- Methane can be thought of as a **thicker blanket than carbon dioxide** — one that is **capable of warming the planet to a greater extent in a shorter period**.
    - It has an immediate effect on warming the planet. However, unlike carbon dioxide which remains in the atmosphere for hundreds of years, methane **exerts its warming effects for roughly a decade.**
- Methane pollution, which is a **primary component of ground-level ozone** and emitted alongside toxic chemicals such as benzene, has been **linked to heart disease, birth defects, asthma and other adverse health impacts.**

What are the Sources of Methane?

- **Biological Sources:** There are biological sources of methane - it is made from some organic

compounds by **methane-generating microbes known as methanogens**.

    - Methanogens are found in various natural environments **where little or no oxygen is present**.
        - Such environments include **wetlands, landfills that are not well vented, and submerged paddy fields.**
- **Agriculture:** Agriculture is the predominant source of global methane emissions. Livestock emissions – from **manure and gastroenteric releases** – account for roughly **32% of human-caused methane emissions.** Cows also belch out methane.

    - **Paddy rice cultivation** – in which flooded fields prevent oxygen from penetrating the soil, creating ideal conditions for methane-emitting bacteria – **accounts for another 8% of human-linked emissions.**
- **Emissions from Fuel and Industries:** Fugitive emissions of methane from **gas, coal, and oil sites** are contributing to the climate crisis, but the extent of leakage of this potent greenhouse gas has been difficult to determine.
    - Methane leakage **occurs at every stage of the supply chain** from extraction and transport to use in homes and industries.
    - Much of the methane **being released is due to "ultra-emitters",** which spew out copious amounts of the gas.

Recent Emissions from Permian Basin -

- Findings from helicopters and drones armed with infrared cameras, and satellite images have shown **larger amounts of leakage of methane from the Permian Basin** in Texas and New Mexico, US.
- A new study in the journal *Environmental Science & Technology* has estimated over **9% of gas production in the Permian Basin being leaked as emissions,** in contrast to the 1.4% predicted by the *US Environmental Protection Agency.*

What has been Done to Curb Methane Emissions?

- **COP 26 Pledges:** At COP26 in Glasgow, over 100 countries signed an **agreement to cut methane emissions by 30% by 2030** as methane might be easier to deal with than carbon dioxide (which is more deeply embedded in the global economy).

    - Ahead of this agreement, the US President announced the Global Methane Pledge, which is an US-EU led effort to cut methane emissions by a third by the end of this decade.
- **MethaneSAT:** Controlling methane emissions will require further scrutiny of its sources. To this end, satellites that will **track methane leakage** such as **MethaneSAT have been planned to launch**.

    - MethaneSAT is a planned **American-New Zealand space mission** scheduled for launch later in 2022.
    - It will be an Earth observation satellite that will monitor and study global methane emissions in order to combat climate change.
- **UN Initiatives:** The **UN Food Systems** Summit in September 2021 was also aimed at helping make **farming and food production more environmentally friendly.**

    - The **UN's Koronivia Joint Work on Agriculture initiative** is supporting the transformation of agricultural and food systems, focusing on how to maintain productivity amid a changing climate.
- **India's Initiative:** Central Salt & Marine Chemical Research Institute (CSMCRI) in collaboration with the country's three leading institutes developed a seaweed-based animal feed additive formulation that aims to reduce methane emissions from cattle and also boost immunity of cattle and poultry.

What is the Significance of Curbing Methane Emissions?

- Human-caused methane emissions **could be reduced by as much as 45%** within the decade.
    - This would **avert nearly 0.3°C of global warming by 2045,** helping to limit global temperature rise to 1.5˚C and putting the planet on track to achieve the Paris Agreement targets.
- Every year, the subsequent reduction in ground-level ozone would also **prevent 260,000 premature deaths,** 775,000 asthma-related hospital visits, 73 billion hours of lost labour from extreme heat and **25 million tonnes of crop losses.**

What Measures can be taken Further to Reduce Methane Emissions?

- **In the Energy Sector:** Methane emissions occur along the entire oil and gas supply chain, but especially from fugitive emissions from leaking equipment, system upsets, and deliberate flaring and venting.
    - Existing cost-effective solutions can help reduce emissions, including **initiating leak detection and repair programs,** implementing **better technologies and operating practices,** and capturing and utilising methane that would otherwise be wasted.
- **In Agriculture:** The farmers can **provide animals with more nutritious feed** so that they are larger, healthier and more productive, effectively producing more with less.
    - **Indian Council of Agricultural Research (ICAR)** has developed an **anti-methanogenic feed supplement** 'Harit Dhara' (HD), which can cut down cattle methane emissions by 17-20% and can also result in higher milk production.
    - When it comes to staple crops like paddy rice, experts recommend **alternate wetting and drying approaches that could halve emissions**.
        - Rather than allowing the continuous flooding of fields, paddies could be irrigated and **drained two to three times throughout the growing season,** limiting methane production without impacting yield.
            - That process would also require one-third less water, making it more economical.
- **In the Waste Sector:** The waste sector **accounts for around 20% of global human-caused methane emissions.**
    - The cost-effective mitigation solutions with the **greatest potential related to separating organics** and recycling also have the potential of creating new jobs.
        - Upstream avoidance of food loss and waste is also key.
    - Additionally, **capturing landfill gas and generating energy** will reduce methane emissions, displace other forms of fuels and create **new streams of revenue.**
- **Role of Government:** The Government of India should envision a food system transition policy to help its people grow and consume food differently.
    - Instead of working in silos, the government must develop a **comprehensive policy that moves farmers to sustainable modes** of plant-based food production, **diverts subsidies from industrial livestock production** and its associated inputs, and looks at **job creation, social justice, poverty reduction, animal protection and better public health** as multiple aspects of a single solution.

Drishti Mains Question

Discuss the major impacts of methane emissions and suggest measures that can be taken to reduce the emissions of methane.

UPSC Civil Services Examination, Previous Year Questions (PYQs):

Q. With reference to two non-conventional energy sources called 'coalbed methane' and 'shale gas', consider the following statements: (2014)

1. Coalbed methane is the pure methane gas extracted from coal seams, while shale gas is a mixture of propane and butane only that can be extracted from fine-grained sedimentary rocks.
2. In India, abundant coalbed methane sources exist, but so far no shale gas sources have been found.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans: (d)

Q. Which of the following statements is/are correct about the deposits of 'methane hydrate'? (2019)

1. Global warming might trigger the release of methane gas from these deposits.
2. Large deposits of 'methane hydrate' are found in Arctic Tundra and under the sea floor.
3. Methane in atmosphere oxidises to carbon dioxide after a decade or two.

Select the correct answer using the code given below:

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

Ans: (d)

Q. Consider the following: (2019)

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

Which of the above are released into 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)

Q. In the cities of our country, which among the following atmospheric gases are normally considered in calculating the value of Air Quality Index? (2016)

1. Carbon dioxide
2. Carbon monoxide
3. Nitrogen dioxide
4. Sulphur dioxide
5. Methane

Select the correct answer using the code given below:

(a) 1, 2 and 3 only
(b) 2, 3 and 4 only
(c) 1, 4 and 5 only
(d) 1, 2, 3, 4 and 5

Ans: (b)