



Black Carbon Emissions and PMUY

For Prelims: [Black Carbon](#), [Carbon Neutrality](#), [Renewable Energy](#), [Biomass](#), [Climate Change](#), [Air Pollution](#), [Global Warming](#), [Fossil Fuel](#), [Air Pollutant](#), [Pradhan Mantri Ujjwala Yojana \(PMUY\)](#), [Liquefied Petroleum Gas \(LPG\)](#), [Ujjwala 2.0](#), [BS-VI norms](#), [Ethanol Blending](#), [Sustainable Alternative Towards Affordable Transportation \(SATAT\)](#), [Compressed Bio-Gas \(CBG\)](#), [National Clean Air Programme](#), [FAME Scheme](#).

For Mains: Contribution of Pradhan Mantri Ujjwala Yojana (PMUY) in India's effort to achieve net zero emission.

Source: [TH](#)

Why in News?

During the **UNFCCC COP26 climate talks** in **Glasgow** in **November 2021**, India committed to attaining **net-zero emissions** by **2070**, positioning itself as a leading contender in the pursuit of **carbon neutrality**.

- As per the **Ministry of New and Renewable Energy**, India has established a renewable energy capacity surpassing **180 GW by 2023** and is on track to achieve its goal of reaching **500 GW by 2030**.
- **Pradhan Mantri Ujjwala Yojana (PMUY)**, a scheme of the government of India can contribute to **net zero emission** significantly by mitigating the black carbon emission.

What is Black Carbon (BC)?

- **About:**
 - **Black carbon (BC)** is the **dark, sooty material** emitted alongside other pollutants when **biomass** and **fossil fuels** are not fully combusted.
 - BC is a short-lived pollutant that is the second-largest contributor to warming the planet behind **carbon dioxide (CO₂)**.
 - Unlike other **greenhouse gas emissions**, BC is quickly washed out and can be eliminated from the atmosphere if emissions stop.
 - Unlike historical carbon emissions it is also a localised source with greater local impact.
 - Black carbon is a kind of an aerosol.
- **Impacts:**
 - Among aerosols (such as brown carbon, sulphates), Black Carbon has been recognized as the second most important anthropogenic agent for **climate change** and the primary marker to understand the adverse effects caused by **air pollution**.
 - Black carbon absorbs solar energy, it warms the atmosphere. When it falls to earth with precipitation, it darkens the surface of snow and ice, reducing their albedo (the reflecting power of a surface), warming the snow, and hastening melting.
 - It contributes to **global warming** and poses severe risks. Studies have found a direct link between exposure to **black carbon** and a higher risk of **heart disease, birth complications, and premature death**.

▪ Source:

- Most **black carbon emissions** in India arise from **burning biomass**, such as **cow dung** or **straw**, in traditional **cookstoves**.
- It gets emitted from **gas** and **diesel engines, coal-fired power plants**, and other sources that burn **fossil fuel**. It comprises a significant portion of **particulate matter (PM)**.
- According to a 2016 study, the **residential sector** contributes **47%** of India's total black carbon emissions.
- Industries contribute a further **22%**, **diesel vehicles 17%**, **open burning 12%**, and other sources **2%**.

What is Pradhan Mantri Ujjwala Yojana (PMUY)?

▪ About:

- The Ministry of Petroleum and Natural Gas (MoPNG), introduced the '**Pradhan Mantri Ujjwala Yojana**' (**PMUY**) in 2016 as a flagship scheme with the objective of making clean cooking fuel such as LPG available to the rural and deprived households which were otherwise using traditional cooking fuels such as firewood, coal, cow-dung cakes etc.
 - Usage of traditional cooking fuels had detrimental impacts on the health of rural women as well as on the environment due to huge emission of particulate matter and black carbon.

▪ Objectives:

- Reducing the number of deaths in India due to unclean cooking fuel which emits more black carbon.
- Preventing young children from a significant number of acute respiratory illnesses caused due to indoor air pollution by burning fossil fuel and black carbon emission.
- To make clean cooking fuel available to rural and poor households and reduce their dependence on traditional cooking fuels.
- To set up infrastructure to accompany LPG connections, which includes providing complimentary gas stoves, deposits for LPG cylinders, and establishing a distribution network.

▪ Features:

- The scheme provides a financial support of **Rs 1600 for each LPG connection** to the BPL households.
- Along with a deposit-free LPG connection, **Ujjwala 2.0** provides the first refill and a hotplate free of cost to the beneficiaries.

▪ Challenges of the Scheme in BC Emission Mitigation:

- **Energy Needs and Traditional Fuels:** Up to half of the energy needs of households benefiting from the PMUY are still met by traditional fuels, emitting high levels of black carbon.
 - In 2022-23, **25%** of all **PMUY beneficiaries** availed either **zero LPG refill** or only **one LPG refill**, according to **RTI data**, meaning they still relied entirely on **traditional biomass** for cooking which aggravates the emission of black carbon.
- **Impact on Health and Well-being:** A shortage of LPG and increased reliance on traditional fuels disproportionately affects women and children, leading to elevated indoor air pollution due to black carbon and other pollutants, health concerns, and premature deaths.
- **LPG Subsidy and Affordability:** In October 2023, the government increased the LPG subsidy to ₹300 from ₹200. However, despite this adjustment, the cost of a 14.2-kg LPG cylinder remains around ₹600, posing affordability challenges for many PMUY beneficiaries compared to free alternatives like cow dung and firewood.
 - Cow dung and firewood are more affordable to PMUY beneficiaries so its use is more prevalent, intensifying the problem of black carbon.
- **Last-Mile Connectivity Hindrance:** The lack of last-mile connectivity in the LPG distribution network poses a significant challenge to the success of PMUY in reducing the black carbon emission, especially impacting remote rural areas heavily reliant on biomass burning which is a significant source of black carbon.

Other Measures Taken to Mitigate Black Carbon Emission

- **Introducing Cleaner Fuels:** Introduction of cleaner / alternate fuels like gaseous fuel (CNG, LPG etc.), [ethanol blending](#).
- **SATAT Scheme:** A new initiative [Sustainable Alternative Towards Affordable Transportation \(SATAT\)](#), has been launched to set up 5000 [Compressed Bio-Gas \(CBG\)](#) production plants and make CBG available in the market for use.
- **Managing Crop Residue:** Agricultural machines and equipment for in-situ crop residue management in Punjab, Haryana, Uttar Pradesh and NCT of Delhi are promoted under the Central Sector Scheme on Promoting Agricultural Mechanization for in-situ Crop Residue Management with 50% subsidy to individual farmers and 80% subsidy to the establishment of Custom Hiring Centers.
- **National Clean Air Programme:** Under the [National Clean Air Programme](#), the government has set a new target: a **40%** reduction in particulate matter concentration in covered cities by **2026**, surpassing the previous goal of **20 to 30%** reduction by **2024**.
- **City specific Clean Air Action Plans:** The [CPCB](#) has identified 131 cities based on ambient air quality levels exceeding national ambient air quality standards, and cities with a million plus population.
 - These plans define time bound targets to control city specific air polluting sources (soil & road dust, vehicles, domestic fuel, municipal solid waste burning, construction material and industries, etc.).
- **FAME Scheme:** [Faster Adoption and Manufacturing of Electric Vehicles \(FAME\)](#) phase-2 scheme has been rolled out.

Way Forward

- **Coal-Bed Methane:** One potential solution to this issue is the local production of coal-bed methane (CBM) gas by composting biomass. CBM is a much cleaner fuel with lower black-carbon emissions and investment.
 - Panchayats can take the initiative to produce CBM gas locally at the village level, ensuring every rural household can access clean cooking fuel.
- **Promoting LPG Adoption:** Increase awareness campaigns to promote the benefits of LPG over traditional fuels, emphasising its positive impact on health and the environment.
- **Improving Supply Chain Efficiency:** Invest in infrastructure development to enhance **last-mile connectivity** in the **LPG distribution network**, ensuring reliable access to **clean cooking fuel**, particularly in **remote rural areas**.
- **Diversifying Clean Energy Sources:** Explore alternative clean energy sources such as biogas or solar energy for cooking purposes, particularly in areas where **LPG accessibility is limited**.
- **Community Engagement:** Engage local communities, especially women and youth, in decision-making processes related to clean energy adoption, ensuring their needs and preferences are adequately addressed.

UPSC Civil Services Examination, Previous Year Questions (PYQ)

Prelims

Q. According to India's National Policy on Biofuels, which of the following can be used as raw materials for the production of biofuels? (2020)

1. Cassava
2. Damaged wheat grains
3. Groundnut seeds
4. Horse gram
5. Rotten potatoes
6. Sugar beet

Select the correct answer using the code given below:

- (a) 1, 2, 5 and 6 only
- (b) 1, 3, 4 and 6 only
- (c) 2, 3, 4 and 5 only
- (d) 1, 2, 3, 4, 5 and 6

Ans: (a)

Mains

Q. Access to affordable, reliable, sustainable and modern energy is the sine qua non to achieve Sustainable Development Goals (SDGs).” Comment on the progress made in India in this regard. **(2018)**

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