GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
RAJYA SABHA
UNSTARRED QUESTION NO. 687
ANSWERED ON 05/02/2026

ASSESSMENT OF CLOUD SEEDING IN DELHI

687. DR. FAUZIA KHAN:

Will the Minister of **EARTH SCIENCES** be pleased to state:

(a) whether Government has reviewed the outcomes of recent cloud-seeding experiment in Delhi, conducted at an expenditure of approximately ₹1.9 crores, in which no significant rainfall was recorded;
(b) if so, whether the Ministry would consider cloud-seeding a sustainable or temporary measure for reducing airborne pollution levels in urban areas; and
(c) the steps being taken to develop long-term atmospheric intervention and air-quality management strategies under the mandate of the Ministry?

ANSWER
THE MINISTER OF STATE (INDEPENDENT CHARGE) FOR
MINISTRY OF SCIENCE AND TECHNOLOGY
AND EARTH SCIENCES
(DR. JITENDRA SINGH)

(a) As approved by the Cabinet vide its Cabinet Decision No. 3200 dated 10.05.2025, Department of Environment, Government of the National Capital Territory of Delhi, in collaboration with the Indian Institute of Technology (IIT) Kanpur, is undertaking a pilot project titled "Technology Demonstration and Evaluation of Cloud Seeding as an Alternative for Delhi NCR Pollution Mitigation." The Department of Environment, GNCTD, so far has paid an amount of Rs. 37,93,420 as the first installment to the Indian Institute of Technology, Kanpur.

(b) At present, the cloud seeding activity is at trial stage with the objective to have one more option to provide relief as an emergency measure during episodic high air-pollution events when conducive cloud cover is present.

(c) The Ministry of Earth Sciences (MoES) is not involved in the ongoing cloud seeding operations in various parts of the country. However, the Indian Institute of Tropical Meteorology (IITM), under the Ministry, conducted a research study on rain enhancement through cloud seeding in the rain shadow region of India during 2017-2019, as part of the Cloud Aerosol Interaction and Precipitation Enhancement Experiment (CAIPEEX) Program. Details of this research project and the outcome of the study are available at

https://www.tropmet.res.in/~lip/Publication/Technical-Reports/CAIPEEX-Report-July2023.pdf .

Air-quality management in the National Capital Region (NCR) is being strengthened through a comprehensive, science-based framework, AIRWISE (Air Quality Warning and Integrated decision Support system for Emissions), developed by IITM, Pune in collaboration with the India Meteorological Department (IMD). This framework integrates advanced monitoring, high-resolution emissions inventories, source apportionment, and predictive modeling. The key steps being undertaken are outlined below:

(i) **Improvement in the Accuracy of Air-Quality Forecasting System**

Efforts are being initiated to explore possibilities for improving the accuracy and reliability of the air-quality forecasting system for the NCR, with a particular focus on $PM_{2.5}$ concentrations. These improvements aim to support proactive air-quality management and timely implementation of control measures under regulatory frameworks such as the Graded Response Action Plan (GRAP). These measures are expected to significantly improve short-term (1–3 day) forecasts, enabling early warnings, informed decision-making, and targeted interventions during pollution episodes.

(ii) **Measurement-Based Source Apportionment of $PM_{2.5}$ in New Delhi**

IITM has carried out near-real-time, measurement-based source apportionment of $PM_{2.5}$ in Delhi in an experimental mode during the post-monsoon and winter seasons of 2025-26. This analysis involves detailed chemical characterization of particulate matter collected at the Atmospheric Chemistry Laboratory in Rajendra Nagar, New Delhi.

(iii) **Strengthening Model-Based Source Apportionment of $PM_{2.5}$ through Measurement Evaluation**

Model-based source apportionment done using the AIRWISE framework is being further strengthened by systematically evaluating and calibrating model outputs against measurement-based source apportionment.

(iv) **Participation in the Development of a Dynamic Emissions Inventory at 500 m Grid Resolution for the Entire NCR**

This inventory aims to reflect current emission patterns with greater spatial and temporal granularity. The project has been funded by the Central Pollution Control Board and supported by the Commission for Air Quality Management (CAQM) in the National Capital Region and the Adjoining Areas. IITM is one of the project partners along with the Automotive Research Association of India (ARAI), the Energy Research Institute (TERI), and the Indian Institute of Technology (IIT), Delhi.

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