Air Quality Forecasts for Delhi

Cambridge Judge Business School

Issue 02
Observations through 15 November 2026
Forecast dates 16–29 November 2026

Introduction

This tracker provides a daily outlook for particulate matter pollution in Delhi during 16–29 November 2026, reporting expected concentrations of PM2.5 and PM10 over the period, alongside the estimated probabilities of exceeding concentration thresholds associated with different levels of air quality.

The forecasts draw on observations through 15 November 2026 from a set of 32 air pollution monitoring stations operating in Delhi. The forecast run was completed on 17 November. The charts and tables show the full 16–29 November model forecast. They cover both daily averages and average station peaks, highlighting periods of intense pollution that daily averages alone can obscure.

Two pollutants and three pollution measures

PM2.5 refers to fine particles with diameters of approximately 2.5 micrometres or less. PM10 includes particles up to approximately 10 micrometres in diameter, including the finer PM2.5 fraction. Concentrations of both pollutants are reported in micrograms per cubic metre of air (μg/m³). The tracker reports three measures for each pollutant:

Daily mean: Station readings are averaged within each qualifying hour to obtain an hourly network mean. These hourly means are then averaged over the day.

Mean of station daily maxima: Each qualifying station's highest hourly concentration over the whole day is identified, and these station maxima are averaged.

Mean of station waking-hour maxima: Each qualifying station's highest hourly concentration between 05:00 and 20:00 IST, inclusive, is identified, and these station maxima are averaged.

Each measure is calculated only when its data-completeness requirements are met. The two maximum-based measures describe average station peak intensity; the peaks can occur at different times at different stations. They are distinct from both the highest individual station-hour reading and the maximum hourly network mean.

Air quality threshold exceedance probabilities

Across 16–29 November 2026, the estimated daily probability that Delhi's network mean PM2.5 exceeds 120 μg/m³ ranges from 78.2% to 96.2%. Concentrations above this threshold fall in the Central Pollution Control Board's (CPCB) "Very Poor" band or worse on the PM2.5 sub-index (AQI above 300). The probability of exceeding 250 μg/m³, the threshold for the "Severe" band (AQI above 400, which is 16.7 times the WHO 24-hour guideline of 15 μg/m³), ranges from 14.1% to 29.5%. It reaches the tracker's 25% warning level on 16, 21, 26 and 28 November.

For PM10 the estimated daily probability of exceeding 350 μg/m³ ranges from 27.8% to 67.9%, exceeding 50% on 16–19 and 21 November. Above 350 μg/m³, the CPCB PM10 sub-index falls

in the "Very Poor" band or worse (AQI above 300). The estimated daily probability that Delhi's network mean PM10 exceeds 430 µg/m³ ranges over 13.0%–29.5% and reaches the tracker's 25% warning level on 16–18 November. This level of concentrations falls in the CPCB's "Severe" band for PM10 (AQI sub-index above 400).

Threshold exceedance probabilities for daily means and warnings: 16–29 November 2026

Pollutant	Concentration threshold (µg/m³)	Probability range	Dates with probability ≥ 25% (count)	Probability above 50%
PM2.5	>120	78.2%–96.2%	16–29 Nov (14)	16–29 Nov
PM2.5	>250	14.1%–29.5%	16 Nov, 21 Nov, 26 Nov, 28 Nov (4)	None
PM10	>350	27.8%–67.9%	16–29 Nov (14)	16–19 Nov, 21 Nov
PM10	>430	13.0%–29.5%	16–18 Nov (3)	None

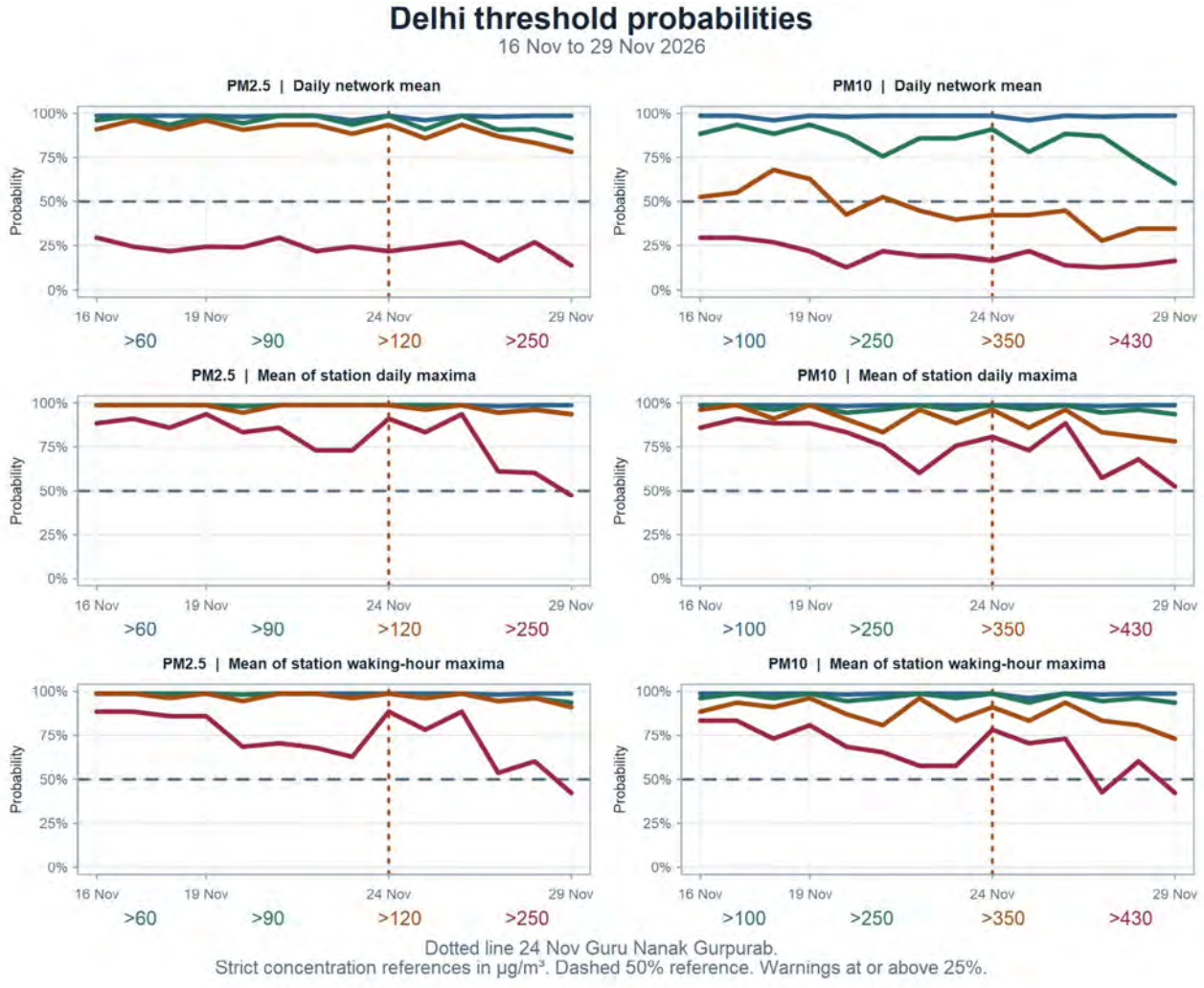


Figure 1. Daily exceedance probabilities for each pollutant and measure.

Note: The reference thresholds are 60, 90, 120 and 250 µg/m³ for PM2.5, and 100, 250, 350 and 430 µg/m³ for PM10. These are the upper 24-hour concentration breakpoints for the Central Pollution Control Board's Satisfactory, Moderate, Poor and Very Poor AQI categories, respectively.

The red curves show the probability of exceeding 250 µg/m³ for PM2.5 and 430 µg/m³ for PM10. For 24-hour concentrations, these are the breakpoints above which the respective CPCB pollutant sub-index enters the "Severe" band. In the four station-peak panels, the same concentrations serve as reference levels for averages of station peaks.

Forecast outlook for daily PM concentrations



Figure 2. Delhi particulate concentrations observed through 15 November and forecast for 16–29 November 2026. Thin black lines show daily observations and thick black lines show centred seven-day averages. Blue lines show the forecasts and blue shading shows exploratory 90% prediction intervals for individual dates.

Delhi's observed daily network mean PM2.5 fell from 272 µg/m³ on 8 November to 114 µg/m³ on 15 November. Over the same dates, PM10 fell from 400 to 191 µg/m³. The forecast starts above the 15 November readings for both pollutants and then eases overall. By 29 November, daily averages are projected to be around 190 µg/m³ for PM2.5 and 325 µg/m³ for PM10, nearly 13 times and about 7.2 times their respective WHO 24-hour guidelines.

Observed means in the two latest weeks

Measure	2–8 Nov	9–15 Nov
PM2.5 Daily network mean	245.4 (7/7)	178.9 (7/7)
PM2.5 Daily maxima	405.5 (7/7)	341.2 (7/7)
PM2.5 Waking-hour maxima	349.8 (7/7)	277.0 (7/7)
PM10 Daily network mean	397.4 (7/7)	281.2 (6/7)
PM10 Daily maxima	615.9 (7/7)	480.5 (7/7)
PM10 Waking-hour maxima	554.9 (7/7)	409.7 (7/7)

Means in µg/m³ over accepted days. Parentheses show accepted days out of seven.

Forecast accuracy

Issue 01 forecast verification, 1–14 November 2026

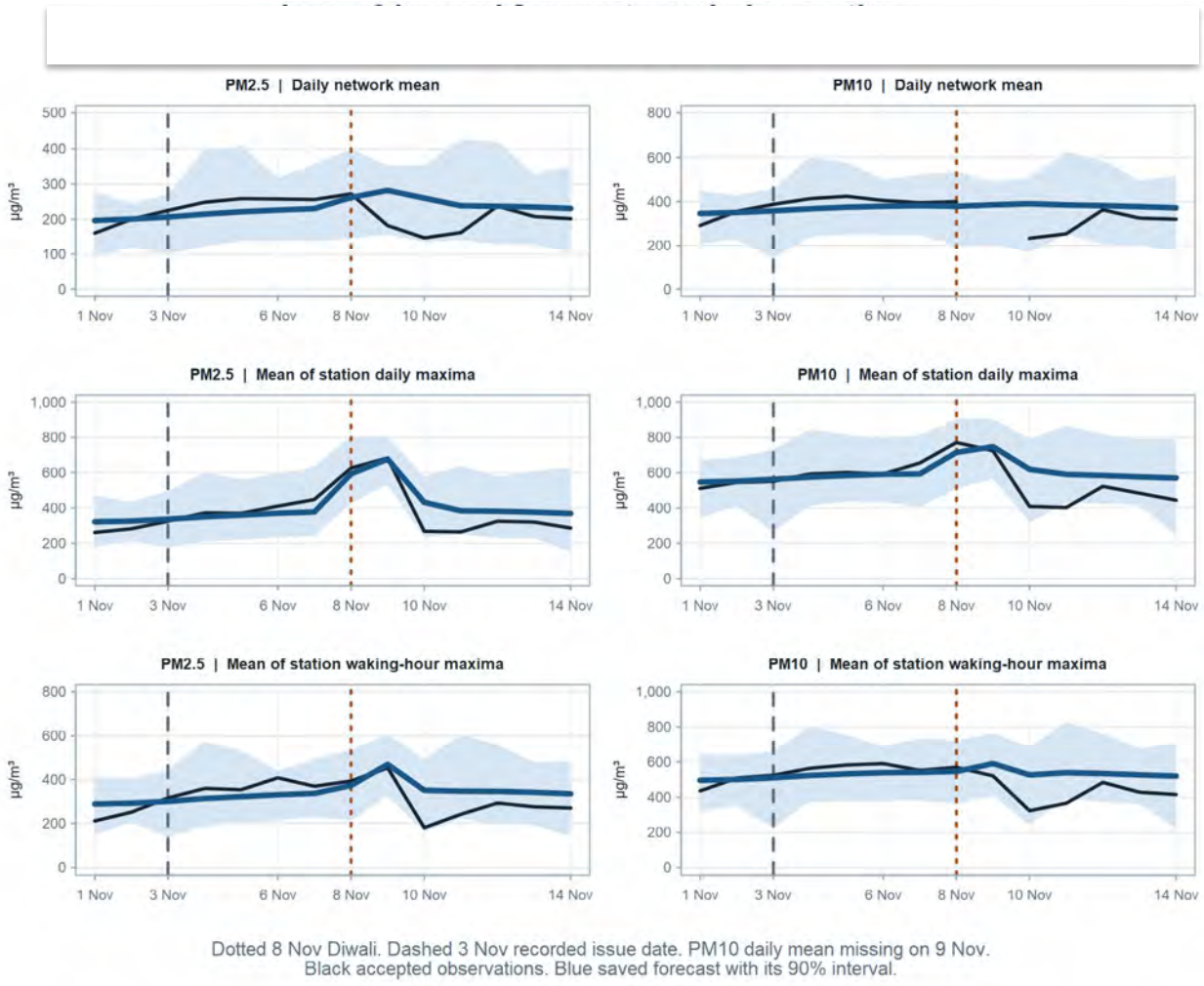


Figure 3. Observed concentrations and the saved Issue 01 forecast for 1–14 November 2026. The forecast used observations through 31 October.

Accuracy of the Issue 01 forecast, 1–14 November 2026

Pollutant and target	Days scored	Bias	MAE	RMSE	WAPE	Inside 90% interval
PM2.5 daily network mean	14	+16.0	38.5	50.7	17.8%	14/14
PM2.5 mean of station daily maxima	14	+29.4	55.6	69.9	14.8%	14/14
PM2.5 mean of station waking-hour maxima	14	+26.4	58.2	70.5	18.6%	14/14
PM10 daily network mean	13	+21.2	50.3	66.4	14.3%	13/13
PM10 mean of station daily maxima	14	+42.9	65.1	91.6	11.7%	13/14
PM10 mean of station waking-hour maxima	14	+39.9	68.5	88.8	14.0%	13/14

Note: Bias, mean absolute error (MAE) and root mean squared error (RMSE) are in µg/m³. Weighted absolute percentage error (WAPE) is expressed as a percentage

How to read the accuracy measures

Bias. The mean of forecast minus observed. Positive values indicate that forecasts ran high on average. Positive and negative errors can cancel.

MAE and RMSE. MAE is the average size of the daily error, regardless of direction. RMSE gives more weight to large errors by squaring them before averaging and taking the square root.

WAPE. Total absolute error divided by total observed concentration, expressed as a percentage. It puts errors in proportion to the observed levels for each target.

Interval coverage. The number of observations inside the saved 90% interval out of the number scored.

Note: The forecasts stayed too high as pollution fell after Diwali. The PM2.5 daily mean peaked at 272.1 on 8 November, while the forecast peaked at 281.8 on 9 November, when the observed mean had fallen to 182.1. The model timed the PM2.5 station daily-maxima peak correctly on 9 November, with 677.4 forecast against 683.9 observed. On 10 November, all six forecasts were higher than actual.

Across the six measures, the 90% prediction intervals contained 81 of the 83 observations with sufficient coverage. For 4–14 November, the dates after the recorded issue date, WAPE ranged from 13.8% to 19.9%. MAE was higher than for the full 1–14 November window for all six measures.

Methods, coverage and sources

Monitoring and target definitions

A daily network mean gives equal weight to qualifying hours. Each qualifying hour averages valid readings from at least 24 stations, and at least 18 hours are required. The two peak-intensity measures average the individual station maxima across at least 24 qualifying stations. The all-day maximum requires 18 valid hours per station. The waking-hour maximum requires 12 of the 16 hourly labels from 05:00 through 20:00 IST.

Calendar adjustments and uncertainty

The baseline combines calendar climatology from a ±9-day window with fitted festival and crop-calendar adjustments. The crop adjustment represents the calendar phase of the paddy season. The model uses those calendar proxies and pollution history.

The calibration provides pointwise 68% and 90% ranges for 84 and 84 of the 84 forecast rows, respectively. The ranges describe uncertainty for individual dates.

Concentration references and official decisions

The thresholds use PM concentration references from the Central Pollution Control Board's 24-hour breakpoints. Official AQI uses pollutant sub-indices and can reflect other pollutants. GRAP actions follow separate decisions by the Commission for Air Quality Management.

Central Pollution Control Board. National Air Quality Index, Table 3.11.

Commission for Air Quality Management. Direction No. 104, Revised Schedule of the Graded Response Action Plan, 29 September 2026.

CAQM Direction No. 104, Revised Schedule of GRAP, 29 September 2026.

World Health Organization. *WHO Global Air Quality Guidelines*, 2021. Table 3.26, recommended guideline levels.

Acknowledgements

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