Conference Abstract

Nadine Saab

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Generator hours and street-level PM2.5 in Beirut: early results from a low-cost sensor network

Beirut relies on a small number of reference air-quality monitors, while thousands of private diesel generators supply electricity during daily power cuts, many of them a few metres from homes. Their contribution to street-level fine particles (PM2.5) has rarely been measured neighbourhood by neighbourhood. This work in progress asks whether a dense network of low-cost sensors can map it. Since March 2026 we have operated 42 low-cost PM2.5 sensors on residential balconies in three neighbourhoods. The sensors were co-located with a reference monitor for six weeks and calibrated with a linear model that corrects for humidity, which raised agreement with the reference from R^2 = 0.62 to 0.89. Generator operating hours were recorded in diaries kept by 120 households. In the first four months, hourly PM2.5 was on average 38% higher during evening generator hours (18:00–24:00) than during daytime hours with grid supply. The full analysis, including seasonal patterns and distance to generators, will be completed by July 2027. These early results suggest that carefully calibrated low-cost networks can reveal sources of pollution that sparse reference monitoring misses, and could help decide where rules on generators are enforced first.

Keywords: air quality; PM2.5; low-cost sensors; diesel generators; Beirut