# SDG: Sustainable Cities and Communities

## Problem Definition: Urban Air Quality Monitoring and Management

Air pollution in urban areas is a significant issue affecting the health and well-being of millions of people worldwide. Poor air quality is associated with a wide range of health problems, including respiratory diseases, cardiovascular conditions, and premature death. The rapid urbanization and industrialization in many cities have exacerbated this problem, leading to increased emissions from vehicles, industries, and other sources.

### Problem Description

The specific problem within SDG 11 (Sustainable Cities and Communities) that needs to be addressed is the lack of real-time, comprehensive air quality monitoring and data-driven management in urban areas. Many cities, especially in developing countries, do not have adequate infrastructure to monitor air quality consistently across different neighborhoods. The existing monitoring stations are often sparse, leading to gaps in data coverage and making it difficult to assess the true extent of air pollution.

### Impact of the Problem

The lack of detailed and real-time air quality data hampers the ability of city authorities to respond effectively to air pollution events. This can result in prolonged exposure to harmful pollutants for city residents, leading to increased public health risks. Additionally, without accurate data, it is challenging to design and implement targeted interventions, such as traffic restrictions, industrial regulations, and public health advisories, which could mitigate the impact of poor air quality.

### Proposed Solution

To address this problem, a data-driven solution that leverages IoT (Internet of Things) sensors, data analytics, and machine learning can be developed. This solution involves deploying a network of low-cost air quality sensors across the city to monitor pollutants such as PM2.5, PM10, NO2, CO, and O3 in real-time. The data collected from these sensors would be stored in a centralized database, where it can be analyzed to identify pollution hotspots, trends, and patterns.

### Benefits of the Solution

The proposed solution will provide city authorities and policymakers with accurate and real-time data on air quality, enabling them to make informed decisions. This could lead to more effective pollution control measures, better public health outcomes, and improved quality of life for urban residents. Furthermore, the data can be used to raise public awareness about air quality issues and encourage community engagement in efforts to reduce pollution.