**Environmental Sustainability Dashboard – A Citywide Environmental Intelligence Platform**

**Objective:**

This project aims to design and develop an interactive dashboard that enables city authorities and environmental agencies to monitor key sustainability indicators. The dashboard consolidates real-time environmental data—such as air quality, carbon emissions, waste management—into a single visual platform to support evidence-based decision-making and promote public environmental awareness.

**Dataset Details:**

| **Feature** | **Air Quality** | **Carbon Emissions** | **Waste Management** |
| --- | --- | --- | --- |
| **Focus** | AQI, PM2.5, city-level pollution, AQI categories | CO levels by city, sector-specific emissions | Waste type and volume by city, recycling rates |
| **Granularity** | Yearly, city-level, bucket (Good to Poor) | Yearly, by city and emission source | Yearly, by city and waste type (organic, e-waste, plastic, etc.) |
| **Time Coverage** | 2015–2020 | 2016–2020 | 2015–2020 |
| **Geographic Coverage** | Indian cities (e.g., Delhi, Mumbai, Ahmedabad) | Top 5 CO-polluted Indian cities | 6 major Indian cities (e.g., Surat, Visakhapatnam, Thiruvananthapuram) |
| **Source** | Environmental sensors, public datasets | Electric power sector CO data | City waste collection and processing records |
| **Measurement Units** | AQI index, PM2.5 (μg/m³) | CO concentration (ppm), CO₂ emission (tons/year) | Tons/year by waste type |

**Dashboard Highlights:**

***1. Air Quality Overview***

* KPI Cards: Average AQI (4M), PM2.5 (2M), current AQI (Delhi: 519K), AQI bucket (“Good”).
* **Trends & Visuals:**
  + AQI Trend Over Time (2015–2020)
  + City-wise AQI bar chart (top: Ahmedabad, Delhi)
  + AQI category donut chart (e.g., Good, Moderate)
  + Geo-map of AQI distribution
  + Time-based state color coding
  + Pollutant composition trend: PM2.5, CO, NO₂, SO₂, O₃

***2. Carbon Emissions***

* **KPI Visuals:**
  + CO Trend Over Time by City (Mumbai, Talcher, etc.)
  + Top 5 Polluted Cities by CO (Thiruvananthapuram: 2.37)
  + Sectoral emissions table (Coal, Geothermal, Non-Biomass)
  + CO-related Air Quality category donut chart
  + Average CO level gauge: 7.31

***3. Waste Management***

* **Interactive Elements:**
  + Waste processed by type and city (bar chart)
  + Waste table by city and category
  + Top performing cities (e.g., Visakhapatnam, Vadodara)
  + Recycling rates with population density
  + Top 3 Waste Types: Incineration, Composting, Recycling

**Insights:**

* **Air Quality:** Some cities maintain consistently high AQI values (e.g., Ahmedabad, Delhi), though the overall trend improves from 2015 to 2020.
* **Carbon Emissions:** Power generation from coal contributes the most to CO emissions. Southern cities show higher average CO levels.
* **Waste Management:** Organic and plastic waste dominate in most cities; Visakhapatnam and Thiruvananthapuram lead in recycling efficiency.

**Steps Followed:**

1. **Data Extraction:** Collected open government datasets and sensor feeds for AQI, emissions, and waste.
2. **Data Transformation**: Cleaned using Power Query and Excel; modeled relationships in Power BI.
3. **Metrics & DAX:** Created measures for averages, category distributions, and trends.
4. **Visualization:** Developed multi-page dashboards with KPI cards, donut charts, maps, bar and line graphs.
5. **Interactivity:** Integrated slicers, filters, and tooltips to enhance user experience.

**Outcome:**

The final Power BI dashboard delivers actionable, real-time insights across three environmental domains—air quality, emissions, and waste. It enables policymakers, planners, and the public to make informed decisions, track sustainability goals, and advocate for cleaner, greener urban living.