# Sustainable Smart City Assistant using IBM Granite LLM

# Project Documentation

## 1. Introduction

Project Title: Sustainable Smart City Assistant using IBM Granite LLM

* Team Members:
  + Jeo Lawrence Francis
  + Esakkiraj M
  + Sujith Kumar E
  + Sathish R

## 2. Project Overview

The Sustainable Smart City Assistant is an AI-powered application designed to promote sustainable living and support environmental policy analysis in the context of smart cities. By leveraging the IBM Granite Large Language Model (LLM), the system provides intelligent insights and practical solutions that empower both individuals and policymakers to make greener choices.

## Key functionalities include:

1. Eco Tips Generator – Users can input environmental challenges or keywords (e.g., plastic pollution, solar energy, water conservation), and the assistant generates practical, actionable eco-friendly tips tailored to the given context.

2. Policy Summarization – Users can upload environmental policy documents in PDF format or paste text directly. The assistant automatically summarizes key points, provisions, and implications, simplifying complex documents for easier understanding and decision-making.

The application features a user-friendly web interface built with Gradio, and integrates PDF text extraction via PyPDF2. This project demonstrates how AI can drive sustainable innovation in smart cities, making environmental awareness and policy engagement more accessible to everyone.

Features:

• Eco-Tips Generator (working)  
• Policy Summarization from text/PDF (working)  
• Gradio Web Interface (working)  
• LLM Integration with IBM Granite  
• Future Enhancements: KPI forecasting, anomaly detection, API integration, database support

## 3. Architecture

• Frontend: Gradio-based web interface  
• Backend: Python app (app.py) with transformers + PyTorch  
• LLM Integration: IBM Granite via Hugging Face  
• Data Handling: Accepts direct text or uploaded PDFs  
• Planned Extensions: API via FastAPI, DB storage, dashboards

## 4. Setup Instructions

• Python 3.9+ required  
• Clone repo  
• Install dependencies (pip install -r requirements.txt)  
• Run Python smartcity.py  
• App launches locally or with share=True for public link

## 5. Folder Structure

• app.py – Main Gradio app  
• requirements.txt – Dependencies  
• README.md – Overview

## 6. Running the Application

Start the app → Open UI → Choose Eco Tips or Policy Summarization tab  
Upload PDF or enter text → Get summary or tips instantly

## 7. API Documentation

Currently none, planned via FastAPI

## 8. Authentication

None yet; future: OAuth2/IBM Cloud tokens

## 9. User Interface

Gradio interface with two tabs (Eco Tips, Policy Summarization)

## 10. Testing

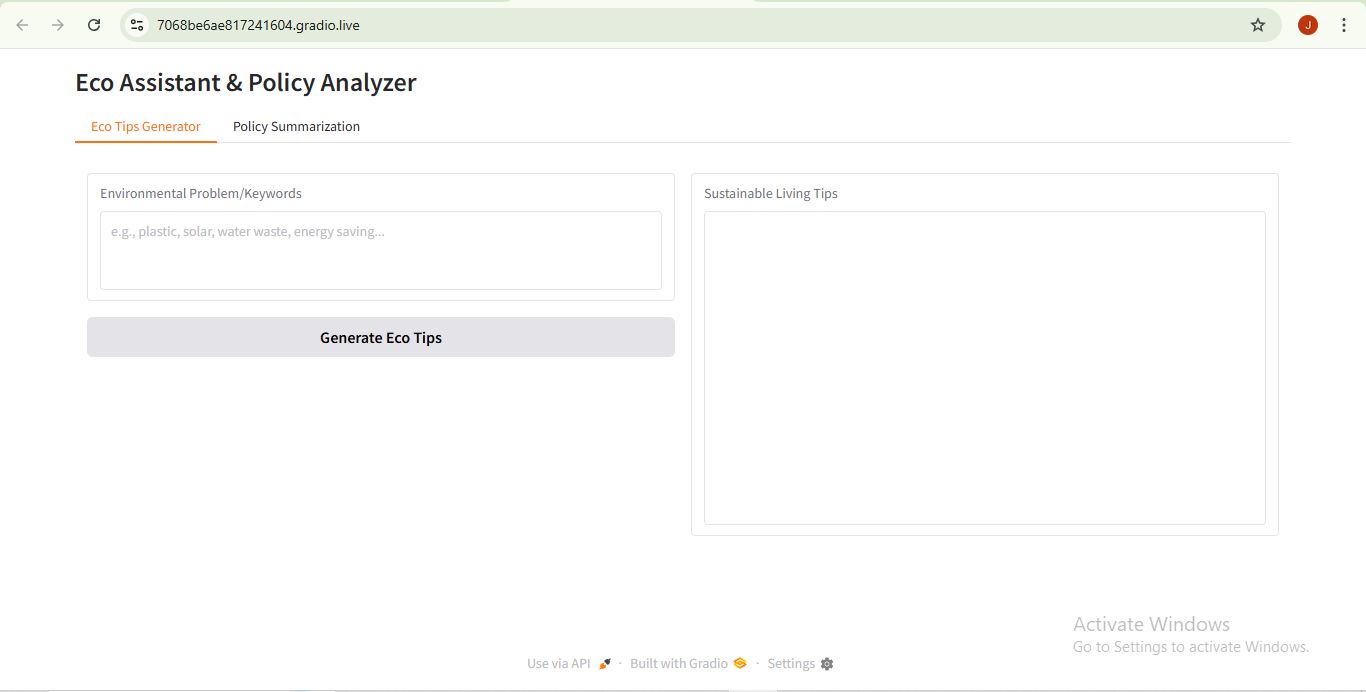
• Manual tests done:  
• Keywords → tips generated  
• PDF → summarized correctly

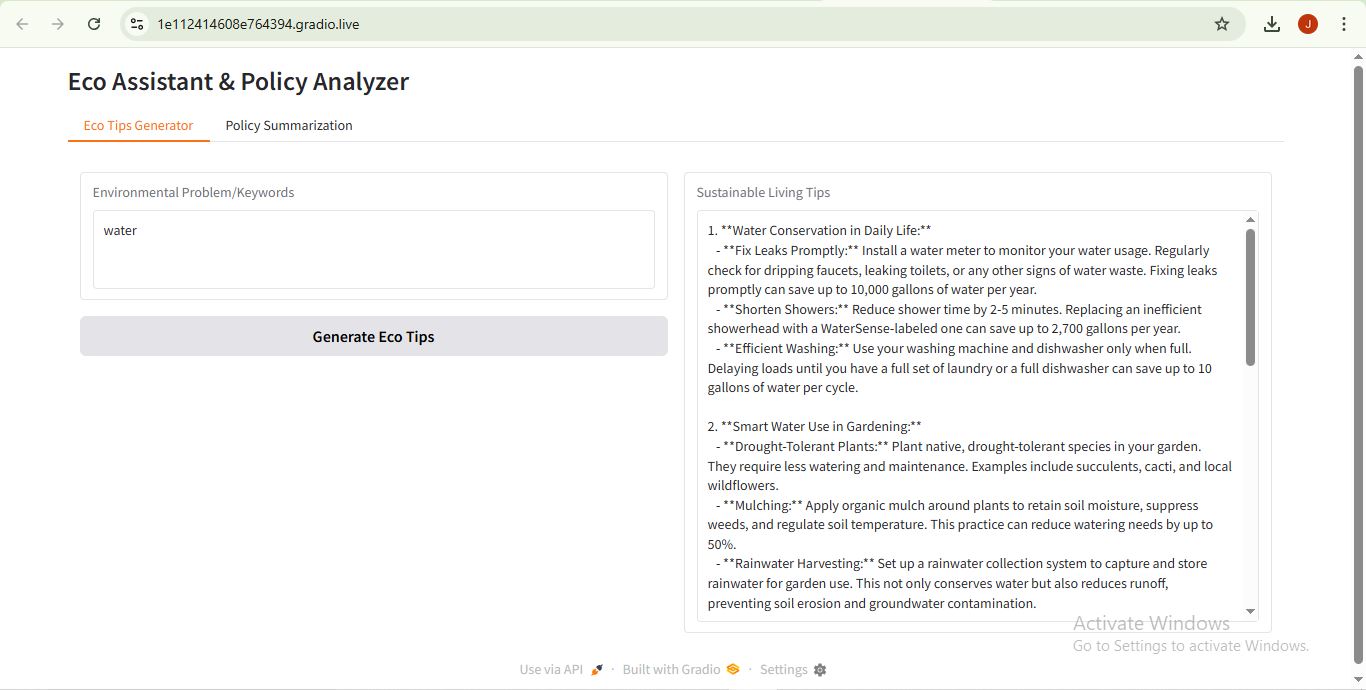
## 11. Known Issues

• Requires internet for Granite model  
• No DB/persistence yet  
• Limited scalability (CPU inference slow)

## 12. Future Enhancements

• KPI forecasting, anomaly detection  
• Database integration (vector DB)  
• REST API with FastAPI  
• Authentication + role management

**13. Work and Output**

****