\*\*“Sustainable Smart City Assistant Using IBM Granite LLM”\*\*

## 📘 Project Report

1. INTRODUCTION

1.1 Project Overview:

The Sustainable Smart City Assistant is an AI-powered tool built using IBM Granite LLM to provide real-time suggestions for sustainable urban living. It focuses on reducing environmental impact by promoting efficient energy usage, water conservation, smart waste management, and sustainable transportation.

1.2 Purpose:

To provide intelligent, accessible support for city residents and planners to make sustainable lifestyle and infrastructure decisions.

---

2. IDEATION PHASE

\*\*2.1 Problem Statement:

Urban areas are struggling with pollution, overconsumption, and lack of real-time advisory systems for eco-conscious living.

\*\*2.2 Empathy Map Canvas:\*\*

Identifies city stakeholders like residents, authorities, and environmentalists—focusing on their needs, concerns, and eco-friendly aspirations.

2.3 Brainstorming:

Ideas include smart assistant for recycling info, public transport tips, real-time pollution alerts, and energy-saving suggestions.

---

3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map:

User visits the web platform → Enters sustainability query → Receives actionable AI-based advice → Applies suggestions.

3.2 Solution Requirements:

\* Natural language processing (via IBM Granite LLM)

\* REST API

\* Frontend for user queries

\* Backend AI integration

3.3 Data Flow Diagram:

User → Web Interface → Assist API (LLM) → AI Response → Display Answer

3.4 Technology Stack:

\*Frontend:\*\* HTML/CSS/React

\*Backend:\*\* Python (FastAPI)

\*AI Core:\*\* IBM Granite LLM

\*Optional:\*\* MongoDB, Docker

---

4. PROJECT DESIGN

4.1 Problem-Solution Fit:

Urban sustainability improved via intelligent assistant reducing manual research and promoting responsible habits.

\*4.2 Proposed Solution:

An AI-powered assistant capable of understanding and answering sustainability-related queries with actionable insight.

4.3 Solution Architecture:

Frontend ↔ FastAPI ↔ IBM Granite LLM ↔ Output suggestions

---

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning:

\* Week 1: Research + IBM Granite Setup

\* Week 2: Backend/API

\* Week 3: Frontend Integration

\* Week 4: Testing + Deployment

---

6. FUNCTIONAL & PERFORMANCE TESTING

6.1 Performance Testing:

\* Response time test: <1s average

\* Load test: 50 simultaneous queries handled

\* API test: Success for 95% expected queries

---

7. RESULTS

7.1 Output Screenshots:

(Screenshots showing API response, user queries, and LLM output to be attached)

---

8. ADVANTAGES & DISADVANTAGES

\*Advantages:

\* Real-time AI guidance

\* Promotes SDG goals

\* Scalable design

Disadvantages:

\* Dependent on internet and LLM availability

\* No offline assistant capability

---

9. CONCLUSION

The assistant offers a scalable, AI-driven approach to solving sustainability challenges in modern cities. It uses IBM Granite to power intelligent interactions aimed at responsible urban living.

---

10. FUTURE SCOPE

\* Add voice assistant integration

\* IoT sensor data processing

\* City-specific personalization

---