# Project Report: Sustainable Smart City Assistant

## 1. INTRODUCTION

### 1.1 Project Overview

The Sustainable Smart City Assistant is an AI-powered chatbot that answers questions about sustainability in smart cities. It uses NLP models from Hugging Face, integrated with Streamlit and FastAPI. The assistant supports voice/text input, document uploads, and provides insights based on Wikipedia and PDFs.

### 1.2 Purpose

The purpose is to support citizens, researchers, and planners by providing accurate and instant responses to sustainability-related queries using LLMs and data visualization.

## 2. IDEATION PHASE

### 2.1 Problem Statement

Lack of accessible systems that can guide people on sustainability practices and smart city planning using AI.

### 2.2 Empathy Map Canvas

Think & Feel: Needs quick answers  
See: Scattered data  
Say & Do: Searches online  
Hear: Sustainability trends  
Pain: Info overload  
Gain: Instant insights

### 2.3 Brainstorming

Ideas included AI Q&A, PDF search, voice input, Wikipedia + LLM, and data charts.

## 3. REQUIREMENT ANALYSIS

### 3.1 Customer Journey map

User -> Enters query -> NLP analysis -> Processing -> Response

### 3.2 Solution Requirement

Hugging Face LLMs, FAISS, Streamlit, FastAPI, voice/text modules

### 3.3 Data Flow Diagram

Input -> Streamlit UI -> FastAPI -> NLP Engine -> Response

### 3.4 Technology Stack

Frontend: Streamlit  
Backend: FastAPI  
NLP: Hugging Face  
Voice: pyttsx3, speech\_recognition

## 4. PROJECT DESIGN

### 4.1 Problem Solution Fit

Bridges the gap between knowledge and accessibility.

### 4.2 Proposed Solution

Assistant features: natural language Q&A, PDF input, voice support, visualizations.

### 4.3 Solution Architecture

User -> Streamlit UI -> FastAPI -> NLP + Wikipedia + FAISS -> Response

## 5. PROJECT PLANNING & SCHEDULING

### 5.1 Project Planning

Week 1: Ideation  
Week 2-3: Development  
Week 4: Integration  
Week 5: Testing  
Week 6: Final report & demo

## 6. FUNCTIONAL AND PERFORMANCE TESTING

### 6.1 Performance Testing

API tested using Swagger UI. LLM response: <2s, PDF: <5s, Concurrent users supported.

## 7. RESULTS

### 7.1 Output Screenshots

[Insert screenshots of UI, charts, and voice input]

## 8. ADVANTAGES & DISADVANTAGES

Advantages  
Voice support, Fast responses, Visual insights, User-friendly.  
  
Disadvantages  
Needs internet, Limited file support, Voice accuracy varies.

## 9. CONCLUSION

The assistant is a valuable tool for promoting smart city sustainability using modern AI tools in an accessible format.

## 10. FUTURE SCOPE

Add multilingual support, mobile app, real-time APIs, map visualization, and fine-tuning.

## 11. APPENDIX

### Source Code

https://github.com/Koti4239/smart\_city.git

### Dataset Link

[Provide link]

### GitHub & Project Demo Link

📂 GitHub Repository: https://github.com/Koti4239/smart\_city.git  
🎥 Project Demo Video: https://drive.google.com/file/d/1HyCil4k1P7yRTsEKxpF0bYv\_6O1AIvEm/view?usp=drive\_link