**Advantages of the Sustainable Smart City Assistant Using IBM Granite LLM:**

1. **AI-Powered Automation**  
   The use of IBM Granite LLM enables automatic summarization of policies, natural language chat interaction, and sustainability report generation, saving time and effort.
2. **Enhanced Civic Engagement**  
   Citizens can actively participate by submitting feedback, asking eco-related questions, and accessing simplified city policies, improving transparency and interaction.
3. **Data-Driven Decision Making**  
   With KPI forecasting and anomaly detection, city planners can make informed decisions regarding infrastructure and resource allocation.
4. **Scalable and Modular Architecture**  
   The modular backend (FastAPI) and frontend (Streamlit) allow easy updates, feature additions, and scalability for future enhancements.
5. **User-Friendly Interface**  
   Streamlit ensures a smooth, clean, and responsive interface accessible to both technical and non-technical users.
6. **Advanced Document Search**  
   Pinecone’s semantic search capabilities allow intelligent and context-aware document retrieval for planners and citizens.
7. **Sustainability Focus**  
   The app actively promotes sustainable practices by providing actionable eco-tips and raising awareness of carbon and resource usage.
8. **Supports Multiple Data Formats**  
   Users can upload and interact with data in CSV, text, or PDF format, making it flexible for real-world government data inputs.

**Disadvantages of the Sustainable Smart City Assistant:**

1. **Dependence on External APIs**  
   The project heavily relies on IBM Watsonx APIs. If API limits are reached or services are unavailable, key features may become non-functional.
2. **Infrastructure Cost**  
   Hosting and using IBM Watsonx, Pinecone, and cloud services can incur high operational costs, especially at scale.
3. **Data Privacy Concerns**  
   Uploading sensitive city data or documents to external LLM services may raise data security and privacy issues.
4. **Limited Offline Support**  
   As a web-based solution, the assistant requires an internet connection, limiting usability in low-connectivity areas.
5. **Complex Initial Setup**  
   Integrating Pinecone, Watsonx, and setting up FastAPI and Streamlit environments may be challenging for beginners.
6. **Model Limitations**  
   While IBM Granite is powerful, it may still produce generic or incorrect responses if prompts are ambiguous or datasets are inconsistent.