# Solution Requirements

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| Date | 30 June2025 |
| Team ID | LTVIP2025TMID38464 |
| Project Name | Sustainable Smart City Assistant Using IBM Granite LLM |
| Maximum Marks | 4 Marks |

**Functional Requirements:**

A Sustainable Smart City Assistant must be capable of understanding and responding to citizen queries through a conversational AI interface, enabling intuitive and inclusive interaction. It should forecast key performance indicators such as energy, water, and traffic usage using time-series models, while also detecting anomalies in environmental or utility data to support proactive decision-making. The assistant must summarize lengthy government policies into concise, accessible formats for public understanding. It should generate personalized eco-friendly tips based on user behaviour or city data, and provide a feedback system for citizens to report issues or suggestions. Additionally, it must support the generation of downloadable sustainability reports and integrate with real-time data sources like IoT sensors and public APIs to ensure up-to-date insights and alerts. These capabilities together empower city administrators and residents to collaborate toward a greener, smarter urban future

Following are the requirements of the proposed solution.

| FR No. | Non-Functional Requirement | Description |
|---|---|---|
| NFR-1 | **Usability** | Intuitive UI/UX (e.g., Streamlit or Gradio interfaces)Multilingual and accessible design (voice/text, screen readers)Simple onboarding and clear feedback mechanisms |
| NFR-2 | **Security** | End-to-end encryption (TLS/SSL)Role-based access control (RBAC)Compliance with GDPR, India's Data Protection Bill, etc.Secure APIs and audit logging |
| NFR-3 | **Reliability** | Fault-tolerant architecture with retry logic Redundant data pipelines and backup systems Continuous monitoring and alerting |

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| NFR-4 | **Performance** | Optimized AI models (quantized/distilled for faster inference) Asynchronous processing for tasks like summarization Caching and CDN for static content |
| NFR-5 | **Availability** | Multi-zone cloud deployment (AWS, Azure, GCP) Load balancers and failover clusters Uptime monitoring and auto-scaling |
| NFR-6 | **Scalability** | Microservices architecture (FastAPI, Docker, Kubernetes) Horizontal scaling of compute and storage Modular APIs for easy feature expansion |