Software Requirements for Energy Efficiency Optimization

1. Functional Requirements

- Energy Data Collection
  - Ability to collect real-time energy consumption data from sensors/meters.
  - Integration with IoT devices or smart meters.

- Data Analysis & Monitoring
  - Analyze energy usage patterns.
  - Visualize energy consumption via dashboards (graphs, charts, KPIs).

- Optimization Engine
  - Implement algorithms (e.g., machine learning, linear programming) to identify inefficiencies.
  - Recommend optimal energy-saving actions or schedules.

- User Management
  - Role-based access (admin, energy manager, technician).
  - User registration, authentication, and profile management.

- Reporting
  - Generate periodic reports on energy consumption and savings.
  - Export data in formats like PDF, Excel.

- Notification System
  - Alerts for unusual energy usage or when thresholds are exceeded.
  - Suggestions for energy-saving actions.

- Integration APIs
  - Interfacing with external systems like HVAC, lighting, ERP, or SCADA.

2. Non-Functional Requirements

- Scalability
  - Support growing number of users, data sources, and geographical locations.

- Performance
  - Fast processing of large datasets.
  - Real-time data visualization with minimal lag.

- Reliability & Availability
  - System uptime should be 99.9% or higher.
  - Backup and recovery mechanisms.

- Security
  - Secure data transmission (e.g., HTTPS, encryption).
  - User authentication and authorization.

- Usability
  - Intuitive UI for both technical and non-technical users.
  - Mobile compatibility or responsive design.

- Maintainability
  - Modular design to allow easy updates and debugging.

- Compliance
  - Adhere to energy and data regulations (e.g., ISO 50001, GDPR).