Measure Energy Consumption

**Features:**

* Green AI
* Energy consumption
* Deep learning
* High performance computing

**Problem Statement:** The measurement of energy consumption is critical in understanding and optimizing energy usage in various sectors, including manufacturing sites, homes, commercial buildings, and transportation. However, the manual collection and analysis of energy consumption data can be time-consuming and error-prone. Therefore, there is a need for an automated approach to collect, analyse and visualize energy consumption data for better decision-making.

**Problem Definition:** The problem at hand is to create an automated system that measures energy consumption, analyses the data, and provides visualizations for informed decision-making. This solution aims to enhance efficiency, accuracy, and ease of understanding in managing energy consumption across various sectors.

**Objectives:**

The objective of Energy Management is to achieve and maintain optimum energy procurement and utilization, throughout the organization and: To minimize energy costs / waste without affecting production & quality • To minimize environmental effects.

**Design Thinking:**

1. Data Source: Identify an available dataset containing energy consumption measurements.
2. Data Preprocessing: Clean, transform, and prepare the dataset for analysis.
3. Feature Extraction: Extract relevant features and metrics from the energy consumption data.
4. Model Development: Utilize statistical analysis to uncover trends, patterns, and anomalies in the data.
5. Visualization: Develop visualizations (graphs, charts) to present the energy consumption trends and insights.
6. Automation: Build a script that automates data collection, analysis, and visualization processes.

A structured methodology to carry out an energy audit is necessary for efficient working. An initial study of the site should always be carried out, as the planning of the procedures necessary for an audit is most important.

**Initial Site Visit and Preparation Required for Detailed Auditing**

An initial site visit may take one day and gives the Energy Auditor/Engineer an opportunity to meet the personnel concerned, to familiarize him with the site and to assess the procedures necessary to carry out the energy audit.

During the initial site visit the Energy Auditor/Engineer should carry out the following actions: -

• Discuss with the site's senior management the aims of the energy audit.

• Discuss economic guidelines associated with the recommendations of the audit.

• Analyse the major energy consumption data with the relevant personnel.

• Obtain site drawings where available - building layout, steam distribution, compressed air distribution, electricity distribution etc.

• Tour the site accompanied by engineering/production.

**Software used:**

An EMS (Energy Management System) is a software used by a company to manage its energy consumption. Energy Management Software’s allow industrial groups and companies in the tertiary sector to deepen the analysis of their energy data.

**The main aims of this visit are: -**

• To finalise Energy Audit team

• To identify the main energy consuming areas/plant items to be surveyed during the audit.

• To identify any existing instrumentation/ additional metering required.

• To decide whether any meters will have to be installed prior to the audit e.g., kWh, steam, oil or gas meters.

• To identify the instrumentation required for carrying out the audit.

• To plan with time frame

• To collect macro data on plant energy resources, major energy consuming centres

• To create awareness through meetings/ programme Phase II- Detailed Energy Audit Activities Depending on the nature and complexity of the site, a comprehensive audit ca