

Project Guideline: Idea Proposal Submission

Title: Forecasting Future Energy Consumption for Households and Businesses

1. Project Idea:

- **Problem Definition:** The goal is to predict future energy consumption to help utility providers and consumers optimize energy use and reduce wastage. This will assist in balancing supply and demand, lowering costs, and supporting sustainable energy use.
- **Objective:** To develop a machine learning model that can forecast short- and long-term energy consumption based on historical data and relevant external factors.

2. Relevance to Sustainable Development Goals (SDGs):

- **SDG 7: Affordable and Clean Energy** - By accurately forecasting energy needs, this project can promote efficient energy use and reduce overproduction and wastage, contributing to more sustainable energy systems.
- **SDG 13: Climate Action** - Reducing unnecessary energy consumption supports lower carbon emissions, which is crucial in the fight against climate change.

3. Literature Examples:

- Forecasting household energy consumption by [Maria Jacob](#) on medium
- Forecasting Electricity Consumption and Production in Smart Homes through Statistical Methods by Arpad Gellert and al¹

4. Describe Your Data:

- **Data Source:** Public datasets, such as those from the Open Power System Data or local utility providers.
- **Data Format:** The data includes historical energy consumption records in CSV format, with time-stamped entries.
- **Size and Preprocessing:** The dataset covers several years, with millions of rows. Preprocessing steps will include handling missing values, feature engineering (e.g., adding weather data), and normalizing data to improve model performance.

5. Approach (Machine Learning or Deep Learning):

- **Chosen Approach:** Machine learning, specifically using algorithms like XGBoost, which is effective for time series forecasting and handles tabular data efficiently.
- **Justification:** Given the structured nature of the data and the forecasting goal, machine learning is sufficient to capture trends and seasonal patterns without the complexity of deep learning.

¹ Gellert et al., « Forecasting Electricity Consumption and Production in Smart Homes through Statistical Methods ».