**Functional Document**

1. Introduction
2. Product Goal
3. Demography (Users, Location)
4. Features
   1. Feature #1
      1. Description
      2. User Story
5. Assumptions

1. **Introduction**

The Ethanol Blends as an Alternative to Fossil Fuels project focuses on forecasting the use of ethanol and other biofuels as a substitute for traditional fossil fuels. This sprint centered on data modeling and analysis across global renewable energy datasets, with a particular focus on region-wise classification and long-term forecasting till 2035. The aim is to support sustainable energy strategies with data-backed insights.

2. **Product Goal**

The goal of this sprint is to develop predictive models that analyze and forecast renewable energy consumption — specifically biofuel and ethanol usage — across various global regions and countries. This provides a solid foundation for assessing the feasibility of transitioning from fossil fuels to ethanol blends in energy supply planning.

3. **Demography (Users, Location)**

**Users**

* **Target Users**: Government energy departments, environmental researchers, investment analysts, academic institutions
* **User Characteristics**: Technically proficient users with knowledge of renewable energy policies, data interpretation, and climate action strategies

**Location**

* **Target Location**: Global (All countries included via ISO country codes)
* **Regions Mapped**: Asia (including 48 countries like Japan, India, China), Europe, Americas, Africa, Oceania

4. **Features**

**Feature #1: Region-wise Renewable Energy Classification**

**Description**:  
The system classifies all countries into regions using ISO country codes and visualizes historical biofuel contribution to total energy supply.

**User Story:**  
*As a researcher*, I want to view how each region's renewable energy trends differ so I can compare progress toward sustainable energy goals.

**Feature #2: Time-Series Forecasting of Biofuel Use (Till 2035)**

**Description**:  
Predictive models trained to forecast future ethanol and biofuel usage in all global regions based on historical energy consumption datasets.

**User Story**:  
*As a policy analyst*, I want to predict my region’s renewable energy future so I can make data-driven decisions on investment and legislation.

**Feature #3: Investment Trends Correlation**

**Description**:   
Explores the correlation between investments in renewables and actual biofuel adoption across different countries.

**User Story**:  
*As an investor*, I want to assess the ROI on renewable energy investments by observing real-world adoption over time.

5. **Assumptions**

* All country codes are accurately mapped using standard ISO-3166 initials.
* Historical data from renewable energy sources is assumed to be reliable and comprehensive.
* External global factors (e.g., war, pandemics, policy shifts) are not directly modelled.
* Infrastructure (Python, Collab, Pandas, Matplotlib) will remain accessible and functional.