AI/ML-Driven Analysis of Green Hydrogen Microgrid Performance

Variables Used

Sinusoidal patterns

Temp, Humidity, Wind

Random noise

EUI (Energy Use Intensity)

Approximated Area

Real data
OpenWeather API
1 YTD

Real data
NASA POWER API
1 YTD

Picking Location

Extracting Weather Data

Extracting Solar Irradiance Data

Generating Synthetic Load

Calculating PV Production

Variables used

GHI (Global Horizontal)

Panel Efficiency

Calculating Converter Losses

Calculating Energy Balance

EB = Inputs - Outputs

Energy Exported to Grid

Energy Imported from Grid

Energy Balance

Summatory of energy inputs and outputs should be 0.
In this case, we'll get positive and negative differences, depending on time.

Positive values would be excess of energy (Energy exported to Grid)

Negative values would be defficiency of energy (Energy imported from Grid)

Also, depending on the cost of each type of energy source, it would vary depending on the time of day.

Calculate how much energy can be used for Hydrogen Production

Hydrogen Production

Including all the components of the sub-system: Electrolyzer, Storage, Fuel Cell.

Calculate Storage Utilization

Calculate LCOH and LCOS

STAGE 1

STAGE 2

FORECASTING

OPTIMIZATION

PREDICTION

OPTIMIZATION