

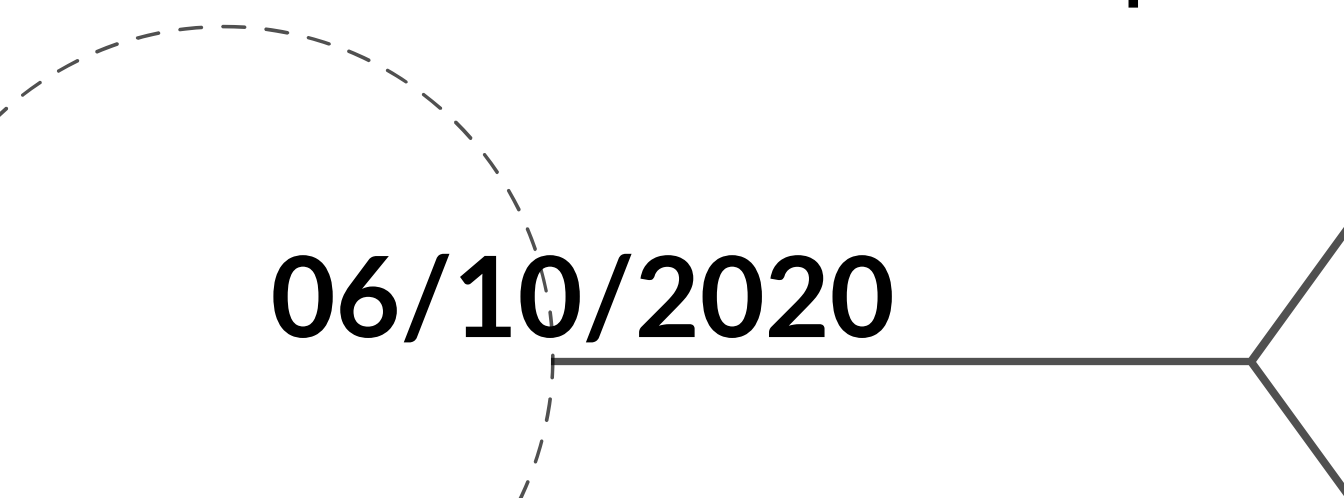


FINAL PROJECT

PRESENTATION

An App to predict the photovoltaic energy generation in Germany.

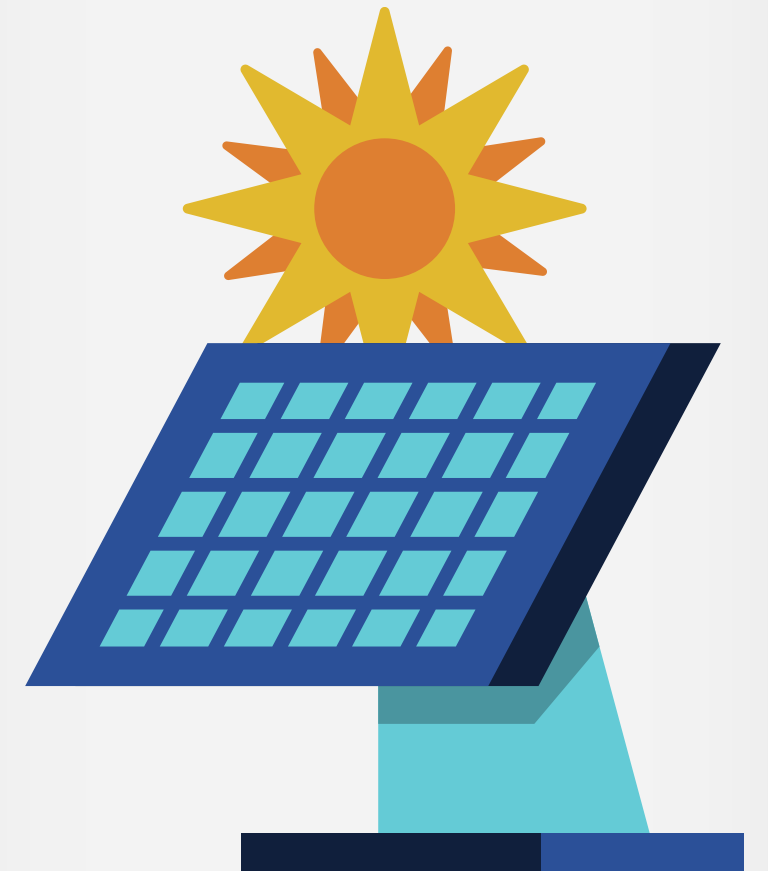
Ícaro da Silva Misquita



06/10/2020

Presentation Script

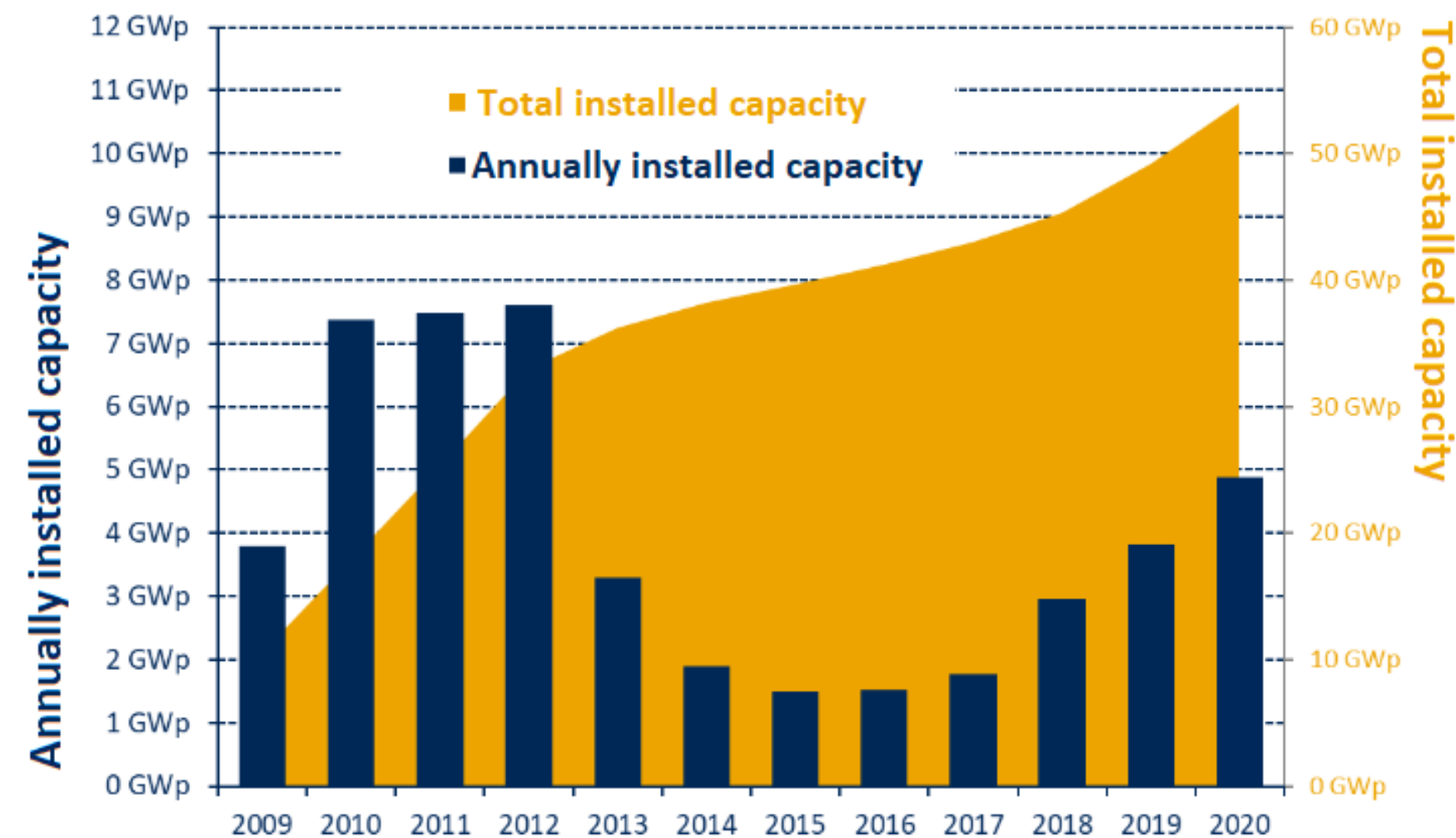
- Motivation and Objective
- Workflow
- Create an App
- Conclusion



» Some facts about Germany

- Germany is ranked 4th globally in PV accumulated power (International Renewable Energy Agency - IRENA).
- In 2021, PV = 10% of country's net power consumption (Fraunhofer ISE)
- In early 2022, **North Rhine-Westphalia** (NRW) and **Baden-Württemberg** implemented a solar-PV obligation for certain construction projects.

Growth of installed solar-PV capacity in Germany



Source: BSW Solar, BNetzA, as of Feb'21

»» Motivation

- With the war in Ukraine and the sanctions imposed on Russia the energy price are sure to rise exponentially. For this motive it's a good time to install PV systems to mitigate this impact for the final customer.

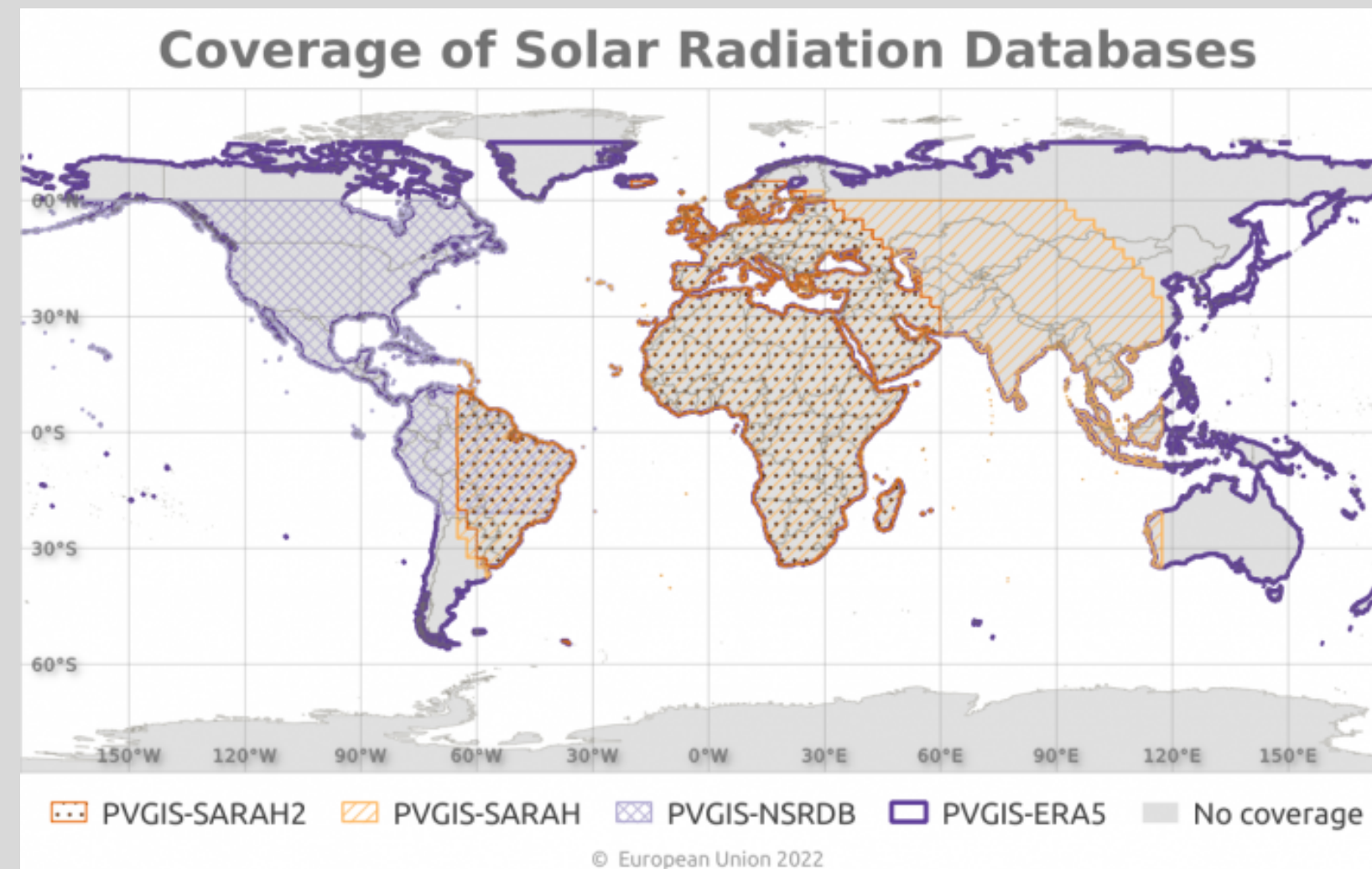
»» Objective

- Create an app to predict the Photovoltaic energy generation in Germany for systems up to 20 KWp. The app has the following features:
 - A daily prediction;
 - A monthly or yearly predictions, depending of the input;
 - Create a model with the user input features.



➤➤ Workflow

- Obtaining the data from the PVLib and PVGIS API from 2006 to 2016 hourly base
 - Cleaning and transforming the data
 - Final dataframe with 34 columns and 8760 rows




Correlation Analysis

Strong (0.60 - 1.0)	Moderate (0.40 - 0.59)	Weak (0.0 - 0.39)
ghi	temp_air	IR(h)
dni	relative_humidity	wind_speed
dhi	cell_temperature	wind_direction
apparent_zenith		pressure
zenith		azimuth
apparent_elevation		equation_of_time
elevation		aoi
poa_global		poa_direct
poa_sky_diffuse		
poa_ground_diffuse		
effective_irradiance		
ac_current		
i_sc		
i_mp		
v_oc		
v_mp		
p_mp		
i_x		
i_xx		

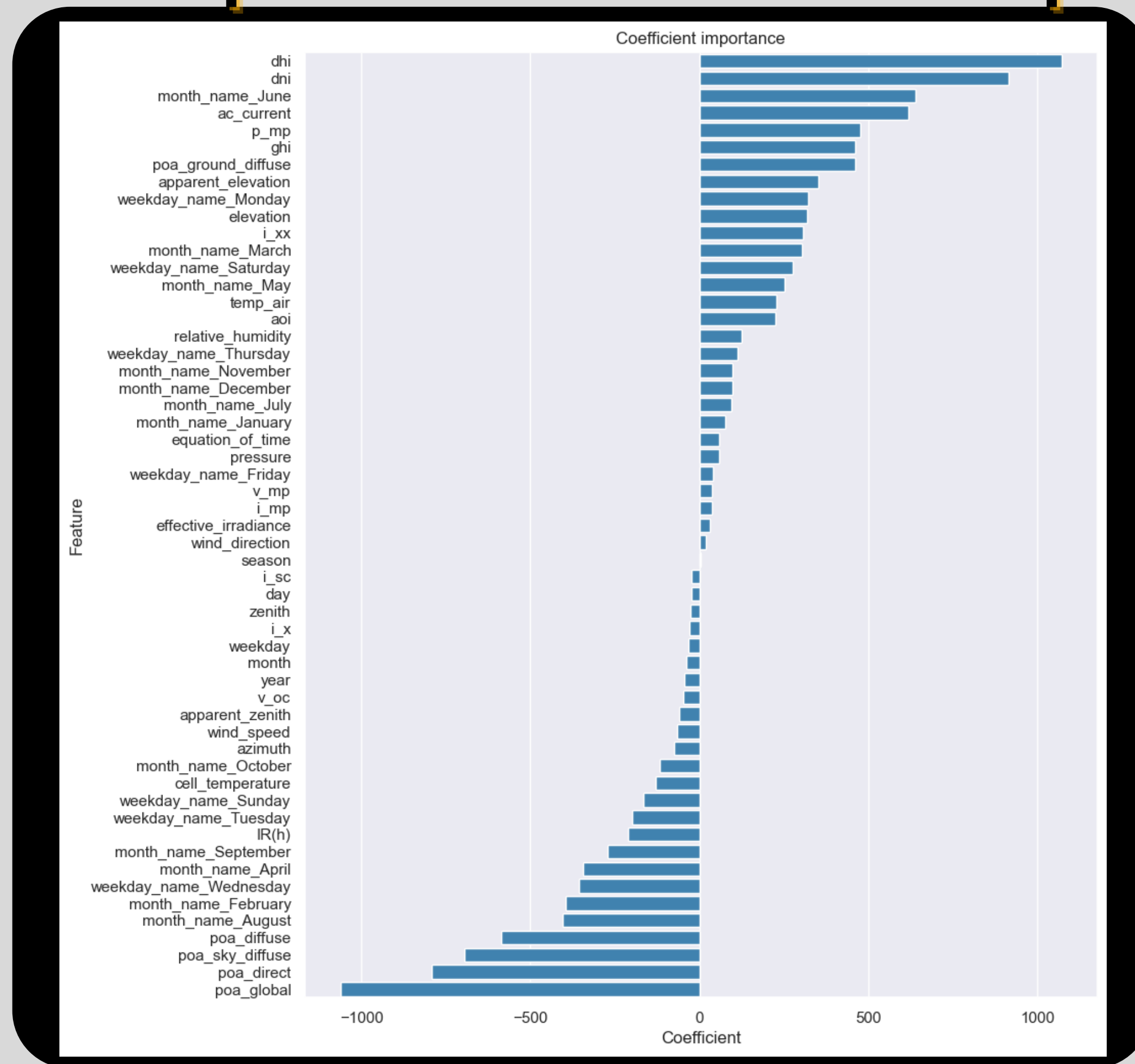
Creating the Machine Learning Model

- Chosen model **RidgeCv** Linear Model
 - OneHotEncoder
 - StandardScaler
 - SimpleImputer
 - KNNImputer
 - GridSearch

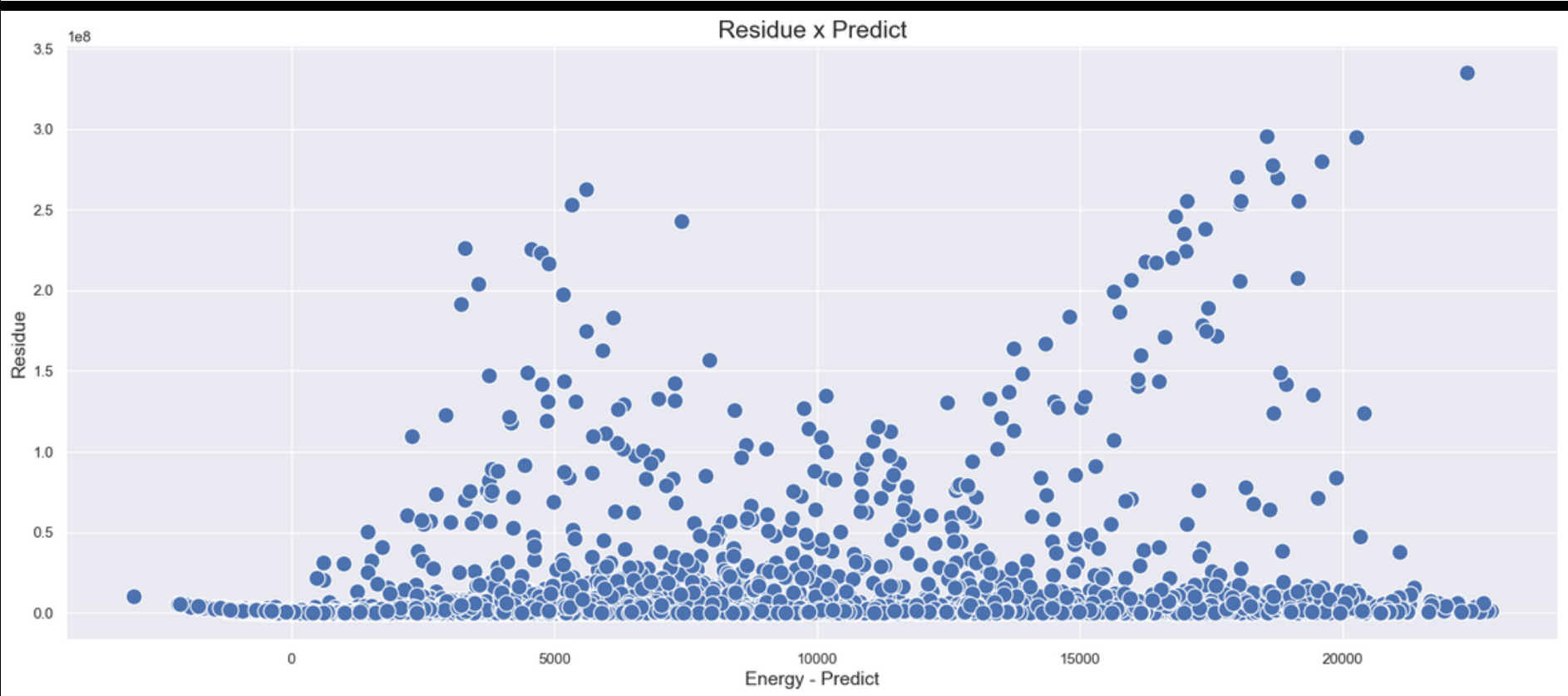
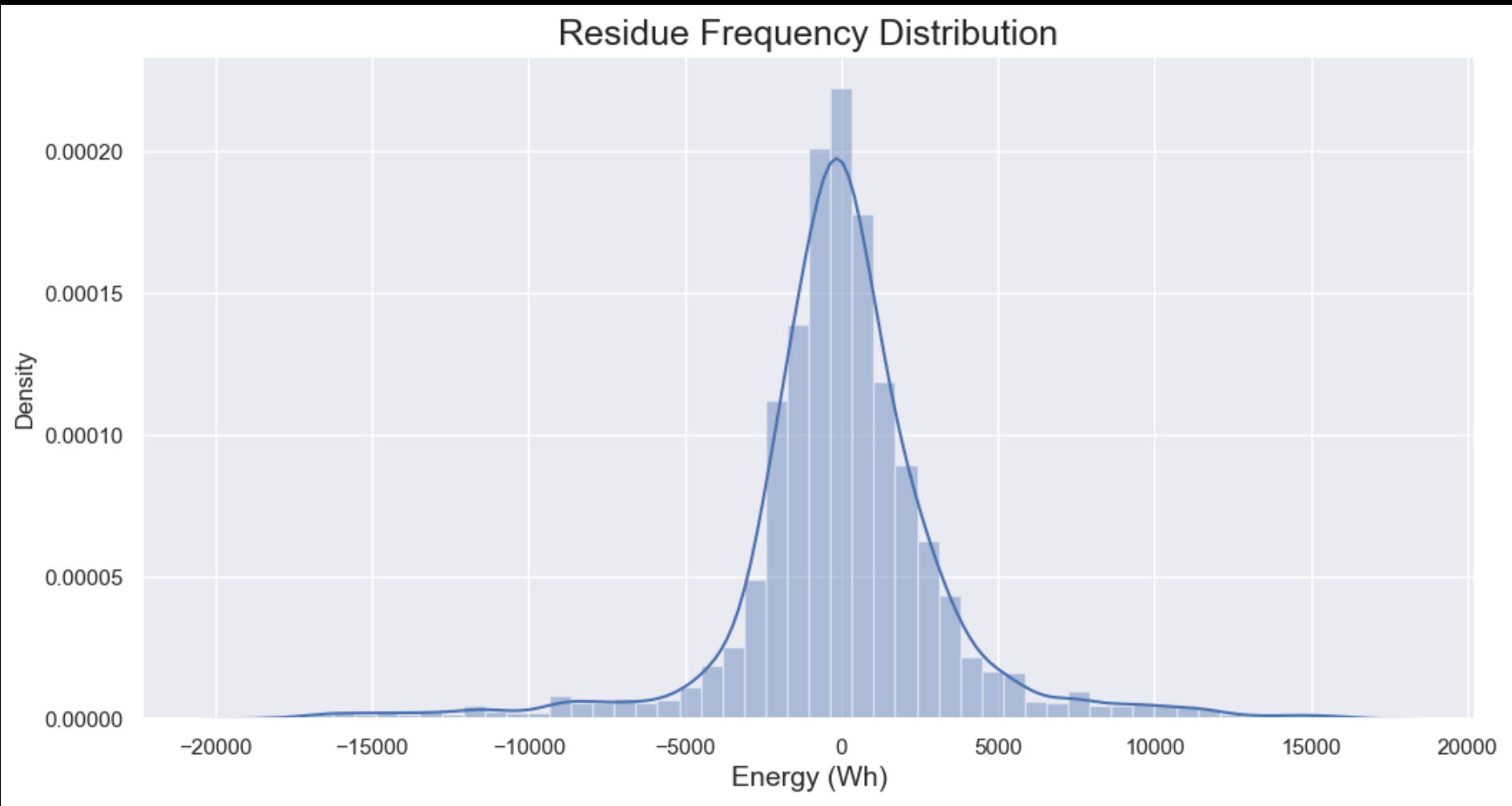


Score on training data: 0.7428
on testing data: 0.7224

Using the ML to plot the coefficient importance

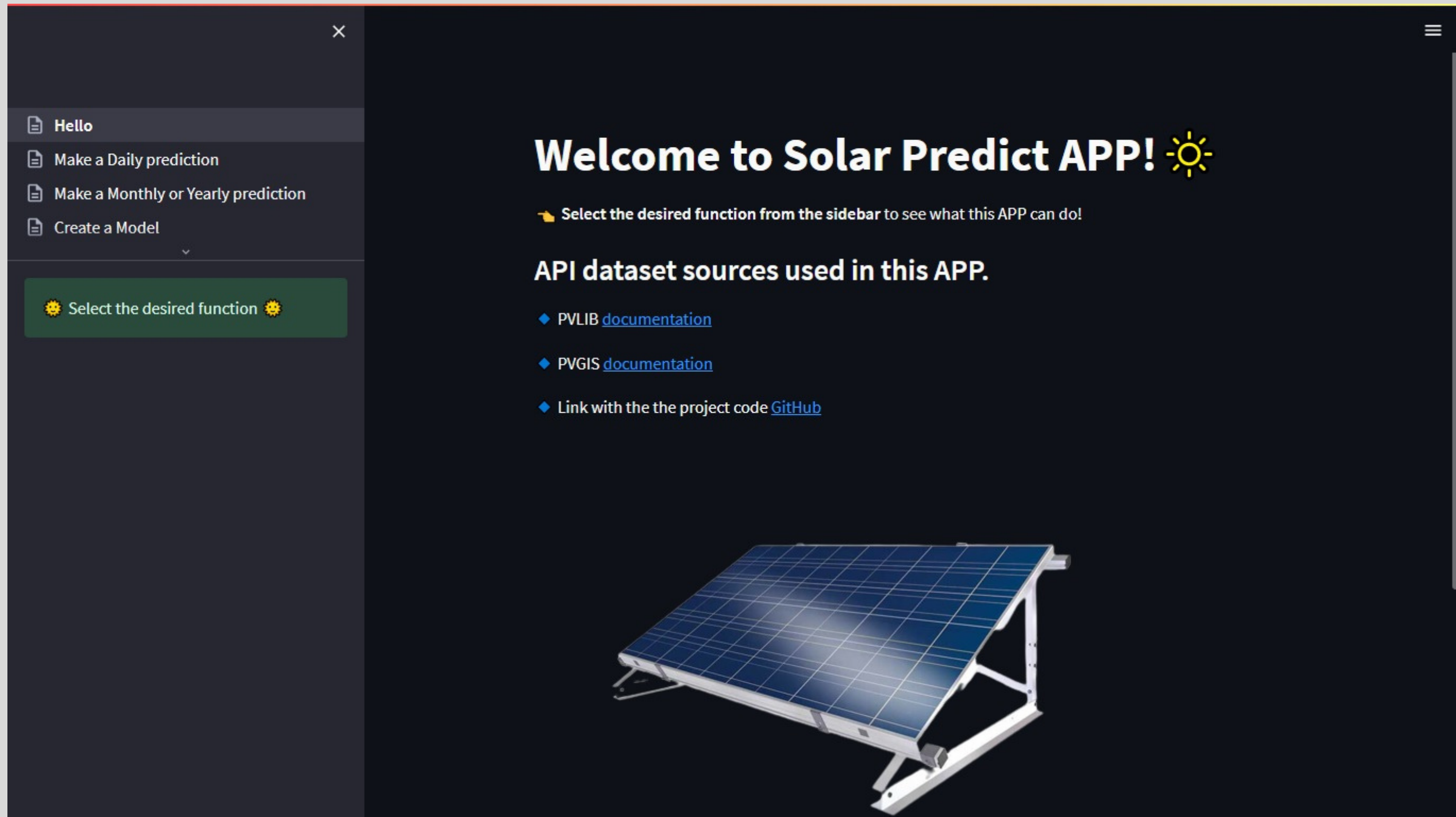


Analysing the predicted results



Metrics	
EQM	13043757.15
REQM	3611.61
R ²	0.7224

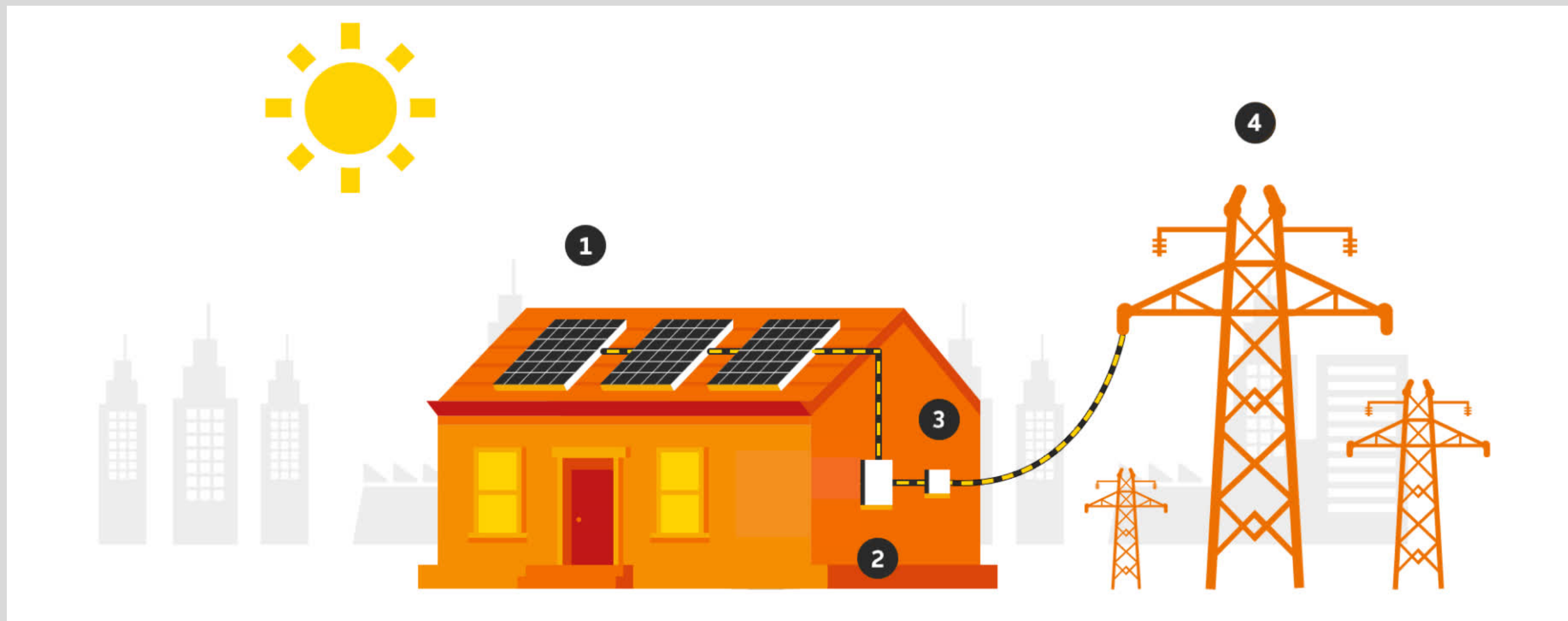
Using Streamlit to create an App



 <https://icaromisquita-wbs-final-project-pv-en-streamlit-apphello-39bkci.streamlitapp.com/>

Conclusion

- The model is able to predict the energy generation with an accuracy of 0.7428 on training data and 0.7224 on testing data;
- The Streamlit app is able to:
 - make predictions on a daily base or for a higher time range with the user input,
 - it can create a model with the user input
 - plot a graph with the **Predicted Energy versus Day**



Questions and suggestions

THANKYOU