Solar PV App
OrxaGrid

OrxaGrid develops IoT devices, analytics and web dashboards for power grid customers

Our app portfolio includes SaaS solutions for energy efficiency, asset health and energy forecasting

A new suite of renewable energy apps are currently under development
Solar PV Sizing Tool

• Decision support SaaS tool
• Optimizes the capacity (size) of a proposed Solar Photovoltaic installation to maximise financial benefit for building owner

• Considers:
  • Electricity demand profile of building over past year using industry standard Half Hourly energy meter data
  • Building roof size, pitch angle and compass direction
  • Grid reference of building
  • Local energy tariffs for import and export
  • Historic meteorological data for building location

• Produces report for building owner complete with financial forecasts and energy visualisations
Background on Solar PV

• Solar Photovoltaic (Solar PV) is a renewable energy conversion technology which generates electricity from sunlight
• Size of Solar PV industry in 2018 was 52.5 billion USD
• Solar panels on rooftop absorb photons and produce direct current electrical energy
• Solar inverters convert direct current to alternating current for use in building or for export to power grid
• Solar PV installation system lifecycle is 25 years
• Installation reduces energy costs, reduces CO2 emissions and owner can earn energy export fees
User Story for OrxaGrid Solar PV App

• I am a building owner or building energy manager
• My building has high costs of energy usage
• I would like to reduce our energy costs and/or our CO2 emissions
• The building has spare roof space available
• We have access to capital for installation costs
• We lack domain-specific expertise on Solar PV system sizing
• We would like an independent cost benefit analysis report before approaching Solar PV installers for quotations
Value Proposition

• Free-to-use decision support tool (other similar software are paid-for solutions or try to upsell the installation product)
• Analyzes building energy demand and forecasted generation at a high temporal resolution (most solar installers do not offer this)
• Uses high spatial resolution resampled satellite weather data for accurate energy forecast
• Populates fields with useful default values which can be relied upon for many buildings
• Quick and easy to use, with integrated embedded maps
Benefits to OrxaGrid

• Gain experience in productionising our data science models directly to Azure cloud without involving our wider developer and operations team
• Lead generation of building owners interested in energy monitoring and analytics systems
• Increase brand awareness
Implementation

• Deployed as Flask app on Azure
• User input data received from HTML form and validated in Python
• API call constructed from form input and file upload
• HTTP request sent to solar energy forecasting service
• Annual hourly energy generation forecast received from API
• Optimal system size calculated in Python
• Results table and visualizations served to browser
Login Page

• Single user login
• Credentials provided in Help page
• Links to T+C’s, privacy policy and help page provided
Help Page

- Instructions for using app
- Download link for sample Half Hourly energy data file
- Example results given
Data Entry Page

• User provides details of their building
• Form is loaded with reasonable default values
• GUI widgets for selecting azimuth (compass direction of roof) and pitch (roof tilt angle)
• Embedded map auto-fills latitude and longitude according to user selected location
File Upload

- User selects a Half Hourly Meter Data file to upload
- Industry standard data which itemises the electrical energy used by a building for each half hour of the past year

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• Table of financial returns
• Graphs of generated, imported and exported energy
• Optimal system size graph
Interpretation of Results

• Report can be downloaded as pdf file

• User can now make an informed choice as to whether Solar PV installation would benefit their building

• Provides benchmark for cost benefit calculations provided by installers during quotation phase
Development Team

• Sanjeev Kumar – Data Scientist

• Robert Brown – Power Systems Engineer

• Harish Iyer – Front End Developer