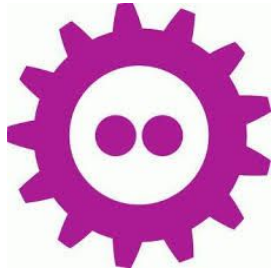
Bringing Machine Learning Renewable Energy Forecasting Models to the Open Source Community



Data engineering and other challenges implementing large ML models

with **Dr. Peter Dudfield**

nationalgridESO

UKRI Innovate UK

MANCHESTER PRIZE

The Alan Turing Institute

UCL

open data institute

Google.org

NVIDIA

What to expect

- Introduction to Open Climate Fix
- Why solar forecasting?
- Quartz Solar
- Open Quartz Solar model
- Open Data PVnet

About OCF

- Founded in 2019
- Non-profit product lab developing open-source AI solutions to decarbonise the electricity grid
- 40 years experience in AI & energy

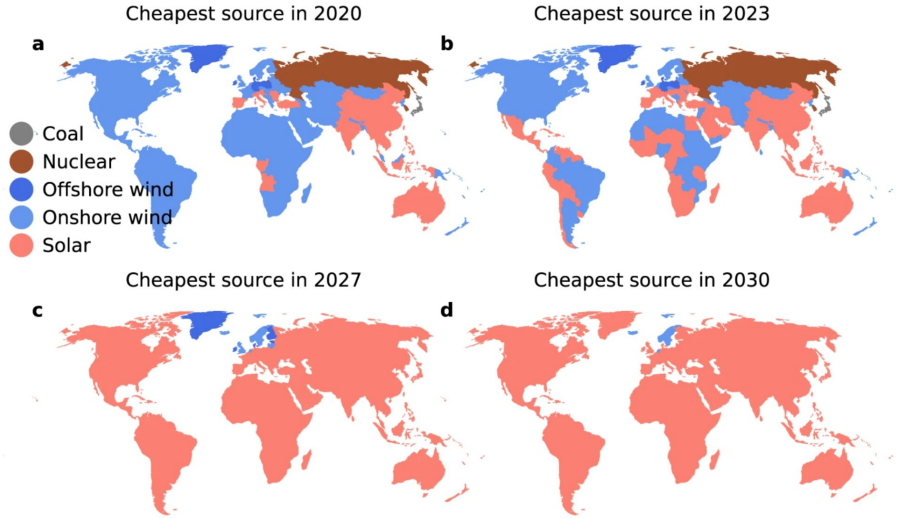
origin
SIEMENS energy
Google DeepMind
NASA
HABITAT ENERGY
KALUZA

IRCAI GLOBAL TOP 100 OUTSTANDING PROJECT 2022
GLOBAL TOP 100 OUTSTANDING PROJECT
AI solutions for Sustainable Development
unesco
IRC AI

Why Solar

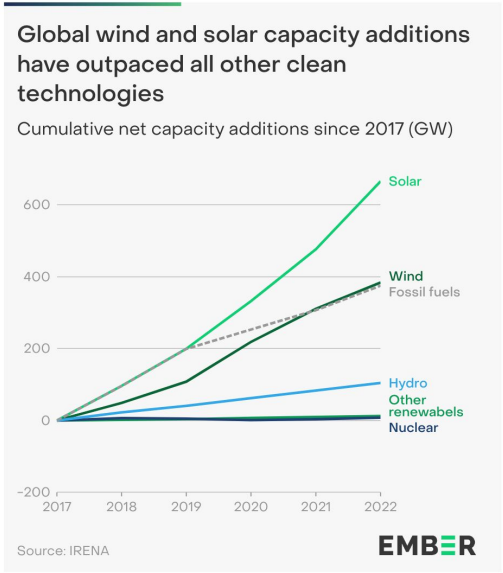
Fig. 4: Technology with the lowest $LCOE_{ssc}$ by year and E3ME region.

From: The momentum of the solar energy transition



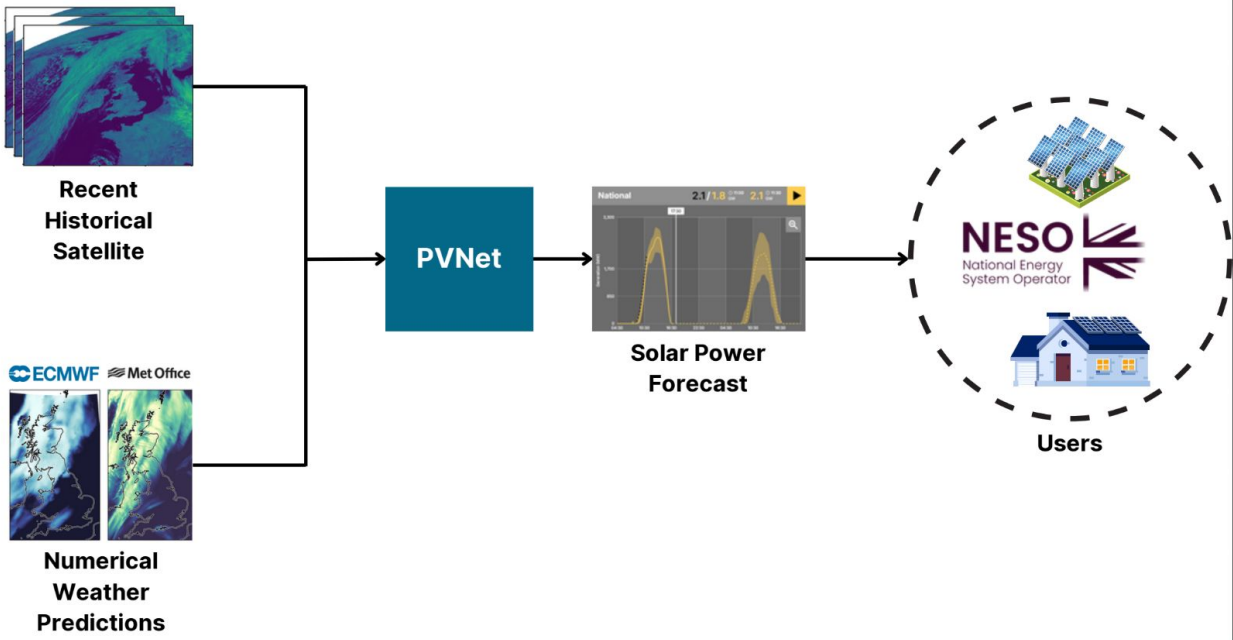
Each map shows the 70 E3ME regions: in 2020 (**a**), 2023 (**b**), 2027 (**c**) and 2030 (**d**). The biggest shift occurs between 2020 and 2027, which sees a range of technologies give way to solar PV as the cheapest source of electricity.

The momentum of the solar energy transition

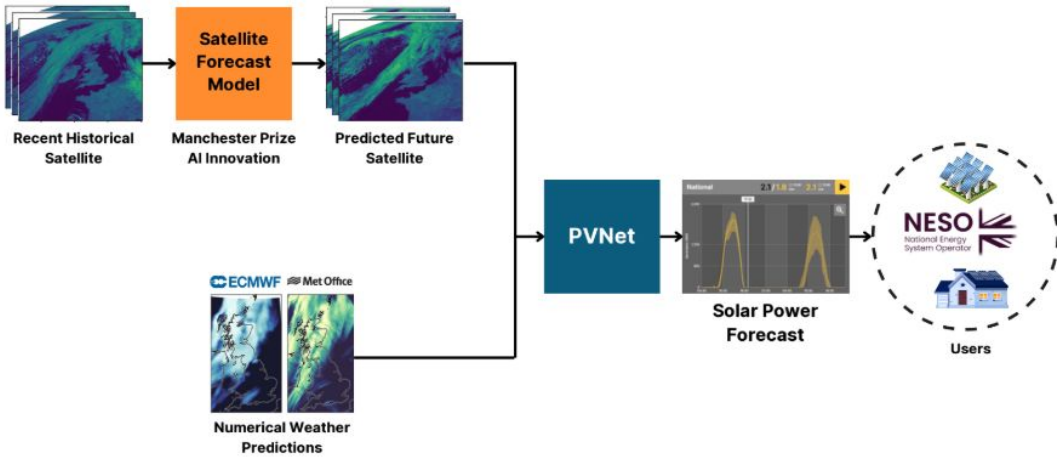


Quartz Solar

- TB's of NWP and Satellite data
- Trained ML model - PVnet
- NESO demand forecast ~8% increase in accuracy
- Saves ~100 MW of reserve settings



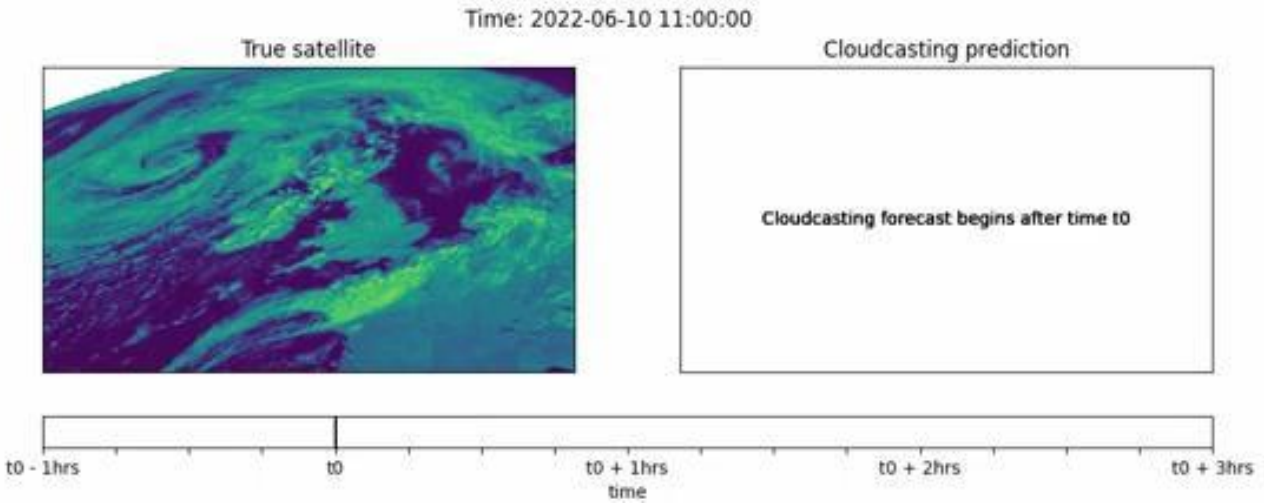
Cloudcasting - Manchester Prize



PVNet + CloudCasting

In the new system, PVNet+Cloudcasting, we first use the Cloudcasting model to predict future satellite images from recent historical satellite images. Then PVNet uses these future satellite predictions and the two weather sources to forecast solar generation.

Cloudcasting



Quartz Solar - Challenges

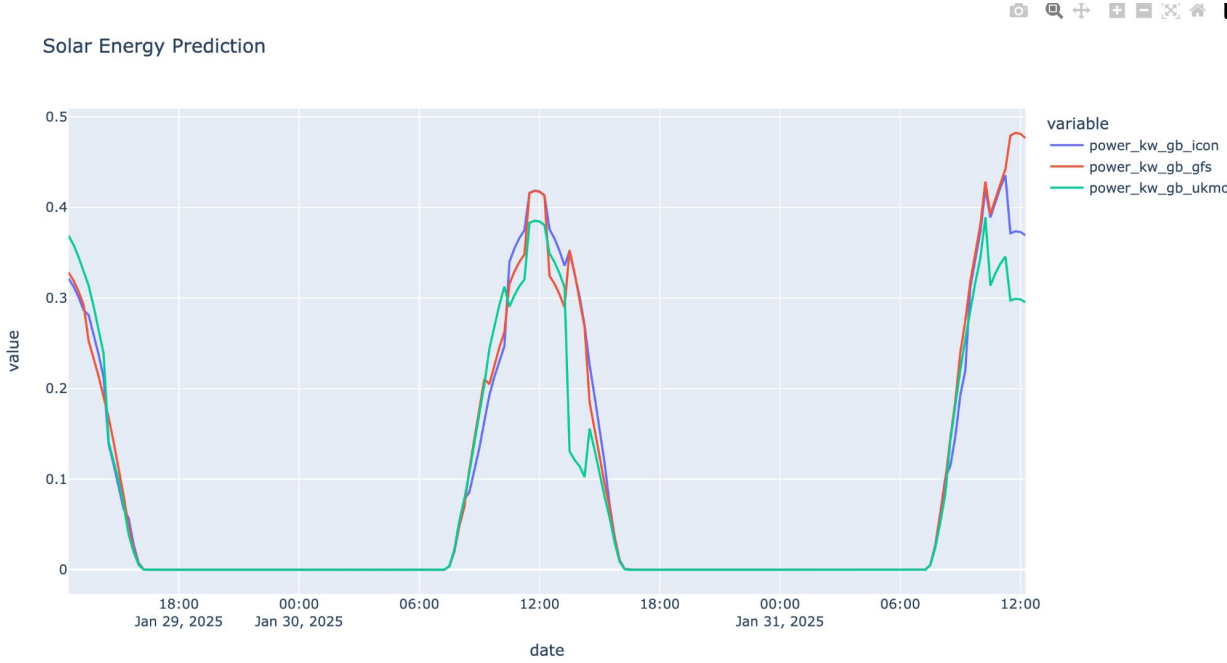
- Collecting Big Data
  - Local machines to save TB's of data
- Data is not Open Source, its paid for. How to do it Open Source?
- Training the model → making samples first
- Cloudcasting
  - Blurry
  - Pipeline of models - reword

Open Quartz - Demo

- Site level

solar forecast

  - TODO update



Open Quartz

Launched at FOSDEM 2024

Site level solar forecasting

open-source-quartz-solar-forecast Public

Open Source Solar Site Level Forecast

Jupyter Notebook 74 59

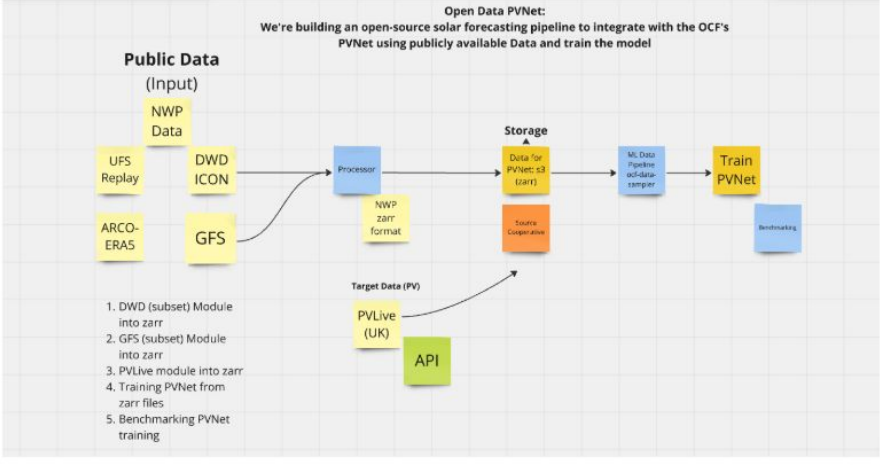
```
from quartz_solar_forecast.forecast import run_forecast
from quartz_solar_forecast.pydantic_models import PVSite

site = PVSite(latitude=51.75, longitude=-1.25, capacity_kwp=1.25)

predictions_df = run_forecast(site=site, ts='2023-11-01')
```

Open Data PVnet

Google Summer of Code

https://github.com/openclimatefix/open-data-pvnet

- Build a Solar Forecast on Open Source Weather data
  - GFS, ECMWF,
- Expand from the UK to every country
- GSOC
- Ocf-data-sampler
  - re-written ocf-datapipes

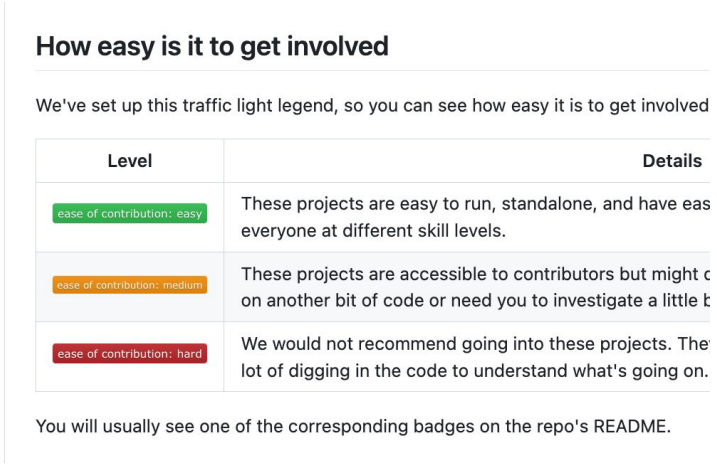


Questions

[Github]

TODO - add links actions for OS community

Thanks for listening, any questions



How easy is it to get involved

We've set up this traffic light legend, so you can see how easy it is to get involved

Level	Details
ease of contribution: easy	These projects are easy to run, standalone, and have eas everyone at different skill levels.
ease of contribution: medium	These projects are accessible to contributors but might c on another bit of code or need you to investigate a little b
ease of contribution: hard	We would not recommend going into these projects. The lot of digging in the code to understand what's going on.

You will usually see one of the corresponding badges on the repo's README.