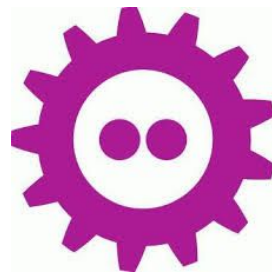


Bringing Machine Learning Renewable Energy Forecasting Models to the Open Source Community



Data engineering and other challenges implementing
large ML models

with **Dr. Peter Dudfield**

nationalgridESO



Innovate
UK

**MANCHESTER
PRIZE**

The
Alan Turing
Institute



Google.org





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



**GLOBAL TOP 100
OUTSTANDING PROJECT**

AI solutions for Sustainable Development

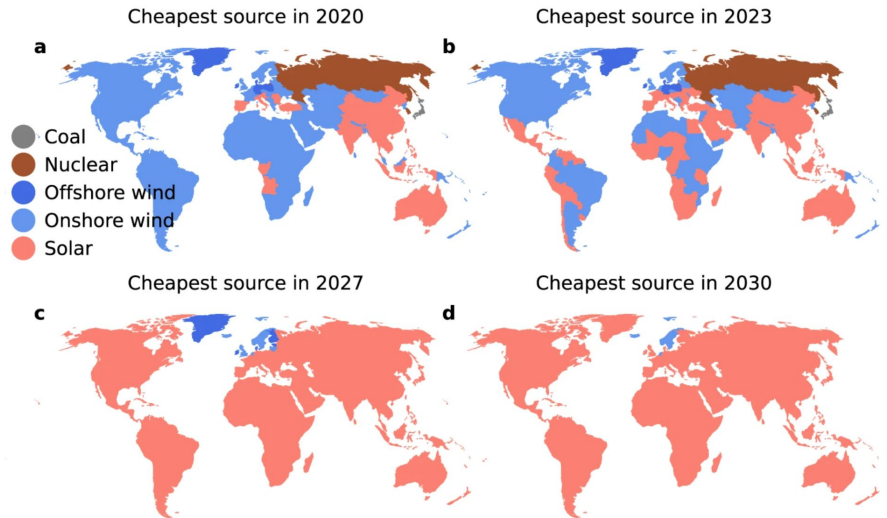




Why Solar

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

From: [The momentum of the solar energy transition](#)

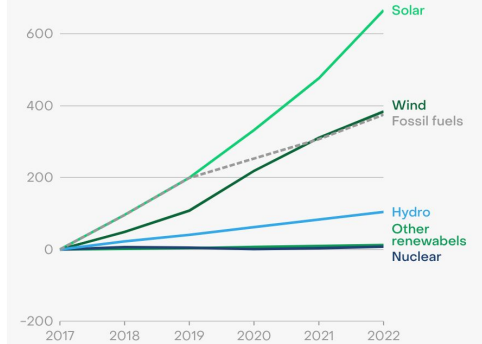


Each map shows the 70 E3ME regions: in 2020 (a), 2023 (b), 2027 (c) and 2030 (d). The biggest shift occurs between 2020 and 2027, which sees a range of technologies give way to solar PV as the cheapest source of electricity.

[The momentum of the solar energy transition](#)

Global wind and solar capacity additions have outpaced all other clean technologies

Cumulative net capacity additions since 2017 (GW)

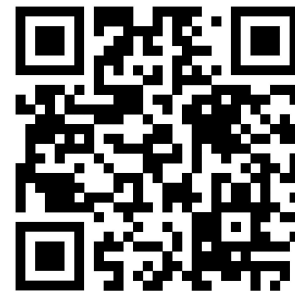


Source: IRENA

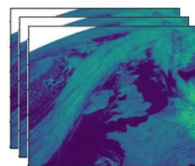
EMBER



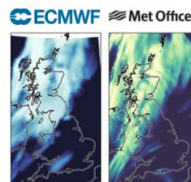
Quartz Solar



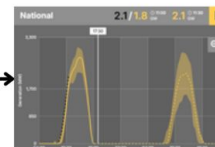
- TB's of NWP and Satellite data
- Trained ML model - PVnet
- NESO demand forecast
~8% increase in accuracy
- Saves ~100 MW of reserve settings



**Recent
Historical
Satellite**



**Numerical
Weather
Predictions**



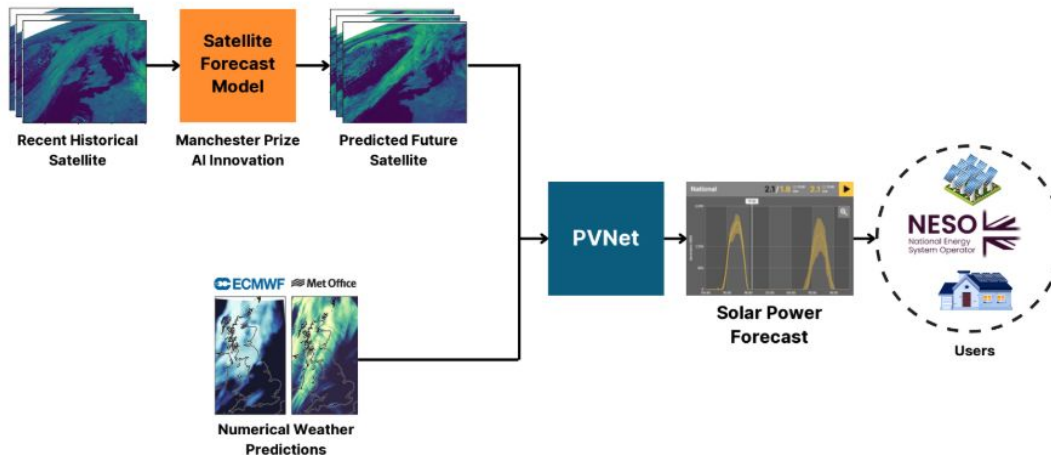
**Solar Power
Forecast**



Users



Cloudcasting - Manchester Prize

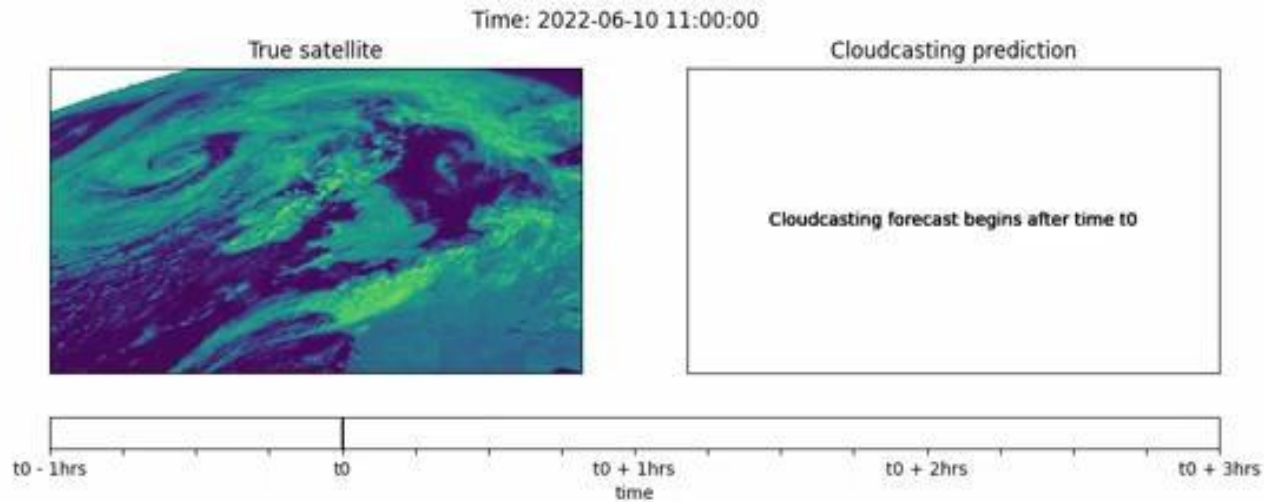


PVNet + CloudCasting

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





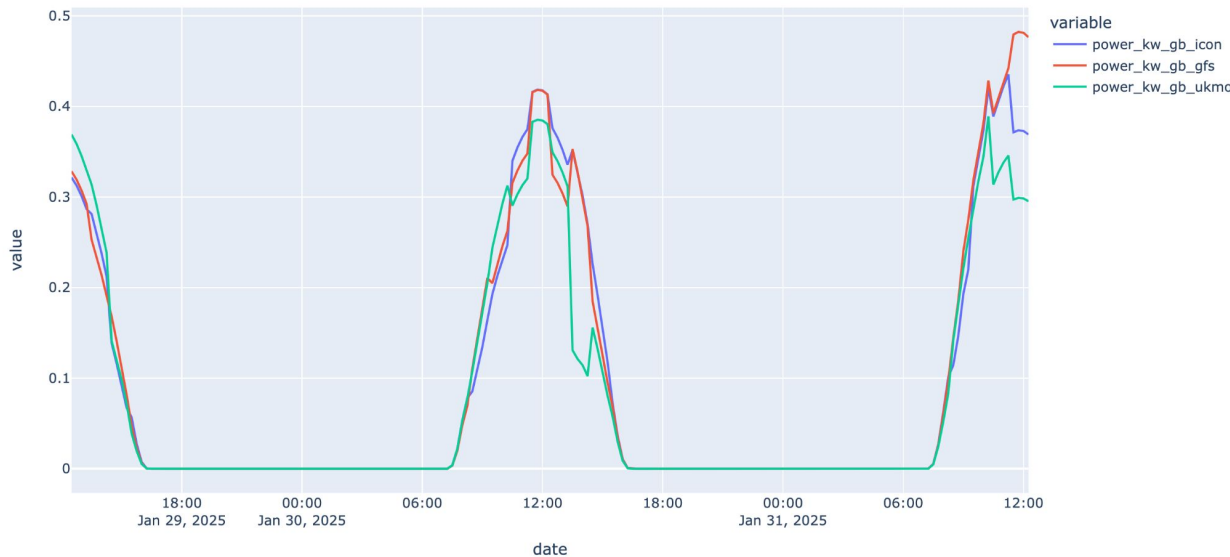
Open Quartz - Demo

- Site level

solar forecast

- TODO update

Solar Energy Prediction





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')
```

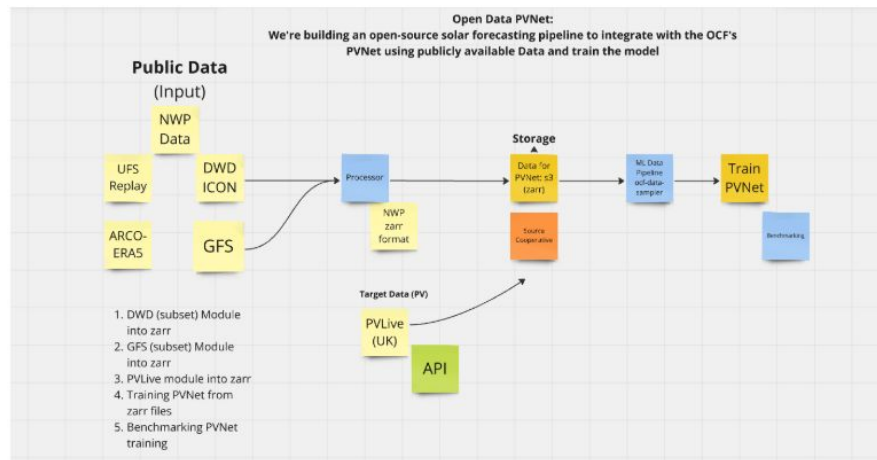


Open Data PVnet



<https://github.com/openclimatfix/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





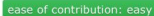
Questions

[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
	These projects are easy to run, standalone, and have eas everyone at different skill levels.
	These projects are accessible to contributors but might c on another bit of code or need you to investigate a little t
	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.