Visualising Daily Solar Supply

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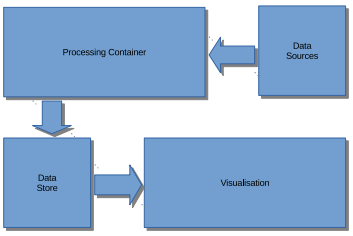
Abstract

Daily Solar supply is important. Providing data on daily solar supply is novel. The data is provided with a 3D interface. Search through geographical areas. View the data by visualising in natural ways.



1 Introduction

1.1 Broad

This project describes the design and implementation of OpenSolar, including building the product system, the theory behind it's estimates and ways that it can be used.

The main part of OpenSolar is a visualisation that displays a 3D visualisation of photovoltaic (PV) sytems for any postcode region in Australia. The other major part of OpenSolar is a data processing backend that formats existing data and also estimates the daily power output.

These values make it easy to find data on daily PV output. We provide data on PV sytem installations per residence, total capacity and daily power output for regions as small as a postcode area, and also display state and national totals.

1.2 Specific

The visualisation is made in WebGL and WebAssembly, because these technologies are available on all modern devices. Anyone can access the data and visualisation by using a web browser.

The data processing is calculated daily, using a docker container with a timed script to execute the process.

The two parts need to communicate, so that the daily data can be accessed by the visualisation. We host the visualisation on Github Pages, which loads a static page from a git repository. We give the docker container access to the same git repository, where it uploads the formatted data files.

2 Background

Solar growing, millions of $s, mandated energy targets. Interest of PV to power companies. Interest of PV to small system owners and community at large.

3D visualisation is an easily available and accessible way to express solar supply. The data can be very dense, so 3D visualisation makes it more interesting.

The solution is available on any device.

Some source data was provided. Some was missing. Part of the project was to find out what the missing data was.

We ended up asking how much solar power is generated each day? There wasn't a good answer, so to find out we had to dig up more data.

By monitoring instantaneos output and daily solar irradaince we could come up with a relation between the current installed capacity and the daily solar power generation.

With all the background data together, the visualisation has everything needed to build a solid foundation.

Digital environment - emcc compiler, opengl, webcore. With this we can generate a blank canvas that we can work from.

Navigation

Postcode to lat-lon to 3d co-ordinate system.

UI

User interface to search for place or postcode.

High-Level viewing

Simple 3D map

Adding terrain - 3D geometry. Construct mesh grids. Adjust height and tile them together. Download and parse elevation tilesets from OSM.

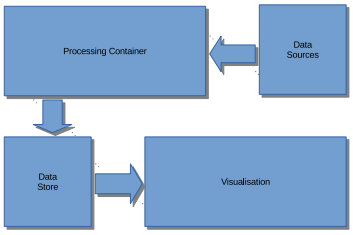
Mesh grids are uv mapped, which lets us show image tiles.

Adding buildings - 3D geometry

Representing the data in the geometry

3 Project Design

4 Results



5 Conclusion

Using this visualisation we can show PV coverage rates and pinpoint individual systems and their immediate output. We can show the projected daily output for postcode regions, and collect the data into state and country sized regions. We can display data that is generated daily using the previous day's latest solar data.

We explore how the concept of a "virtual twin" city could use virtual space to integrate a number of data services.

We explore how the tool could be used to display relevant solar data.

Acknowledgement