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Visualising Daily Solar Supply

Annotated Bibliography

The following details on solar research will cover factors that are relevant in various fields, from urban electricity grids[1], to policy decision[3][11] and geospatial analysis of potential solar density[5][6]. We can see that there are a wide range of projects and how visualisation is used at some point in the project. This will help shape our initiative and find gaps where our proposed visualisation may be useful.

Background

One of the interesting things about solar research is that it covers a wide range of disciplines. In Modelling the Uptake of Energy Efficient Technologies in the Residential Sector[7], the authors cover topics such as power grid engineering, location geography, and how policy affects the uptake of solar power output. This research aims at reducing planning costs in solar projects. 3D visualisations are used for modeling and demonstration purposes.

A more specific example can be found in Causal loop modelling of residential solar and battery adoption dynamics: A case study of Queensland, Australia[2]. This is a local study and by looking at how they used the tools available, we can identify gaps as well as evaluate the value of other visualisation tools. The study recommends an energy policy to achieve long term goals as well as technical optimisations in pv-panels and batteries.

A planning system for solar projects is described in GIS-based decision support for solar energy planning in urban environments[9]. The system uses an energy model and GIS planning software using a relational database. Discusses impact on an urban scale.

Another important tool for planning solar projects appears to be Townscope II—A computer system to support solar access decision-making[10]. Uses spherical projections to assess sites for solar potential and sky view. Also develops a "computer system"[10] to support decision making. 3D urban "information system"[10] with a set of solar tools.

Since there is so much software for different aspects of solar project planning, there is even a State-of-the-art review of solar design tools and methods for assessing daylighting and solar potential for building-integrated photovoltaics[4]. This looks like an important article. The review is a large overview, looking at over 200 software products, factors of solar design and

pv-systems. Looking at integration into CAD and BIM software as an integraded design process.

Finally, to assess the state of the art, Design and development of distributed solar PV systems: Do the current tools work?[12] There are currently a range of tools and it it interesting to see how they fit into the current design process and what needs to be improved. As well as covering different solar design tools, this should be a good reference for project workflow. Importantly, it explains factors and aspects that go into PV project decisions.

Freely available data sources

Solar supply can come from photovoltaic (PV) generators on homes, busineses or large power stations.

Solar and renewable energy is a growing market in Australia. The Australian Government Clean Energy Regulator writes in The Renewable Energy Target 2018 Administrative Report that the number of small and mid-size PV installations is increasing, and 86% of the 361 newly accredited power stations are solar PV.

For daily solar supply specifically, the Australian PV Institute (APVI) provides time-series data by postcode.

The Australian Renewable Energy Agency (ARENA) provides funding to energy projects, including solar, and supports the APVI project.

The data source is availaible at http://pv-map.apvi.org.au/

Direction of reearch

The current research should focus on using existing data in a new and novel way. Some kinds of visualisation in 3D and VR haven't been done with solar supply data before. We will be looking at how this kind of visualisation can assist in engagement and energy literacy. The nature of this topic is broad and will also touch on many aspects of other solar projects and evolve as uptake increases.

The heading of "Smart Cities" covers aspects of data, feedback and integrated systems with high level of engagement between citizens and urban systems.

These publications will be more relevant for the design and visualisation of an engaging display which feeds into the solar supply data. [8] [14] [13]

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