1. **Devices**

Device suitable for Solar Panels Ltd Solar Configuration system include any device that can run a web browser. The optimal display experience is on a laptop or desktop PC.

1. **Operating Systems**

The web application is suitable for operating systems optimal for running latop or desktop PCs, for example:

* Windows 10
* MAC OSX
* Debian 11
* Ubuntu 20.04.3 LTS

1. **Browsers**

Recommended browsers are those that have been tested. The software is not recommended for Internet Explorer. Internet Explorer is now obsolete and is still available on Windows to run legacy enterprise applications (Asus, 2020):

* Google Chrome
* Mozilla Firefox
* Microsoft Edge

1. **Other requirements:**

Standard human input devices will be required to run the application including:

* Mouse
* Keyboard

The web application requires the user have a stable Internet connection for the following dependencies:

* Google Charts (Frozen Charts v.51) to display the customers data graphically on the webpage.

The application utilises 2 APIs to configure the data specifically for your location. These are:

* GetTheData (api.getthedata.com) an organisation of UK open-source data which is used to find the latitude and longitude from a postcode.
* Meteomatics (api.meteomatics.com) to retrieve global forecast data. The application utilises the sun-elevation data.

1. **Programming Languages & Version**

* HTML5 and CSS3 supported by all modern web browsers
* JavaScript (ECMAScript 2016)
* JQuery (1.10.2)
* XAMPP
  + Apache (Apache/2.4.46 (Win64) OpenSSL/1.1.1g PHP/7.4.10)
  + PHP (7.4.10)

1. **Database and Version Information**

Local development of the web application was configured with the following:

* PHPMyAdmin (5.0.2)
  + MySQL 5.5

The production system can be configured with the following:

* MySQL 5.5

1. **Required tools**

* Visual Studio v.1.60.0 for configuration management by system administrators
* Compression tool to extract the project to the web server, 7-Zip 19.00 is suggested

1. **Where to find all resources**

The complete list of system resources can be found in the following public GitHub repository:

<https://github.com/mcbreese/solar-panels>

Complete list of system files and resources:

* HTML webpages
* CSS (Folder)
* JS (Folder)
* Resources (Folder) containing the PHP scripts
* SQL containing the solar SQL database

User Documentation:

1. **Steps to deploy the application**

Steps to deploy AWS t3.micro instances can be found here:

https://docs.aws.amazon.com/AWSEC2/latest/WindowsGuide/EC2\_GetStarted.html

Deploy the system as described in the maintenance plan below, however for production servers changes the xampp.conf file found in <install directory>\apache\conf\extra

Change the phpMyAdmin from ‘Require local’ to ‘Require all granted’ to allow external access.

Text

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There are a series of self-checking tests for validation on each of the web pages. Open the console to identify this information. E.g., in Google Chrome this can be found in the options menu and ‘Developer Tools’.

Graphical user interface, text, application

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Upon deployment access to the application will be resolved against the domain name of the organisation:

* https://application.solar-panels-ltd.co.uk/

1. **Maintenance Plan**

Due to the application simplicity the application maintainability requirements are regarded as being low. Should the application require maintenance this can be done by exporting the system into a local ‘test’ development system using XAMPP.

* 1. Install XAMPP
  2. Import the project files into the htdocs folder in the XAMPP folder
  3. Graphical user interface

     Description automatically generatedGraphical user interface, application

     Description automatically generatedRun XAMPP, start the Apache and MySQL services
  4. Go to http://localhost/phpmyadmin/index.php and import the SQL database provided in the GitHub repository: https://stackhowto.com/how-to-import-database-in-phpmyadmin/
  5. Go to http://localhost/<name of folder>/ to access the test system

The code comments in the system files should provide assistance in the role of each function for troubleshooting purposes.

Maintenance will be required on the dependencies including Google Charts and jQuery if new versions are released. This should be reviewed yearly starting from the system deployment date (10th September 2021).

1. Customer and System Administrator Manual

**Customer Manual – Solar Panels Ltd**

1. Register for the Solar Panels Ltd Service.
   1. Fill out the fields on the following screenshot.
   2. Table

      Description automatically generatedClick register to be taken to the login page.
2. Graphical user interface, application

   Description automatically generatedSign in using your username and password you just registered with:
3. Upon login you get the option to chage budget
   1. Graphical user interface, application

      Description automatically generatedType in a value and click submit
4. Any data configured by the system administrators will be displayed as your options on the left and in a line and bar chart on the right

*Note: if you have no data configured then this page will be blank*

Graphical user interface, text, application

Description automatically generated

1. Graphical user interface, application

   Description automatically generatedOn the same page, select the option you want to continue with and press submit.

Congratulations you are on the next step to your solar panel installation in your home!

**Administrator Manual – Solar Panels Ltd**

1. Graphical user interface, application

   Description automatically generatedLog in using ‘admin@solar.co.uk’ and ‘solar’ as the password:
2. This will take you through to the power generation page. Here you need to fill out the following to configure data for the customer:
   1. Customer ID – to match data with their account
   2. Roof angle of the customers house
   3. Solar panel type (3 options)
   4. Average temperature in summer
   5. Roof area
   6. Cost per solar panel
   7. Graphical user interface, application

      Description automatically generatedThen click **submit**
3. The page will output the calculations and submit the data into the database. The breakdown shows the power made at noon for both solstices, the install cost, and the cost per watt.

Graphical user interface, text, application

Description automatically generated

1. Click next to go to the battery power page. On this page you complete a similar exercise as before by filling in fields, but the output will tell you how much of the day the battery is likely to last before the customer requires energy from the national grid.
   1. Power consumption of the house
   2. The efficiency of the battery in the proposed installation
   3. The efficiency of the PDM in the proposed installation
   4. The battery capacity
   5. The battery voltage
   6. Graphical user interface

      Description automatically generatedThen click submit
2. Chart, line chart

   Description automatically generatedThe page will then inform the admin of the hours the battery is likely to be discharged over summer and winter and display this on a line chart. The data is saved to the database.
3. Click next to go to the telemetry page. Enter the size of the OBC data storage being deployed to the customer, this determines how often an engineer callout is required. The click submit.

Graphical user interface, application

Description automatically generated

1. This is the final step for the system administrator unless they want to configure another option for the customer. Click next to begin the process again!