ElectroBits
Requirements Document

Solo Solar

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1 PROJECT OVERVIEW

1.1 System Overview & Objective

Solo Solar installs and maintains solar panels on suitable roof tops or surfaces on private property. A user gives permission to SS to install solar panels on the specified area. These solar panels then generate electricity that gets fed back into the grid. Eskom pays SS for the contribution accordingly, and then SS compensates the owners of the property for the usage of the specified space.

The 1st objective of the system would be to provide a website where potential users can quickly and easily determine an accurate expected earning potential of their available surfaces. This is achieved by accepting user input about all the required information of the property and then calculating the potential generating capacity, while taking into account the surface area, type of panels, location, direction of the surface and lastly the intensity of the sun in that area (weather patterns, google API).

A major factor of potential generation is the location of the property, there for an additional function of the system is to automatically gather the coordinates of the user by looking at the location of the user's device. Alternatively there will be a map where a user can locate their property and thus get the coordinates.

The system makes use of a database to store things such as: User, property, and solar panel details as well as the amount of power generated by each property, each day, in order to calculate the amount of remuneration payable to each client at the end of the month.

1.2 System Assumptions

We assume that our clients either already know their current roof dimensions or have the ability to work it out and provide us with these measurements. Eg elderly person might not be able to measure their roof.

1.3 Deliverables Out of Scope

To provide the user with an area drawing tool using google maps. Users may find their house or business on a map and draw a virtual border around the edges of the building. The estimated square meterage of the building's roof will be calculated as a result of this drawing.

To create an online marketplace where clients can view a multitude of solar products from local suppliers.

- Implement a Solar panel fault notification system.

1.4 Stakeholders

1.4.1 Business Actors

Actor	Role
Eskom	Directly receives electricity generated by our clients, and calculates how much we should be compensated for the contribution to the grid, as well as approve special large scale installations to ensure the infrastructure can handle the additional electricity flow.
Google API	Takes in a given co-ordinate representing particular clients' residential location which will then return an efficiency/performance rating for our solar panels in the clients' area.
Meters	This hardware allows us to monitor the generation of electricity for each of our clients. This information can then be used to generate further individual statistics.
Clients	Views and reads limited content on the Solo Solar including publications submitted, and their location. Provide the system with the necessary information for us to calculate the potential earnings, along with a multitude of other statistics, of renting their roofs to our company.
Administrator	- Processes applications and checks the legitimacy of home owners. - Maintains the Solo Solar online system by reviewing and updating code.

1.4.2 Development Team

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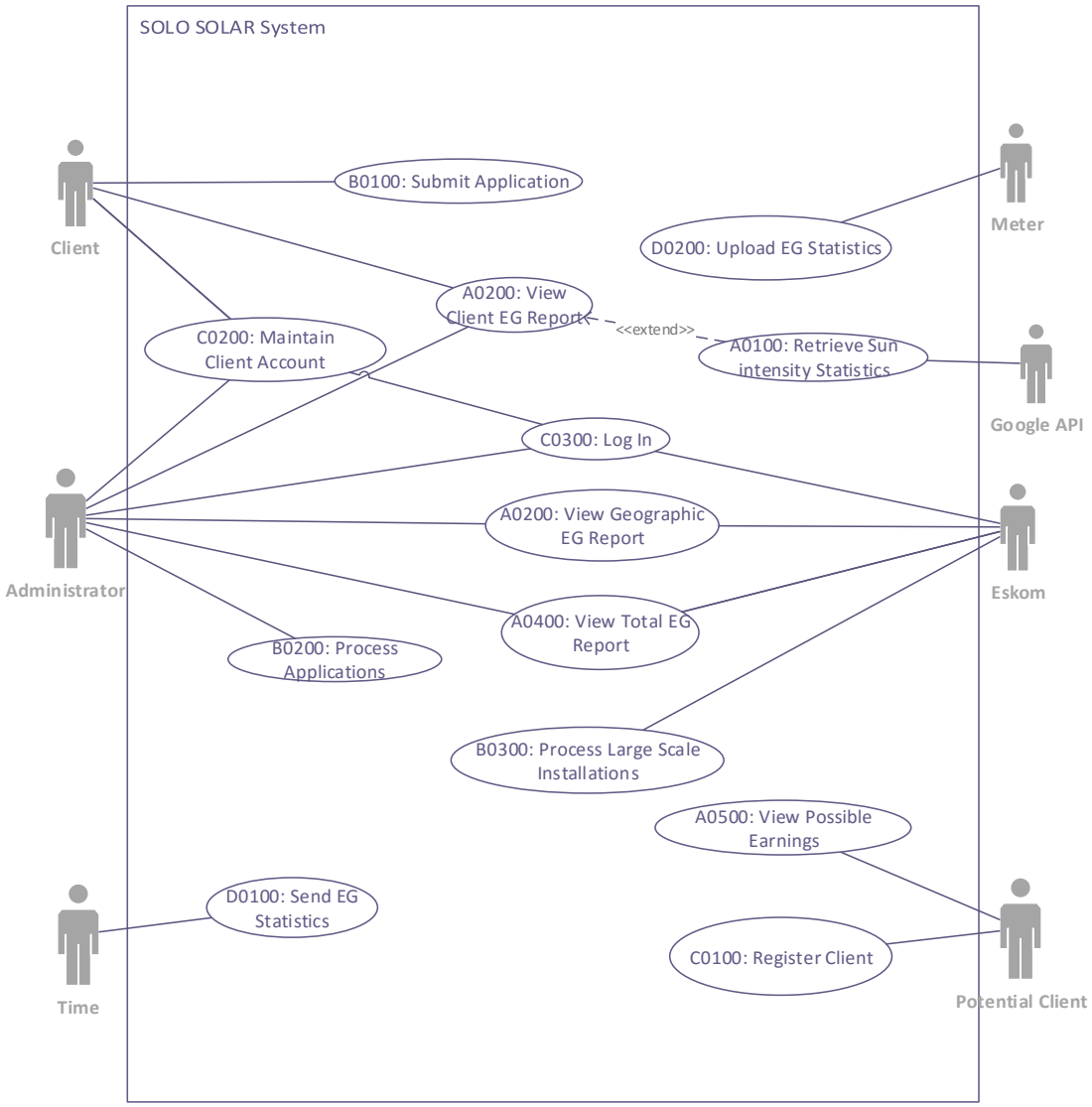
2 FUNCTIONAL REQUIREMENTS

2.1 Business Rules

1. A client is able to log in and out of the system.
2. A client may only have one account.
3. The system may have many accounts.
4. A client may only be logged on to a single system at any particular time.
5. Only one instance of a specific account can be logged into the system at any given time.
6. A client may maintain their account information.
7. A client may have more than one property assigned to his account.
8. Each property may only have a single meter assigned to it.
9. A client with many properties will have more than one meter.
10. A client may view their specific electricity generation report.
11. Only a meter can publish electricity usage to the system.
12. The client must have proof of ownership for each of his associated properties.
13. In order for a client's application to be approved, the property must first undergo an inspection by the technician.
14. Large scale installation applications need to be approved by Eskom as well.
15. Only an administrator may process and accept applications.
16. Only an administrator may generate all reports.
17. Eskom may generate geographic and total EG reports.
18. A Potential client may view their potential earnings.

2.2 Business Use Case Model



2.3 Use Case Glossary

Package Id: A	Package Name: Report Package	
Use Case Id	**Use Case Name**	**Actors**
A0100	Retrieve Sun intensity Statistics	Google API
Queries/Reports		
A0200	View Client EG Report	Client, Administrator
A0300	View Geographic EG Report	Administrator
A0400	View Total EG Report	Eskom, Administrator
A0500	View Possible Earnings	Potential Client

Package Id: B	Package Name: Applications package	
Use Case Id	**Use Case Name**	**Actors**
B0100	Submit Applications	Client, Administrator
B0200	Process Applications	Administrator, Client
B0300	Process Large Scale Installations	Eskom
Queries/Reports		

Package Id: C	Package Name: Account package	
Use Case Id	**Use Case Name**	**Actors**
C0100	Register Client	Potential, Client
C0200	Maintain Client Account	Client, Administrator
C0300	Log In	Client, Administrator, Eskom
Queries/Reports		

Package Id: D	Package Name: Statistics Package	
Use Case Id	**Use Case Name**	**Actors**
D0100	Send EG Statistics	Client
D0200	Upload EG Statistics	Meter, Time
Queries/Reports		

2.4 Use Case Narratives (User Stories)

2.4.1 Package A: [Report Package]

Use Case ID	Use Case Name	
A0100	Retrieve Sun intensity Statistics	
Primary Business Actors		**Other participating Actors**
Google API		
Description	This integrated system will take coordinates representing a client's roof location, and will return sun intensity ratings of that location.	
Pre-Conditions	• The coordinates entered, needs to be valid	
Triggers	Whenever an estimation needs to be calculated involving sun intensity statistics.	
Post-Conditions	The system has received the sun intensity statistics of the specified location.	
Basic Flow of Events	1. A location rating needs to be calculated. 2. Anyone can navigate to the sun intensity page 3. The system then displays a window with the required input fields 4. User fills in their location. 4. Calculate button is clicked 5. The system then uses an integrated Google API system to calculate and return a rating of the client's efficiency/performance of their panels by using the user input. 6. The client's rating is then displayed. Alternate flow of events	

Use Case ID	Use Case Name	
A0200	View Client EG report	
Primary Business Actors		**Other participating Actors**
Client, Admin		
Description	A client views various electricity generation statistics including but not limited to the amount generated currently, day, week, month, year and total, as well as the corresponding rand value. Admin can also view any client's report	
Pre-Conditions	· Client needs to be registered Be logged in Currently residing on the dashboard page · Have functional solar panels installed on roof	
Triggers	Clicking on the "view Stats" button, which is located on the dashboard.	
Post-Conditions	A page is displayed with all the various statistics visible	
Basic Flow of Events	1. Click "view stats" button 2. system queries the database and compiles an appropriate report 3. The page containing all the electricity generation statistics for the associated client is displayed.	

Use Case ID	Use Case Name	
A0300	View Geographic EG Report	
Primary Business Actors		**Other participating Actors**
Administrator		
Description	The electricity generation for all clients is stored in the database. Admins have the ability to view the electricity generation statistics for a given geographic location.	
Pre-Conditions	• The admin is logged in. • The database contains data of clients i.e. not empty.	
Triggers	• Business report for clientele and their generation in a certain province/city etc. • Monitor performance of certain areas. • Gather useful business information on specific locations.	
Post-Conditions	The admin views the report.	
Basic Flow of Events	1. The admin navigates to the dashboard page. 2. The admin selects the “view geographic report” button. 3. The admin views the report.	

Use Case ID	Use Case Name	
A0400	View Total EG Report	
Primary Business Actors		**Other participating Actors**
Eskom, Administrator		
	Eskom is able to view the total electricity generation by all Solo Solar clients nationwide.	
Pre-Conditions	• Eskom has logged in. • There exists at least one clients in the Solo Solar database who are generating electricity. • Eskom has navigated to their dashboard page.	
Triggers	Eskom selects the “view total generation report” button.	
Post-Conditions	Eskom views the total electricity generation report.	
Basic Flow of Events	1. Eskom logs in. 2. Eskom navigates to the dashboard page. 3. Eskom selects the “view total generation report” button. 4. Eskom views the report.	

Use Case ID	Use Case Name	
A0500	View Possible Earnings	
Primary Business Actors		**Other participating Actors**
Potential Client		
Description	A potential client can view the estimated earning potential of the solar panels that would be installed on their roof. This information is calculated by taking into account the roof dimensions and location.	
Pre-Conditions	• The potential client must online, and browsing the Solo Solar website.	
Triggers	The “View possible earnings” button is clicked by a potential client.	
Post-Conditions	The possible earnings is displayed by the system.	
Basic Flow of Events	1. Potential Client navigates to the system's main menu. 2. Potential Client clicks on “View possible earnings” button. 3. The system then displays a window with the required input fields the client needs to fill in. 4. Potential Client fills in their required location and roof information. 5. Potential Client clicks on a generate earnings button. 6. The system then calculates the potential earnings with the given user input. 7. The system then displays the Potential Client’s earnings based on their inputs.	

2.4.2 Package B: [Applications Package]

Use Case ID	Use Case Name	
B0100	Submit Application	
Primary Business Actors		**Other participating Actors**
Client		Administrator
Description	When a client wants to install solar panels on their property they need to fill in and submit an installation application form.	
Pre-Conditions	- User need to be a registered client. - Client needs to be logged in to the system.	
Triggers	A Client clicks on the “Apply” button.	
Post-Conditions	The system receives an client’s solar installation application form.	
Basic Flow of Events		

Use Case ID	Use Case Name	
B0200	Process Applications	
Primary Business Actors		**Other participating Actors**
Administrators		Clients
Description	It is the admins responsibility to receive solar panel installation applications. The admin then assigns the application to the appropriate technician. The client’s application status will be set after it is received back from a technician i.e. Approved or Declined. It is also the duty of an admin to send large scale installation applications to Eskom for further approval.	
Pre-Conditions	● A client must be successfully registered in the database. ● A client must have passed the online approval (i.e. dimensions were valid, not negative, too small or too big) ● A client must have sent an application to take part in our service. ● A technician needs to be hired and available for distribution to the physical sites.	
Triggers	A client submits an application.	
Post-Conditions	Client's application request is approved or rejected.	
Basic Flow of Events	1. The system receives an application. 2. The system sorts the applications by type (large scale or	

	standard). 3. The admin reviews the legitimacy of the application. 4. The Admins assigns a technician to perform an on-site evaluation for the client's property. 5. The technician submits his completed evaluation form to the system. 6. For standard applications, the admin selects either approve or reject for the client's application status. For large scale applications, if Solo Soar's technician has approved it, the application is forwarded to Eskom, otherwise the application is rejected altogether. 7. The Admin receives Eskom's verdict and either fully approves or rejects the application. 8. The system then notifies the client of their applications status.

Use Case ID	**Use Case Name**
B0300	Process Large Scale Installations

Primary Business Actors	**Other participating Actors**
Eskom	

Description	Eskom needs to approve large scale installations in order to ensure the grid can handle the additional electricity flow. This is because of the laws in South Africa regulating power generation along with the infrastructure that is actually available in and around the applicant's property. Eskom deals with these applications in their own discretion and merely reports back with a simple approved or rejected status.
Pre-Conditions	There exists an application for a large scale installation which has already been approved by an admin.
Triggers	Eskom receives a large scale installation application from an admin.
Post-Conditions	Application is either approved or rejected and the Solo Solar system is notified.
Basic Flow of Events	1.Admin performs the first part of the application evaluation and submits it to Eskom. 2.Eskom receives the application. 3. Eskom performs their own evaluation and sends the results along with feedback. 4. The admin then approves or rejects the application based on Eskom's verdict.

2.4.3 Package C: [Account package]

Use Case ID	Use Case Name	
C0100	Register Client	
Primary Business Actors		**Other participating Actors**
Potential Client		Administrator
Description	A potential client interested in installing our solar panels on their roof can become an actual client by registering on the system. Here personal information will be collected and stored in a database	
Pre-Conditions	· The desire to install our solar panels · The client must be able to provide the following information: ○ Estimated dimensions of usable roof space	
Triggers	A potential client clicking on the register button.	
Post-Conditions	● An account is created on the database containing all the relevant information. ● The client is now able to log in using his email address in combination with a password, and has access to the client dashboard. ● the client can now apply for solar panels	
Basic Flow of Events	1. Click on registration button 2. Fill in personal details 3. Click agree to terms and conditions and submit 4. System then verifies potential client input. 5. A Screen is displayed prompting the potential client to go their email inbox and click on the link confirming the registration. 6. A screen is displayed informing the potential client that the registration was successful and that he is now an actual client, on the screen is a button that takes the client to their account maintenance page(calls the maintain account use case)	

Use Case ID	Use Case Name
C0200	Maintain Client Account

Primary Business Actors	Other participating Actors
Client, Administrator	

Description	A Client may have need to update various account details. In some cases, admin can also update a client's account details.
Pre-Conditions	● The system has registered clients. ● Either Admin or is logged in.
Triggers	● The "Edit Client Details" button is clicked because Details needs to be updated
Post-Conditions	● Client Details is updated and all changes are saved.
Basic Flow of Events	1. Client logs in. 2. Client navigates to Client Dashboard. 3. Client clicks on "Edit Client Details" button 4. Details Client Details are displayed 5. Client inserts/removes/edits or reads the data in the 6. Client clicks "Save Changes" and is redirected to back Client dashboard. Alternate flow: 1. Admin logs in. 2. Admin navigates to Admin Dashboard. 3. Admin clicks on "Edit Client Details" button 4 Admin enters specific Client ID 5. Details Client Details are displayed 6. Admin inserts/removes/edits or reads the data in the 7. Admin clicks "Save Changes" and is redirected to back to the Admin dashboard.

Use Case ID	Use Case Name	
C0300	Log In	
Primary Business Actors		**Other participating Actors**
Client, Eskom, Admin		
Description	A client is able to log into their account using their email address and password, either to maintain account details or to view their dashboard.	
Pre-Conditions	· The person must be successfully registered as a client · The person must have the desire to log in	
Triggers	Click on the “login ” button	
Post-Conditions	The client is logged in and has access to the dashboard and all other settings and information.	
Basic Flow of Events	1. Click Account login button 2. Enter email address and password 3. Click login button 4. System verifies email address and password 5. Taken to client dashboard	

2.4.4 Package D: [Statistics Package]

Use Case ID	Use Case Name	
D0100	Send EG Statistics	
Primary Business Actors		**Other participating Actors**
Time		Client
Description	At predetermined time intervals (set by Client), a report will be sent to all the clients that are registered on the system. This notification will include a report of the client's total electricity generated for the time specified.	
Pre-Conditions	• The client needs to be registered on the system. • The client needs to have at least a single functional EG system. • The client must have opted to receive a notification from the system, as well as specified the time intervals on which to receive the report	
Triggers	Time interval reached, as specified by client	
Post-Conditions	The EG report has been sent to the client at the specified interval.	
Basic Flow of Events	1. The reoccurring time interval is reached. 2. The system compiles the specific EG report 3. The system sends the report to the client.	

Use Case ID	Use Case Name	
D0200	Upload EG Statistics	
Primary Business Actors		**Other participating Actors**
Meter		
Description	The meter periodically (hourly) uploads generation data to the database, and notifies the client according to the client's specified notification intervals.	
Pre-Conditions	· Have solar panels installed and functioning · Have the meter assigned to a particular client's active account	
Triggers	Time , hourly uploads	
Post-Conditions	The database reflects the electricity generated by a specific meter after a specific time on a specific account	
Basic Flow of Events	1. Meter gathers electricity generation data from the solar panel. 2. Every hour the meter transmits electricity generation data to the system. 3. The system receives and process this data 4. System notifies the user	

3 NON-FUNCTIONAL REQUIREMENTS

3.1 Interface Requirements

Solo Solar will be implemented in the form of a web based system. The system will be created following a minimalistic design trend. This design avoids cluttering which assists in creating a professional look for efficient and effective use. Its seeks to simplify interfaces ensuring the user feels in control at all times. The system employs creative and innovative principles which lead to an enjoyable user experience.

Usability goals:

Effectiveness
Due to Solo Solar's business model, accuracy is of utmost importance. It aims to truly bring to light the benefits of using our service. This means that giving the user meaningful and precise information is a number one priority. With this in mind the system includes only the most vital information and gives the users exactly what they came for in an effective manner

Efficiency
The number one priority of a business may be to satisfy the clients needs however the manner in which this is done is just as important. For this reason, the navigation in and around the website is smooth and simple, making for an easy flow through the important steps of the website. Not only should navigation be a breeze but so should the calculations involved during the query process. No calculations or functions should take longer than 3 seconds to compute and no webpage should be out of reach after 3 clicks.

Saftety

Data theft is a real threat that websites in particular have to deal with and Solo Solar recognises the seriousness of this. The database will be storing sensitive information such as street addresses and other personal information about the user. The user is therefore required to login with their very own unique client ID and client password to gain access to their stored information.

Utility

Functionality plays a large role in the Solo Solar website. The aim is to give the user the useful information that they need as quickly and as easily as possible. To do this all the different tools that give access to the functions which a user of the system may perform are all displayed within one page called the dashboard.This page serves as a hub and provides a clear path for users to edit personal information, view reports on their properties electricity generation and apply for a new property etc.The Dashboard page is one click away from any page in the website.

Learnability and Memorability

Solo Solar intends on providing a straightforward process for users to have no hassles in obtaining the information they desire. The best way to ease first-time registered users into reaching their goals within our system is to display pop-up tips along every step. These pop-ups may be disabled by the user once the user has a firm grasp of the website's flow. As mentioned in the above paragraph, the grouping of all essential user functions are intentionally placed within the hub. This creates a familiar page where users may easily recall their past actions taking place. Users will know that the first place to navigate to will be their dashboard when needing to perform any sort of main function. Any and all functions that are not included in this dashboard such as login, logout etc. are structured to be displayed in a consistent area of the screen where the user may recall they saw them before. E.g. logout on the top right of and breadcrumbs at the top left for every page.

User Experience Goals

Solo Solar's interface will be welcoming, simple and aesthetically pleasing. The design will leave the user with a feeling of satisfaction as well as the desire to use the system again.
The interface will be appealing and satisfying for all the users to use.

The user will be made at home by the familiar structure and consistency of the website design. The design and theme will add to a calm feeling while browsing which in turn evokes an emotionally fulfilling experience.

Clients will be notified via email about all major events occurring on the website such as a change in the client's application status. This way the client does not have to continually log on to check whether his application has been approved or rejected. This gives the user comfort and a sense of control.

User requirements

The users are expected to be able to know their available roof space dimensions (in metric units).

Users will not need to have an above average grasp of computers in order to utilise the website successfully. Thanks to the minimalistic design to the website the steps taken to achieve a user's goal are extremely clear and self-explanatory.

All newly registered users will be assumed to be novice or casual users. Upon registering the pop-ups will be displayed to ease the user into getting to where the important functions and explain how to use them.

For those slightly more capable users, the pop up messages can be disabled. Unfortunately due to the system being on the web, the ability to add helpful keyboard shortcuts is dramatically diminished because of possible conflicts with existing browser shortcuts.

3.2 Performance Requirements

The website will be the first interaction potential clients will have with the system, thus is it of paramount importance to ensure that the website is responsive and transitions swiftly between pages. The systems is hosted on a server which will ensure the reliability and accessibility of the system 24/7

The system will provide an overall speedy task completion time. Client will receive EG reports at intervals specified by them. It is the responsibility of the system to ensure that these reports are compiled and sent at the times required

Eskom has access to the total EG report, the compilation of the report will be one of the more process intensive actions performed by the system. The database therefore needs be structured in such a manner that the queries can be executed without delay

3.3 Security Requirements

Solo Solar is an online based web system with the following security requirements:

Potential clients will need to register to use this system, after doing so they become a client and will then be required to log into the system using their email address and password set at registration. This will insure that all personal information stored on the system is safe and secure.

A hierarchy has been allocated to the various users of the system. This is essential to ensure the system and data integrity is kept intact, as well as to guarantee that no unauthorized tampering of sensitive data. This hierarchy restricts access to some users/clients

Examples of the data and process security restrictions include:

- A Potential client cannot edit or view any account information.
- A Potential client will be restricted and cannot access any report generation functionality of the system.
- A client is restricted to only being able to view and edit their personal account details.
- A client with an approved solar panel application is granted access to the system dashboard functionality. Restricting them to only be able to perform EG reports with their own account data.
- An Administrator has no restriction and access to all data in the system. They are able to view and edit all client information and EG statistics reports.

- Administrators are granted access to the system's full functionality of report generation and views of reports.
- Eskom is able to edit their account details and also have access to view the total EG and Geographic reports by all users.

3.4 Operational Requirements

Solo Solar is a web based system that will be hosted on a suitable server by a professional web hosting company. Browser support is therefore the number one priority with mobile devices following shortly after. The software environment for the system will be visual studio with SQL management studio serving as it database management system.

4 DATA REQUIREMENTS

Entity	Example	Entity Attributes
Client	John63 Password63! John Fischer 9504075258089 johnfischer@email.com Pending True	Username Password Name Surname ID Number Email Application Status Login Status
Roof	45degrees North Facing 8m 12m	RoofID Angle Roof Direction Width Length
Technician	01 Available Western Cape	TechnicianID Technician Status Province
Panel	PV-MLU255HC 1625m 1019 m 15.4% 20kg 31.2V	PanelID Panel Width Panel Length Module Efficiency Weight Maximum Power Voltage

	8.18A Class C	Maximum Power Current Fire Rating
Administrator	Admin007 Admin@227	AdminID Admin Password
Meter	M00001 10W 100W 700W 2100W	MeterID Hourly Voltage Generation Daily Voltage Generation Weekly Voltage Generation Monthly Voltage Generation
Property	P1235 Black Street 88 Walmer PE 6210 40.67418076162595 5,- 73.96614074707031	PropertyID Street Name Property Number Suburb City Postal Code Property Coordinates

Appendix A – Summary of an Existing System

India Goes Solar

Website Link: http://indiagoessolar.com/solar-calculator/

What the system does (what functionality it has)?

'India goes solar' is a broad website with many functions. The system acts as a hub to everything 'solar' particularly targeted for those who reside in India as they are an Indian company.
Their four main functions are:

- To provide an online marketplace for solar products, from panels to solar powered backpacks.
- To provide detailed information about the providers of solar powered equipment and products. In this section, users can find solar installers nearest to their location, they will be able to compare solar installers, look at their credentials and projects they have done, and browse products they offer.
- A forum where participants can log and in and discuss topics around what solar is, its advancements, to discussing business with prospective solar installers.
- Finally, and most importantly this website provides its users with calculator which takes information from the user about their location and roof dimensions and calculates an assortment of statistics around what it would be like if they had solar panels on their roof.

What are the shortcomings of the system (maybe yours can improve on that)?

India Goes Solar is a professionally build web based system with lots of good features and functionality built into it. It covers all the basic criteria of a good website and more. From a developers stand point they do not lack any functionality, we do not see any shortcomings.

What are some good features it has?

- Allows users to quickly navigate their website using the 3 click rule. The UI is well planned out and complements the system.
- Functionality is added to allow the system to be linked to a number of social media platforms as well as a solar forum that is incorporated into the system allowing the interaction with prospective solar owners and solar companies. Allowing for users to share their ideas and experiences with respect to solar. A blog page is also been incorporated.

- Ecommerce functionality is also incorporated into the system with a solar product page, with a number of different solar products on display.
- A search functionality has been added to the system to allow quick and easy searching on a desired topic, products or information.
- A Solar calculator is built into the system, allowing users to estimate their solar potential based on their rooftop area and electricity bill. Giving you the cost and benefit of going solar, the number of modules and batteries needed, your monthly power generation and savings.

Appendix B – User Questions

1. Would you like a number system other than the metric system to input your data? (i.e. roof dimensions)
2. Would you like an extra security measure when logging in? (i.e. Secret question)
3. Would you like an option to disable advertisements on the system?
4. Would you like to receive monthly information via email about Solar and other related products?
5. What details do we need from the customer, and what are you comfortable sharing? (i.e. Location)
6. Will there be emergency service details provided by the system, and will they be logged by the system?
7. Would you like to search for your location via map or type in your address?
8. Would you like to see a report of savings in your area?