FeiSeZ(Feed in Solar energy Zimbabwe)

"Let There Be Light"

Project Plan

FeiSeZ(Feed in Solar energy Zimbabwe

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Creation Date: 01/03/2013

Last Revised: 15/03/2012

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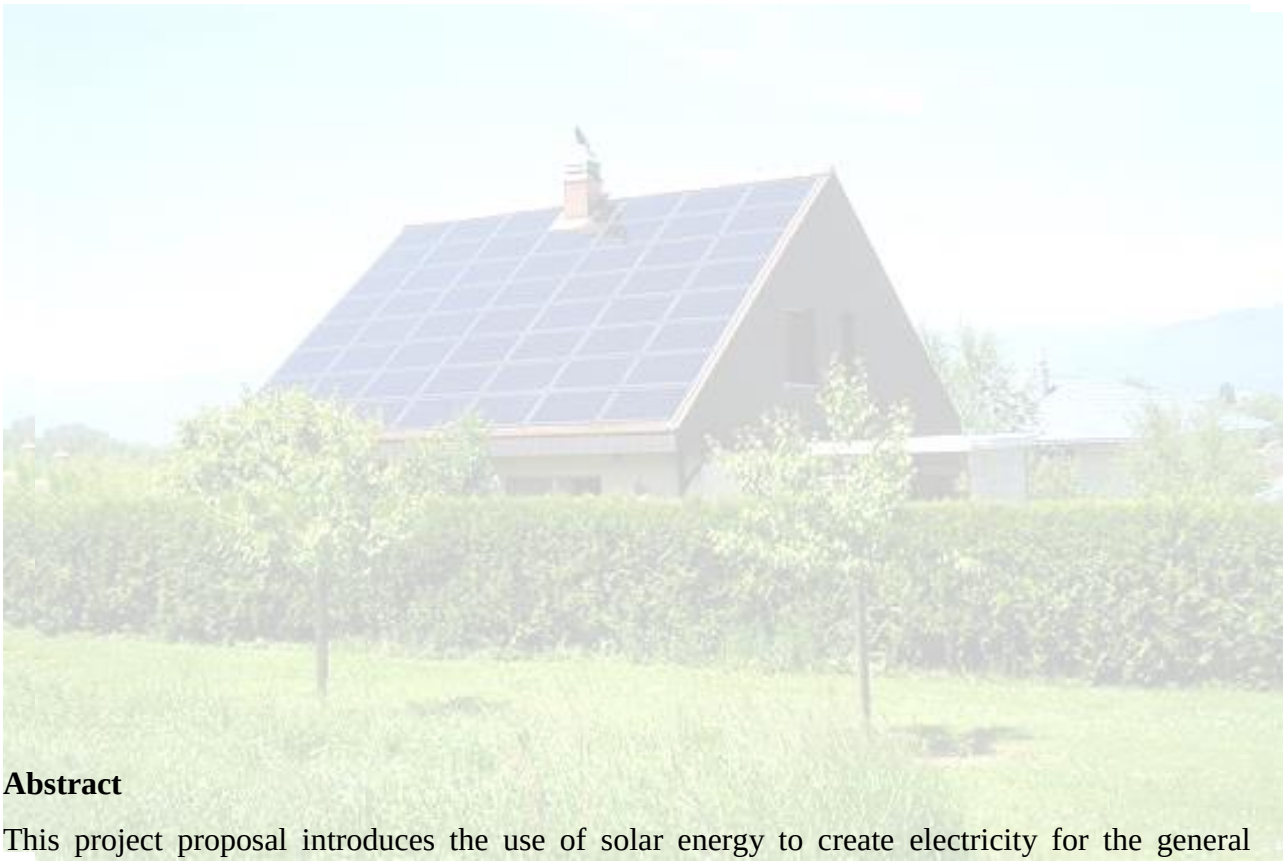

Abstract

This project proposal introduces the use of solar energy to create electricity for the general household in Zimbabwe. The number of houses being looked at on this occasion is 10 000.

Every aspect of the installation, the labour required, the tariff calculations and the monetary calculations have been done in detail. The project proposes a time scale of a year in which these 10 000 homes can be solar electrified.

Installing solar panels needs clarifying who benefits from the electric energy generated, therefore three options were identified as to the ownership of the solar system. These were; the Council/Landlord(home owner), ZESA(supply authority) and the FeiSeZ(the installation company).

A Renewable Souce of Energy: *Prepared by: Esau*
and Bernard Madzura

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(1) INTRODUCTION

Purpose of Plan

The Feed in Solar energy Zimbabwe Project Plan will provide a definition of the project, the goals and objectives. The Plan will also serve as an agreement for: Project Sponsor, Driving Committee, Project Management, Project Team, and other interested parties.

The Project Plan defines the following:

- Project purpose
- Project goals and objectives
- Scope and expectations
- Roles and responsibilities
- Assumptions and constraints
- Project management approach
- Ground rules for the project
- Project budget
- Project timeline
- The conceptual design of the technology

(11)Background Information

For very long, the hydro-electric power plant has remained the backbone of the world's power supply, but due to the unpredictability of rain patterns and the ever expanding metropolises, other sources of supplying electrical power had to be figured out. These included coal-powered, oil-powered and in cases of highly developed nations; nuclear powered plants.

However, these methods carry considerable disadvantages varying from radiation risk to damage to the environment. The bigger long term risk is the environmental damage which

is already showing on the increase in rising sea levels and the melting of the icecaps!!! Yes, these places might seem a million miles from our location, but rest assured the same poor rainfall patterns affecting us are the very results of these changes.

FeiSEZ recognizes the importance of saving the environment by doing our 'Global' part as a civilized nation which recognizes life doesn't end with our own life!! It is this simple fact that, we would be very happy to know the earth survived for another 7.5 billion years(roughly the time the sun will run out of fuel) because of the global effort we put on our part!!!

We, at FeiSEZ believe religiously that Zimbabwe can be 'a beacon of light' both physically and intellectually!!! The power of our dreams drives us forward and nothing can stop what we dream! We live for these dreams and we will be willing to be crucified for them!

The Feed In Solar Energy Scheme will gradually but surely change the way we produce our electricity on a day to day basis. We foresee a time in the future whereby a household will only pay for services and not the actual energy used! We also see the Supply authority shutting down some of the 'toxic' power generation plants and even selling power to neighbouring countries! We foresee a highly organized set of ideas to maximize our production, distribution and use of electricity.

If the sunless, inhospitable UK can more than half the gas and electric bills in a standard household by installing solar feed in systems, then the sun-smiley Zimbabwe can even make a profit for the landlord! This can be demonstrated by simple calculation.

The gains we stand to achieve are enormous, we can afford to become solar crazy and reverse a lot of our misfortunes! Sometimes the gold we seek is not in the Goldmine, but in the little understood machine called the human conscience!!!

FeiSEZ vows to do wonders for our country and take our place in the world!!

Project Main Contacts

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4. Hon Felix T Mhona, mobile: 00263777281601 email: ftmhona@gmail.com

5. Vernon Wise Muringani.mobile: 00263777618962

PRESENT

Technical Team

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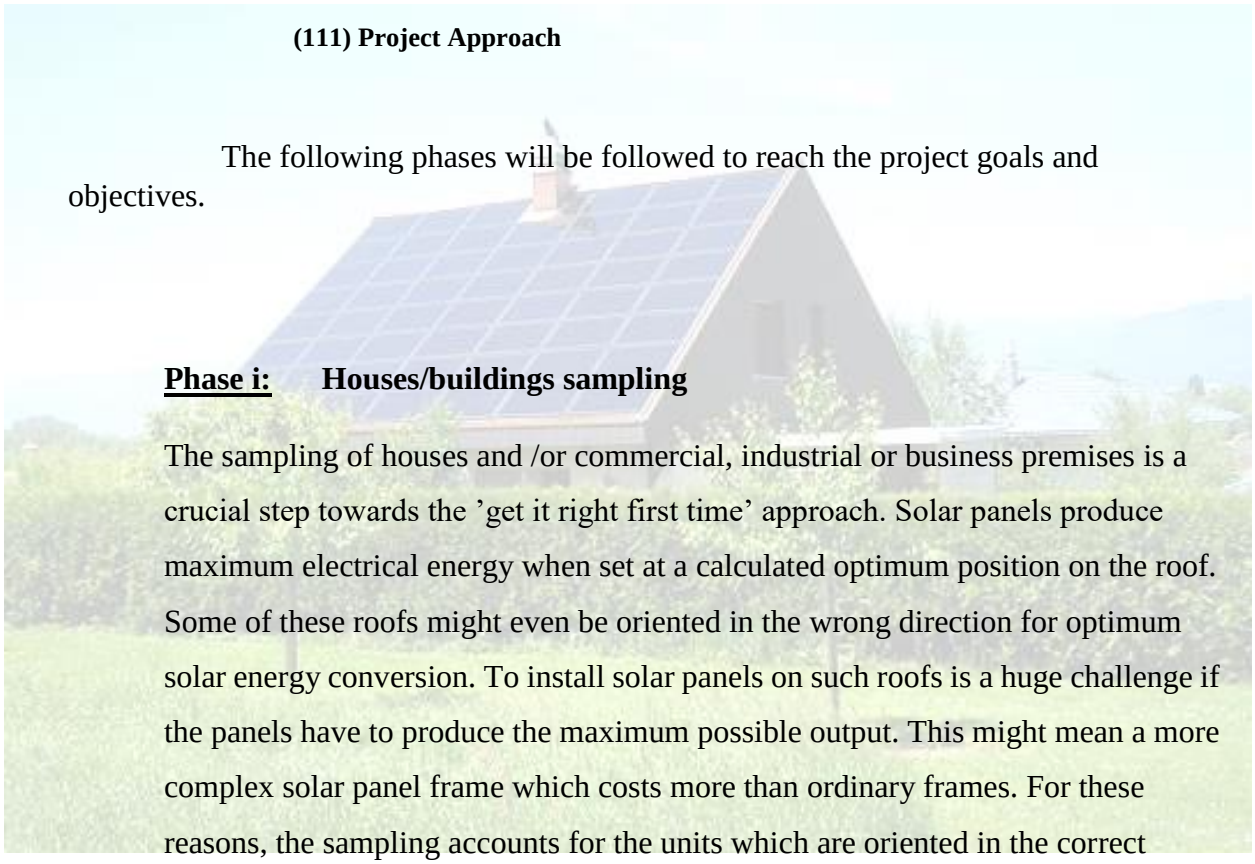


(111) Project Approach

The following phases will be followed to reach the project goals and objectives.

Phase i: **Houses/buildings sampling**

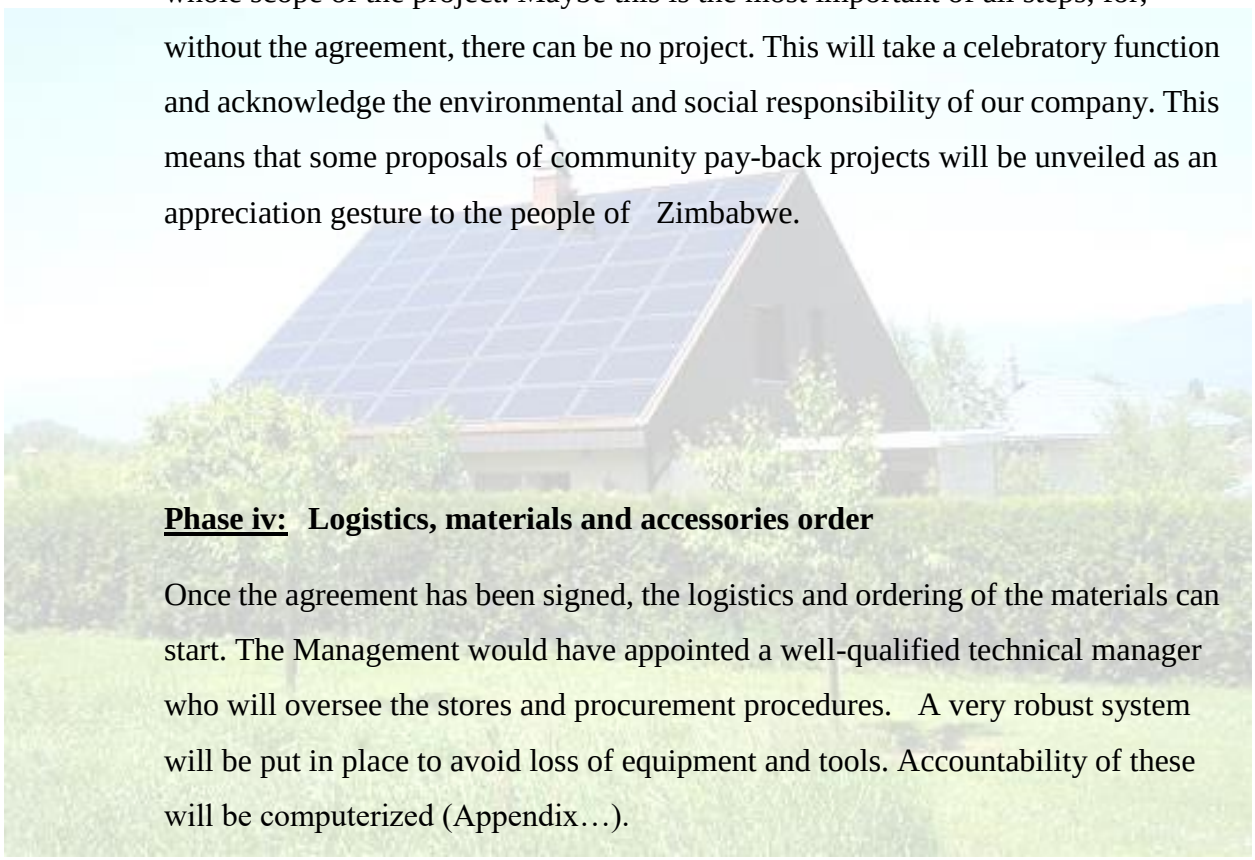
The sampling of houses and /or commercial, industrial or business premises is a crucial step towards the 'get it right first time' approach. Solar panels produce maximum electrical energy when set at a calculated optimum position on the roof. Some of these roofs might even be oriented in the wrong direction for optimum solar energy conversion. To install solar panels on such roofs is a huge challenge if the panels have to produce the maximum possible output. This might mean a more complex solar panel frame which costs more than ordinary frames. For these reasons, the sampling accounts for the units which are oriented in the correct direction. Those facing the wrong direction will be noted and a recommendation given as to the remedial action for future solar installation. **The sustainable weight on the roofs will be notified by the City Council. **

Phase ii: **Project presentation and proto-type**

The project presentation is a job capability demonstration exercise. To us, FeiSEZ, this is an opportunity to showcase what we have to offer on a practical basis. The presentation will be in the format of a Microsoft power point presentation, but a practical small scale fully functional model will be presented as well.

Phase iii: Project agreement

Project agreement and signing is an important step towards the fulfillment of the whole scope of the project. Maybe this is the most important of all steps, for, without the agreement, there can be no project. This will take a celebratory function and acknowledge the environmental and social responsibility of our company. This means that some proposals of community pay-back projects will be unveiled as an appreciation gesture to the people of Zimbabwe.



Phase iv: Logistics, materials and accessories order

Once the agreement has been signed, the logistics and ordering of the materials can start. The Management would have appointed a well-qualified technical manager who will oversee the stores and procurement procedures. A very robust system will be put in place to avoid loss of equipment and tools. Accountability of these will be computerized (Appendix…).

Phase v: Staff training and induction & (health and safety)

Staff will be trained and signed on when the first batch of materials has arrived. It makes the job easier to train people using the equipment they will use in the field.

Phase vi: Construct frames and start installations

The construction of frames is very important to all the installation work. It has to be considered that dwellings have different roof configurations, therefore special jigs

will be used depending on the type of roof as predetermined by the sampling. Otherwise the construction of frames is done simultaneously with the installation work. It is a continuous process.

Getting to grips with the work

It is easy to watch one person doing something, but entirely different doing it yourself! The supervisors and technicians get to really start the work on a real life situation at this stage. This stage will be slow for the purposes of verification and quality control. This is the benchmark of the project!!

Qualified Technicians

Introduction

The complexities of engineering projects require technical project managers to oversee the various aspects and economic factors involved in the job. Project technician careers call for strong engineering skills, combined with the project management, development and post-production support.

Project engineers or technicians will be responsible for leading a team of engineers, or tracking the status of a project to ensure that it meets deadlines and stays within budget. These positions are part of project management. This means that the workforce; engineers, receptionists, health and safety officers, technicians, research and development technicians etc.., have to be sourced from within the bounds of Zimbabwe.

Personnel Quafications

1. Esau Madzura: (BEng) Automation and Control Manchester Metropolitan University and (Apprenticeship) Electrical Power Engineering.

2. Jacob Madzura: BEng Electrical and Electronic Engineering, Manchester Metropolitan University.

3 Bernard Madzura BSc (Hons) Clinical Engineering, University of Bradford

4. Wilson Chimuka: BSc (Hons) Building Surveying and Property Management.

5. Wilbrod M Madzura: B.Admin- UZimbabwe; Dip. Business Mngnt- Harare Polytechnic; M.Sc. – Rural Sociology and Cert. in Rural Development – University of Missouri at Columbia, MO, USA; PhD – Sociology – Univ. of Missouri at Columbia.

6. Isaac Takawira: 1999-2003 (University of Swansea UK, Phd in ccomputational electromagnetics, 1991-1992: University of Swansea UK, MSc in communication systems, 1983-1986: University of Zimbabwe, BSc,(Hons) Electrical Engineering,2004-2008: Senior Development Engineer, Robert Bosch in Cardiff UK.

Personal Zimbabwean Identity Numbers

Name:	**Identification Number**:
. Esau Madzura.	.29-012717-L-18
. Bernard Madzura.	.18-066429-X-18
.Latoya Yohane	

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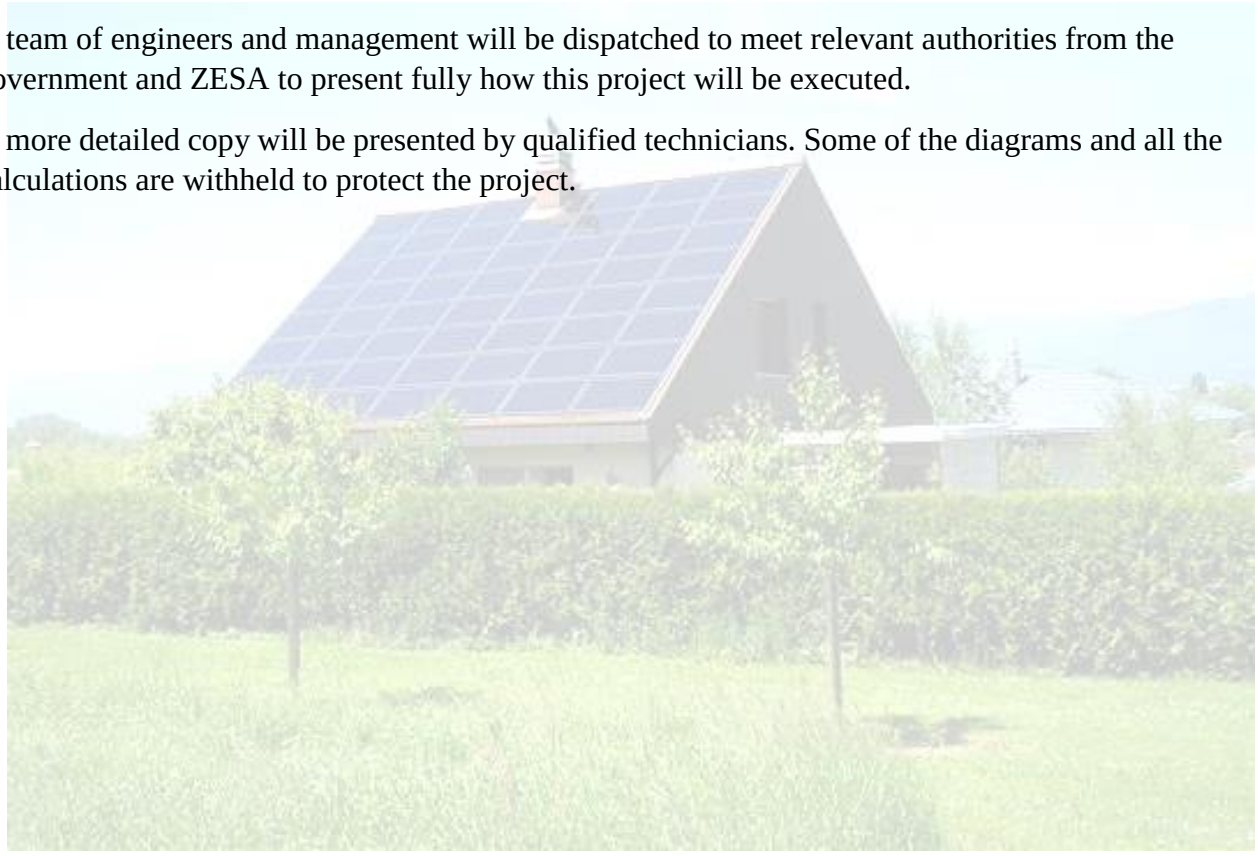
Presentation.

A team of engineers and management will be dispatched to meet relevant authorities from the government and ZESA to present fully how this project will be executed.

A more detailed copy will be presented by qualified technicians. Some of the diagrams and all the calculations are withheld to protect the project.



(2) GOALS AND OBJECTIVES

(1) Project Goals and Objectives

Goals:

To install Grid Tied-In Solar Electrical Systems to 10, 000 households and/or industrial/commercial/business units.

Objectives:

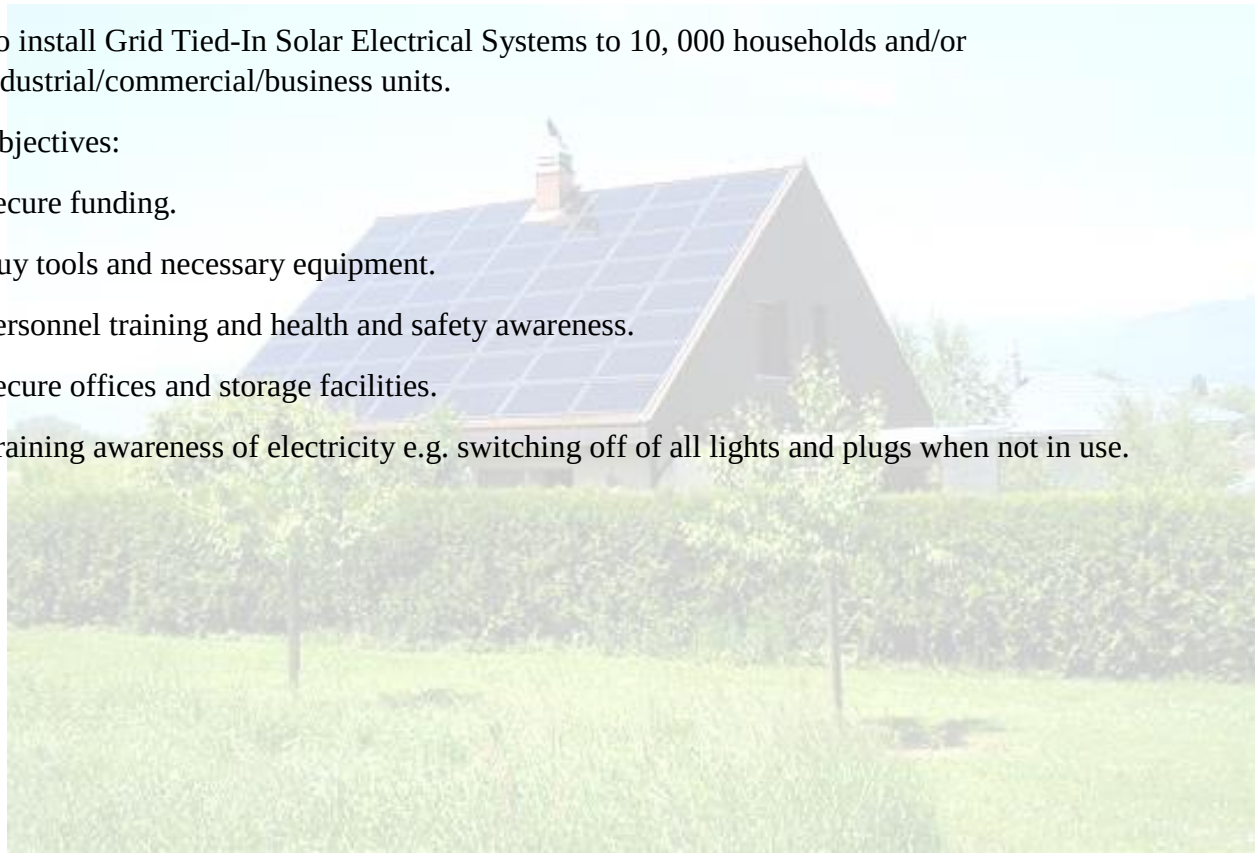
Secure funding.

Buy tools and necessary equipment.

Personnel training and health and safety awareness.

Secure offices and storage facilities.

Training awareness of electricity e.g. switching off of all lights and plugs when not in use.



111 SCOPE

(1) Scope Definition

The Project will introduce new electrical interfaces to the following:

- 10,000 house solar feed in tariff systems
- commercial solar feed in tariff systems
- industrial units

Including the following:

- money back to the property owner, Zesa or FeiSeZ

Desired Enhancements

Dependent on individual properties.

(1) Items Beyond Scope

The project does not include the following:

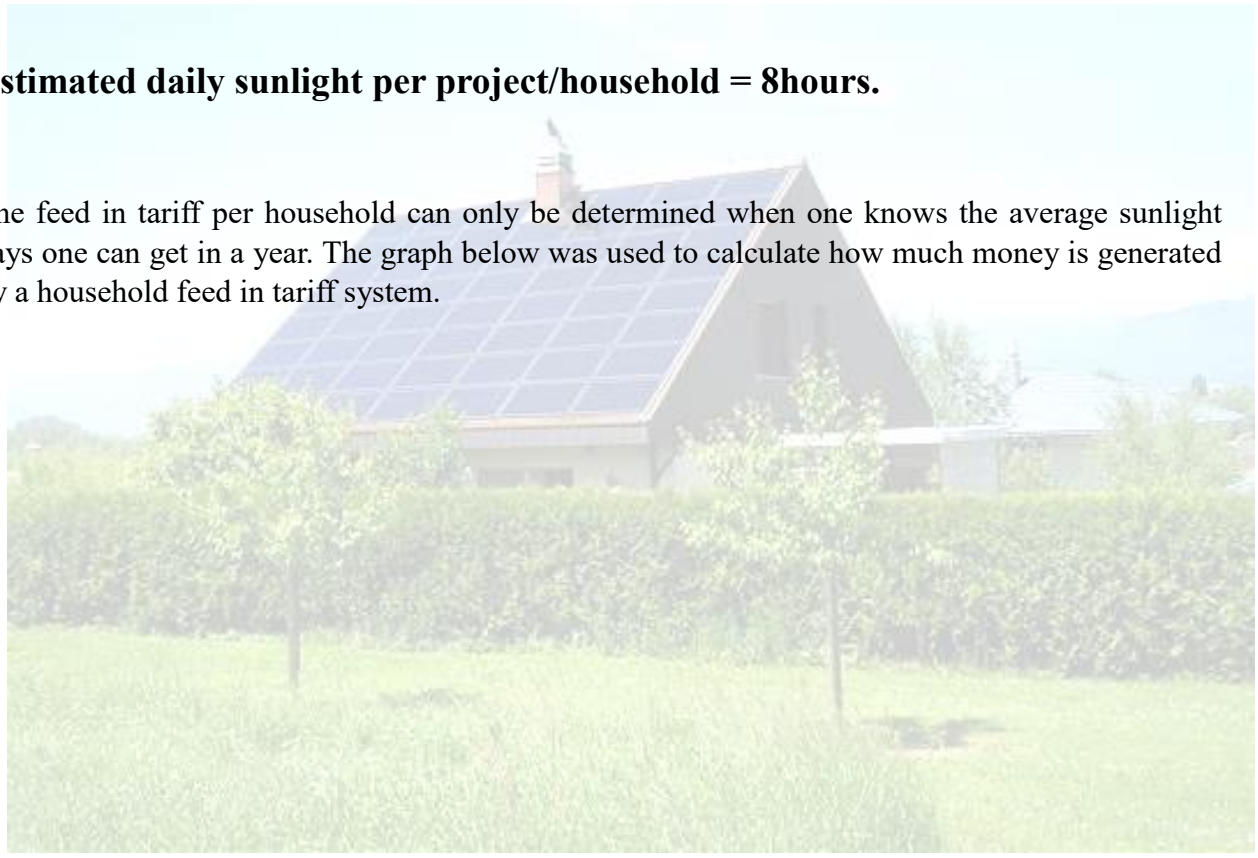
- Guarantee of spares after 5 years except for solar panels
- Cleaning of the panels after installation
- Owner carelessness breakages and tempering
- Natural disasters

(1)Projected Budget

We aim to start by installing 10,000 households, each household require a budget of $4600 at 1kW per household depending on the household energy consumption.

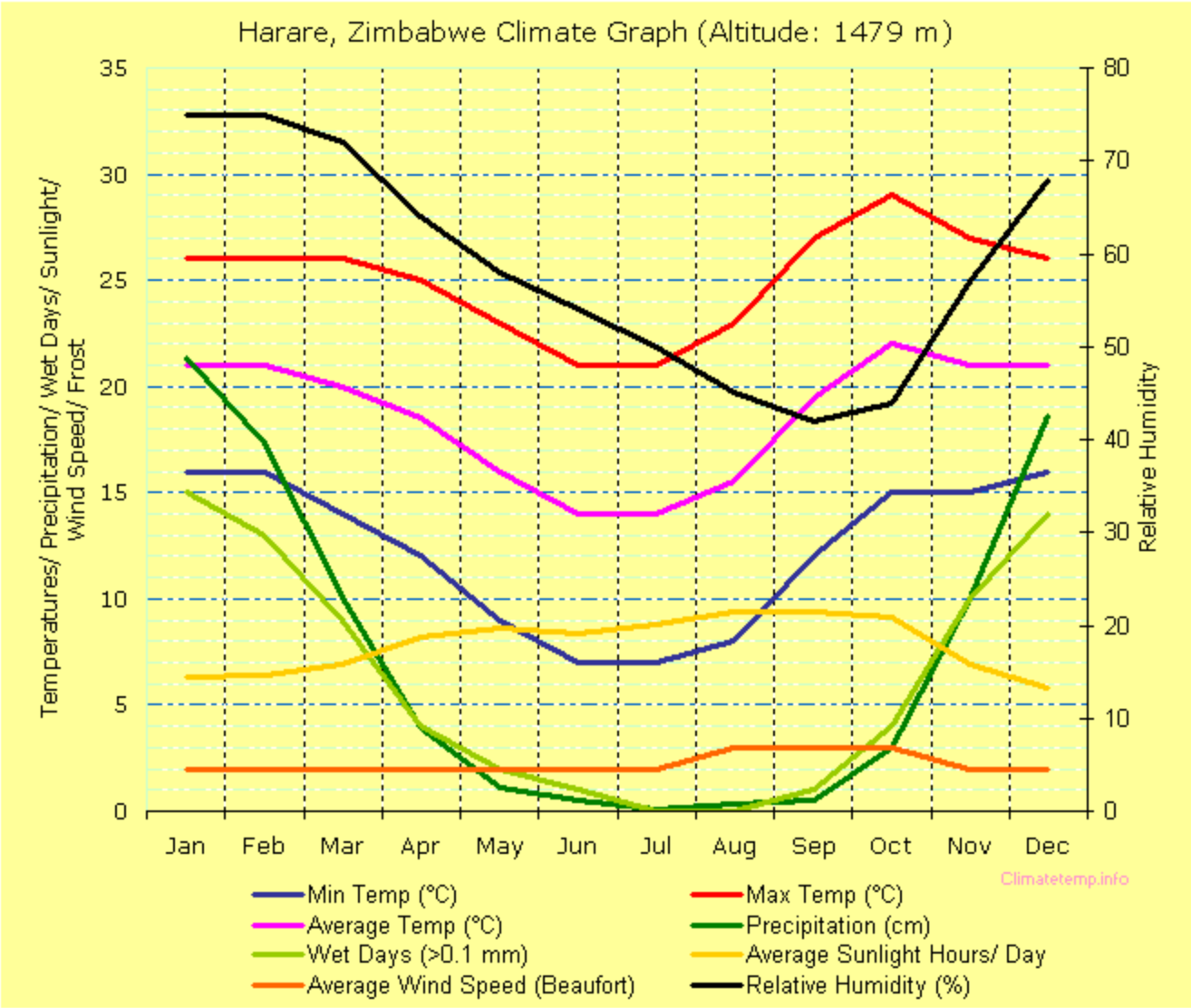
Items	number of items x single cost	Total cost of items
Materials	**10,000 x US$1,600.00**	**$16,000,000.00**

Overheads…Employee salaries (managers, technicians, secretaries, security etc..) **Peripherals: tools, stationery, faxes, computers,** **safety equipment, uniforms, safety boots, gloves, staff training, mobile phones, laptops, desktops, PDAs, iPads, storage containers,** **generators, drills, compressors..**	**10,000 x $3,000.00/house**	**US$30,000,000.00**
Transport company cars,	**4 x 7.5tonne rigid Daf truck@ $100,000.00** **10 x (4x4) Nissan Navara Pick-up Double Cab trucks @$40,000.00each**	**$500,000.00**
Rent per months	**Estimate, 12x$3000**	**$36,000.00 per annual**
Electricity per months	**Estimate, 12x$1000**	**$12,000.00 per annual**
Water Bills per months	**Estimate, 12x$500** **Dependant on council charges**	**$6,000.00 per annual** **Dependant on council charges**
Fuel, insurance, VID inspection road tax and vehicle service and maintenance…	**Approx US$10,000.00 x 10** **Approx US$10,000.00 x 1**	**Approx US$110,000.00**
Government customs duty for importing of solar cells, smart meters, grid inverters	**Estimate**	**$20,000.00**
Cargo and shipping of equipment	**At $8,000.00 per 24 foot container x 10 containers** **Plus road transportation**	**Approx US$100,000.00**
Panel Aluminium rails		
Total Amount needed		**US$46,784,000.00**



Estimated daily sunlight per project/household = 8hours.

The feed in tariff per household can only be determined when one knows the average sunlight days one can get in a year. The graph below was used to calculate how much money is generated by a household feed in tariff system.



http://www.zimbabwe.climatemps.com/

1V Risk assessment

The initial **Risk Assessment** (following page) attempts to identify, characterize, prioritize and document a mitigation approach relative to those risks which can be identified prior to the start of the project.

The **Risk Assessment** will be continuously monitored and updated throughout the life of the project, with monthly assessments included in the status report (see **Communications Plan**) and open to amendment by the Project Management.

Mitigation approaches have to be agreed upon by the Management and Supervisors as the work progresses and new risks are identified.

The Project Management will enact the agreed amendments as soon as is reasonably practicable.

I. Initial Project Risk Assessment

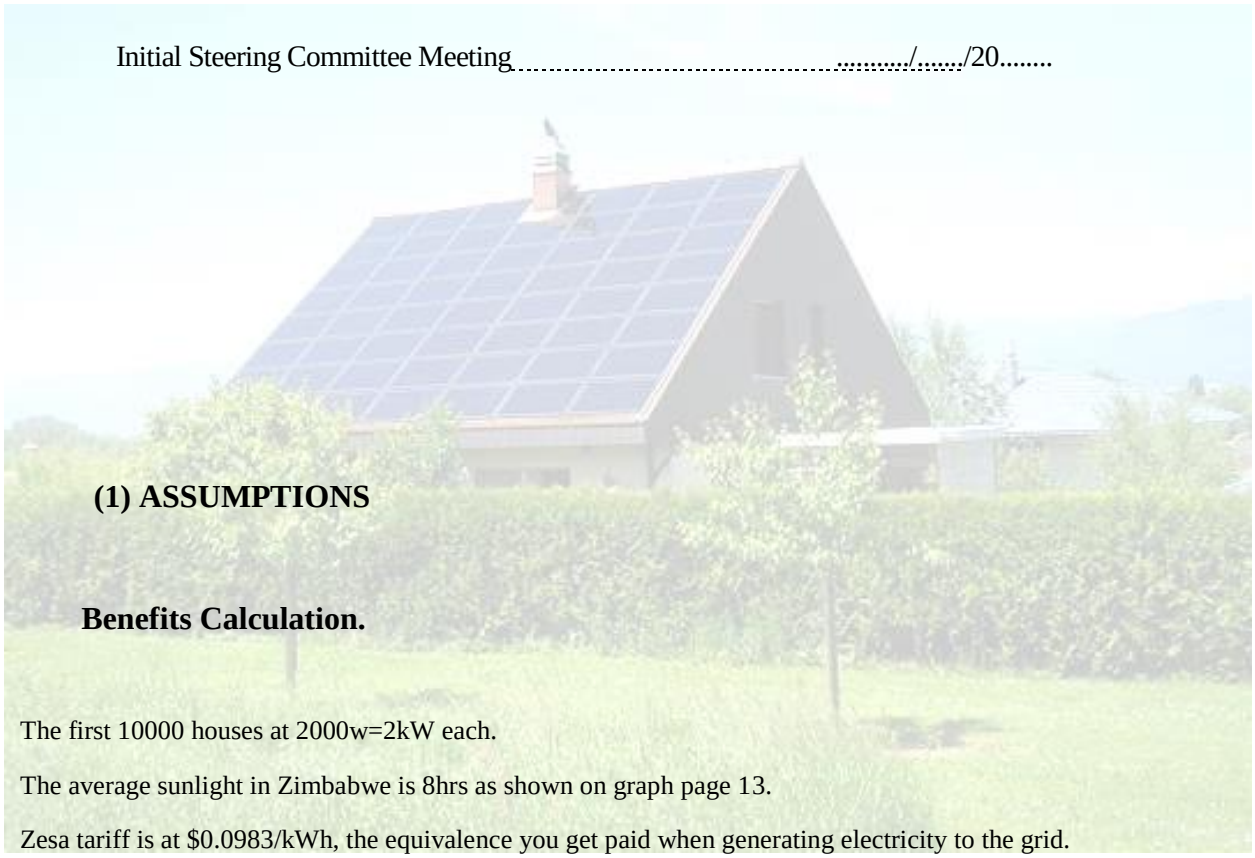
Risk	Risk Level L/M/H	Likelihood of Event	Mitigation Strategy
Project Size			
Person Hours	**H:** Over 20,000	**Certainty**	Assigned Project Manager, engaged consultant, comprehensive project management approach and communications plan
Estimated Project Schedule	**H: Around** 12 months	**Certainty**	Created comprehensive project timeline with frequent baseline reviews
Team Size at Peak	**H:** Over 250 members	**Certainty**	Comprehensive communications plan, frequent meetings, tight project management oversight
Number of Supplies to Existing Systems Affected	**H:** Over 10, 000	**Certainty**	Develop smooth and flawless document for switch over
Project Definition			
Narrow Knowledge Level of Users	**L:** Knowledgeable of user area only	**Likely**	Assigned Project Manager(s) to assess global implications
Available documentation clouds establishment of baseline	**M:** More than 75% complete/current	**Likely**	Balance of information to be gathered by consultant
Project Scope Creep	**L:** Scope generally defined, subject to revision	**Unlikely**	Scope initially defined in project plan, reviewed monthly Project Management.
Project Deliverables unclear	**L:** Well defined	**Unlikely**	Included in project plan, subject to amendment
Cost Estimates Unrealistic	**L**: Thoroughly predicted by using 5% margin of error	**Unlikely**	Included in project plan, subject to amendment as new details regarding project scope are revealed
Timeline Estimates Unrealistic	**M:** Timeline assumes no derailment	**Somewhat likely**	Timeline reviewed monthly by Project Management to prevent undetected timeline departures

Risk	Risk Level L/M/H	Likelihood of Event	Mitigation Strategy
Number of Team Members Unknowledgeable of Business	**L**: Team well versed in business operations impacted by technology	**Unlikely**	Project Management and consultants to identify knowledge gaps and provide training, as necessary
Project Leadership			
Absence of Commitment Level/Attitude of Management	**L:** Understands value & supports project	**Unlikely**	Frequently seek feedback to ensure continued support
Absence of Commitment Level/Attitude of Users	**L:** Understands value & supports project	**Unlikely**	Frequently seek feedback to ensure continued support
Project Staffing			
Project Team Availability	**M:** Distributed team makes availability questionable	**Somewhat likely**	Continuous review of project momentum by all levels. Consultant to identify any impacts caused by unavailability. If necessary, increase committmment by participants to full time status
Physical Location of Team prevents effective management	**M:** Team is dispersed among several sites	**Likely**	Use of Intranet project website, comprehensive Communications Plan
Project Team's Shared Work Experience creates poor working relationship	**M:** Some have worked together before	**Somewhat likely**	Comprehensive Communications Plan
Project Management			
Procurement Methodology Used foreign to team	**L:** Procurement Methodology familiar to team	**Unlikely**	N/A
Change Management Procedures undefined	**L:** Well-defined	**Unlikely**	N/A
Quality Management Procedures unclear	**L:** Well-defined and accepted	**Unlikely**	N/A
Software Vendor			
Number of Times Team Has Done Prior Work with Vendor Creates Foreign Relationship	**H:** Never	**Certainty**	A comprehensive vendor evaluation and selection process (incorporated into Project Plan) will be employed to predict and define the relationship between the department and the vendor

IV Milestones

The following represent key project milestones, with estimated completion dates:

Milestone	Estimated Completion Date
Phase I: XXX	
Initial Steering Committee Meeting	...../...../20.....



(1) ASSUMPTIONS

Benefits Calculation.

The first 10000 houses at 2000w=2kW each.

The average sunlight in Zimbabwe is 8hrs as shown on graph page 13.

Zesa tariff is at $0.0983/kWh, the equivalence you get paid when generating electricity to the grid.

2kWh X 8hrs = 16kW per household per day.

16kW X $0.0983 = $1.5728 per household per day.

Each household per week; 7 x $1.5728 =$11.0096 a week.

In a month per household = $11.0096 X 52 weeks in a year, divide by 12.

= $47.70 a month per household.

10000 homes per month = 10000 X $47.70= $477,000.00

$572.40 per household in a year.

In a year = $572.40 X 10,000 homes = $5,724,000.00

I. Project Constraints

The following represent known project constraints:

- Project funding sources are limited.
- Due to the nature of law enforcement, resource availability is inconsistent.

II. Related Projects

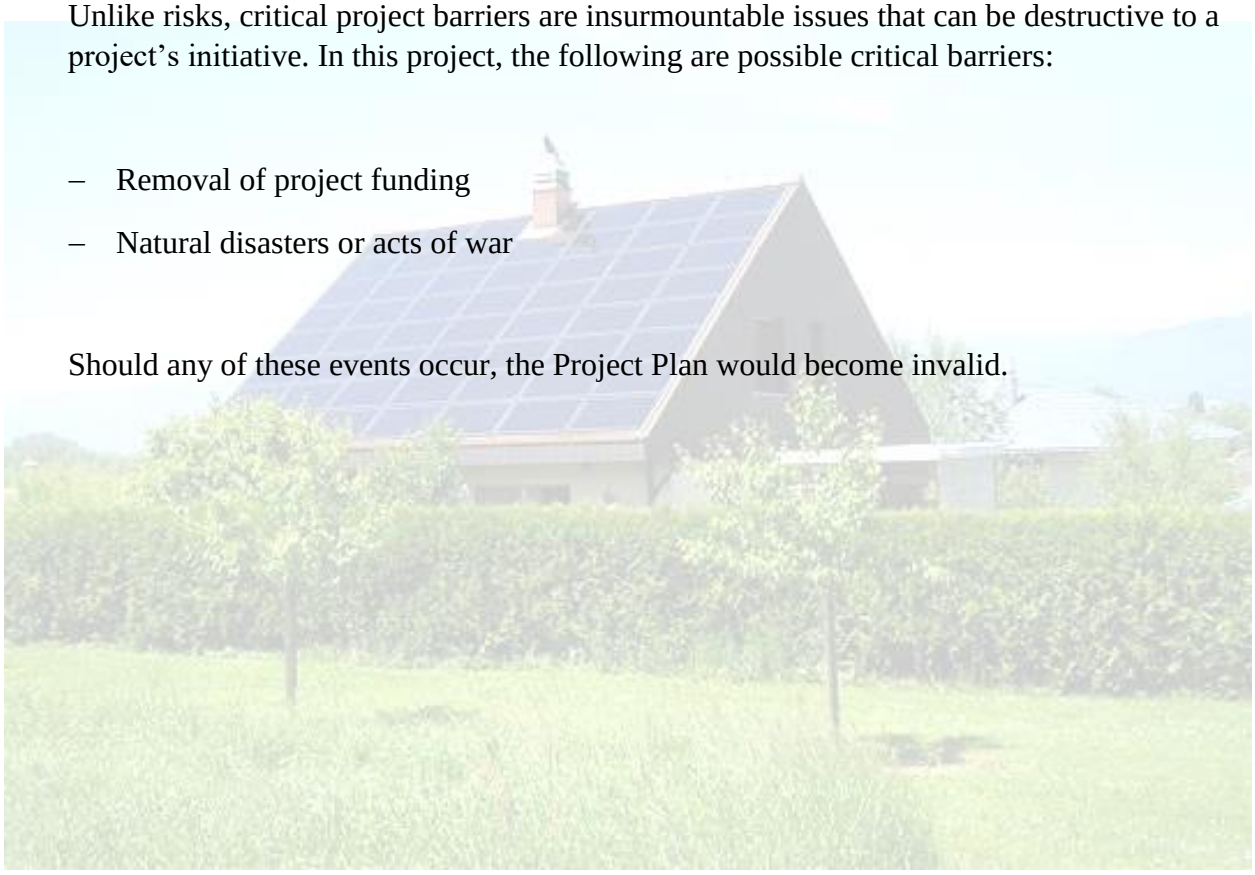
3kw feed-in installations Manchester UK.

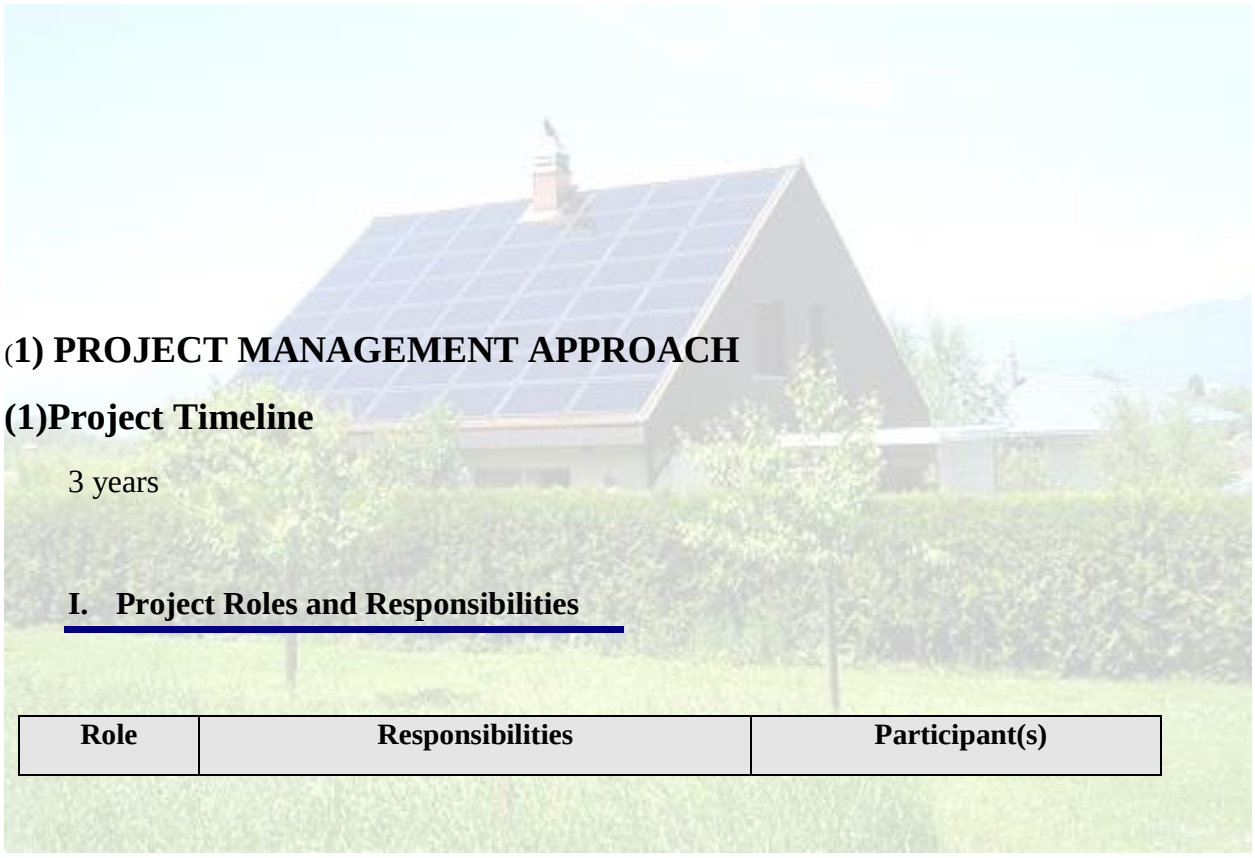
III. Critical Project Barriers

Unlike risks, critical project barriers are insurmountable issues that can be destructive to a project's initiative. In this project, the following are possible critical barriers:

- Removal of project funding
- Natural disasters or acts of war

Should any of these events occur, the Project Plan would become invalid.





(1) PROJECT MANAGEMENT APPROACH

(1)Project Timeline

3 years

I. Project Roles and Responsibilities

Role	Responsibilities	Participant(s)

Role	Responsibilities	Participant(s)
Project Sponsor	▪ Ultimate decision-maker and tie-breaker ▪ Provide project oversight and guidance ▪ Review/approve some project elements	
Steering Committee	▪ Commits department resources ▪ Approves major funding and resource allocation strategies, and significant changes to funding/resource allocation ▪ Resolves conflicts and issues ▪ Provides direction to the Project Manage ▪ Review project deliverables	
Project Manager	▪ Manages project in accordance to the project plan ▪ Serves as liaison to the Steering Committee ▪ Receive guidance from Steering Committee ▪ Supervises consultants ▪ Supervise vendor(s) ▪ Provide overall project direction ▪ Direct/lead team members toward project objectives ▪ Handle problem resolution ▪ Manages the project budget	

Role	Responsibilities	Participant(s)
Project Participants	▪ Understand the user needs and business processes of their area ▪ Act as consumer advocate in representing their area ▪ Communicate project goals, status and progress throughout the project to personnel in their area ▪ Review and approve project deliverables ▪ Creates or helps create work products ▪ Coordinates participation of work groups, individuals and stakeholders ▪ Provide knowledge and recommendations ▪ Helps identify and remove project barriers ▪ Assure quality of products that will meet the project goals and objectives ▪ Identify risks and issues and help in resolutions	To be identified by Steering Committee
Subject Matter Experts	▪ Lend expertise and guidance as needed	To be identified by Steering Committee

11 Issue Management

The information contained within the Project Plan will likely change as the project progresses.While change is both certain and required, it is important to note that any changes to the Project Plan will impact at least one of three critical success factors: Available Time, Available Resources (Financial, Personnel), or Project Quality. The decision by which to make modifications to the Project Plan (including project scope and resources) should be coordinated using the following process:

Step 1: As soon as a change which impacts project scope, schedule, staffing or spending is identified, the Project Management will document the issue.

Step 2: The Project Manager will review the change and determine the associated impact to the project and will forward the issue, along with a recommendation, to the Steering Committee for review and decision.

Step 3: Upon receipt, the Steering Committee should reach a consensus opinion on whether to approve, reject or modify the request based upon the information contained within the project website, the Project Manager's recommendation and their own judgment. Should the Steering Committee be unable to reach consensus on the approval or denial of a change, the issue will be forwarded to the Project Sponsor, with a written summation of the issue, for ultimate resolution.

Step 4: If required under the decision matrix or due to a lack of consensus, the Project Sponsor shall review the issue(s) and render a final decision on the approval or denial of a change.

Step 5: Following an approval or denial (by the Steering Committee or Project Sponsor), the Project Manager will notify the original requestor of the action taken. There is no appeal process.

II. Communications Plan

Disseminating knowledge about the project is essential to the project's success. Project participants desire knowledge of what the status of the project is and how they are affected. Furthermore, they are anxious to participate. The more that people are educated about the progress of the project and how it will help them in the future, the more they are likely to participate and benefit.

This plan provides a framework for informing, involving, and obtaining buy-in from all participants throughout the duration of the project.

Audience This communication plan is for the following audiences:

- Project Sponsor
- Steering Committee
- Project Manager
- User Group Participants
- Subject Matter Experts

Communications Methodology The communications methodology utilizes three directions for effective communication:

Top-Down It is absolutely crucial that all participants in this project sense the executive support and guidance for this effort. The executive leadership of the organization needs to speak with a unified, enthusiastic voice about the project and what it holds for everyone involved. This will be 'hands-on' change management, if it is to be successful. Not only will the executives need to speak directly to all levels of the organization, they will also need to listen directly to all levels of the organization, as well.

The transition from the project management practices of today to the practices envisioned for tomorrow will be driven by a sure and convinced leadership focused on a vision and guided by clearly defined, strategic, measurable goals.

Bottom-Up To ensure the buy-in and confidence of the personnel involved in bringing the proposed changes to reality, it will be important to communicate the way in which the solutions were created. If the perception in the organization is that only the Steering Committee created the proposed changes, resistance is likely to occur. However, if it is understood that all participants were consulted, acceptance seems more promising.

Middle-Out Full support at all levels, where the changes will have to be implemented, is important to sustainable improvement. At this level (as with all levels), there must be an effort to find and communicate the specific benefits of the changes. People need a personal stake in the success of the project management practices.

Communications Outreach The following is a list of communication events that are established for this project:

Monthly Status Reports The Project Manager shall provide monthly written status reports to the Steering Committee. The reports shall include the following information tracked against the Project Plan:

- Summary of tasks completed in previous month
- Summary of tasks scheduled for completion in the next month
- Summary of issue status and resolutions

Monthly Steering Committee Meeting These status meetings are held at least once per month and are coordinated by the Project Manager. Every member of the Steering Committee participates in the meeting. The Project Manager sends the status report to each member of the team prior to the meeting time so everyone can review it in advance.

Bi-Monthly Project Team Status Meeting These status meetings are held every other month. Every member of the Project Team will be invited to participate in the meeting. Project Manager sends the status report to each member of the team prior to the meeting so everyone can review it in advance.

Website Use User Group Participants and Subject Matter Experts may be updated monthly at the discretion of the Project Manager. Information will be posted to the project's website.

1. ATTACHMENTS/APPENDICES

Appendices/Attachments may be included in a hardcopy form

(EXAMPLE) Feed in Grid Smart Meter

Feed in Grid smart meter generally it shows you the amount of energy you are supplying to the grid and the amount of energy your household consume.

EXAMPLE OF GRID TIED INVETORS

3000W Grid Tie Inverter.

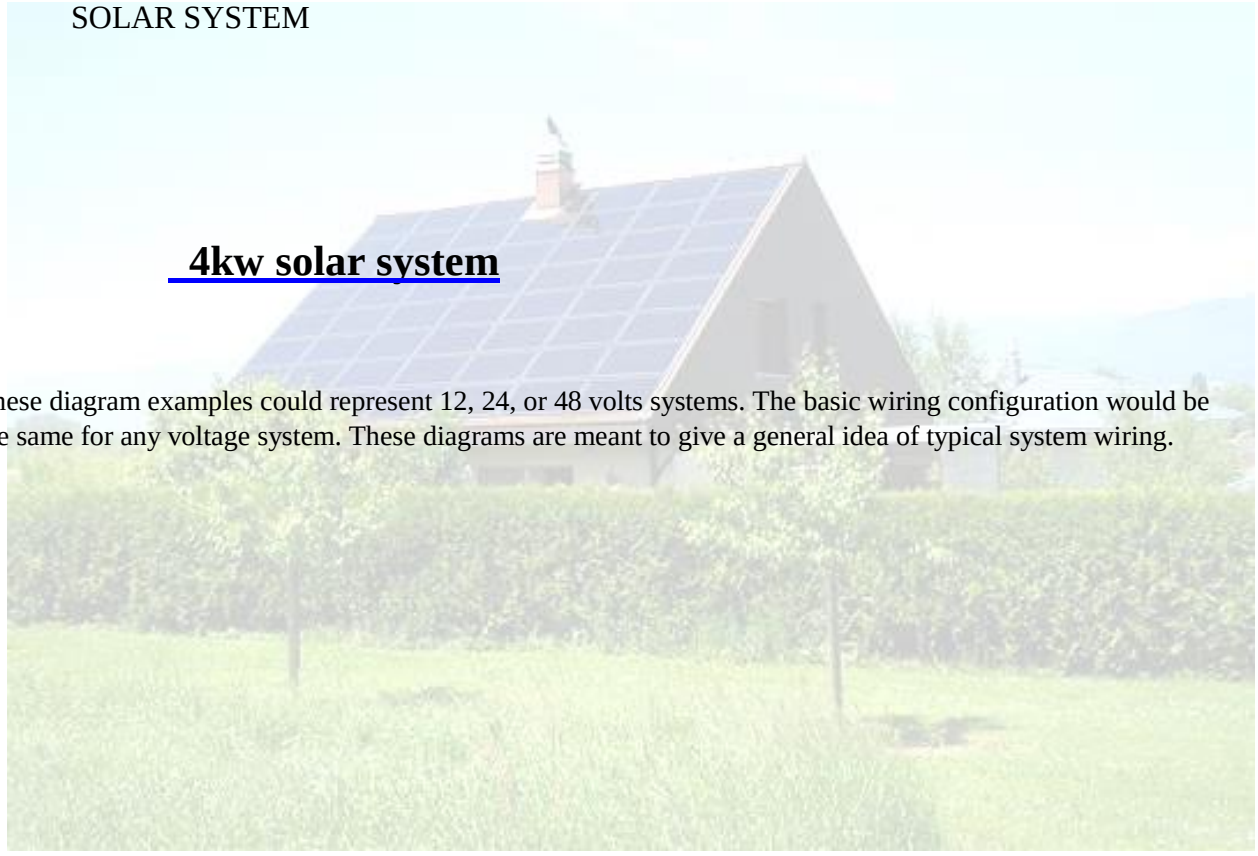
Input (DC)	Details
Max DC Power	3000W
Max DC Voltage	600V
PV Voltage Range, MPPT	268V - 600V
Max Input Current	12A
DC Voltage Ripple	<10%
Max. Number of Strings (Parallel)	3
DC Disconnection	Snap cable connectors, ESS
Thermally Monitored Varistors	Yes
Ground Fault Monitoring	Yes
Pole Confusion Protection	Short circuit diode

Output(DC)	Details
Nominal AC Output	2750W
Max AC Output	3000W
THD of Grid Current	<4%
Nominal AC Voltage	220V-240V
Nominal AC Grid Frequency	50Hz / 60Hz
Power Factor	1
Short Circuit Proof	Yes, current control
Connection to Utility	AC Plug

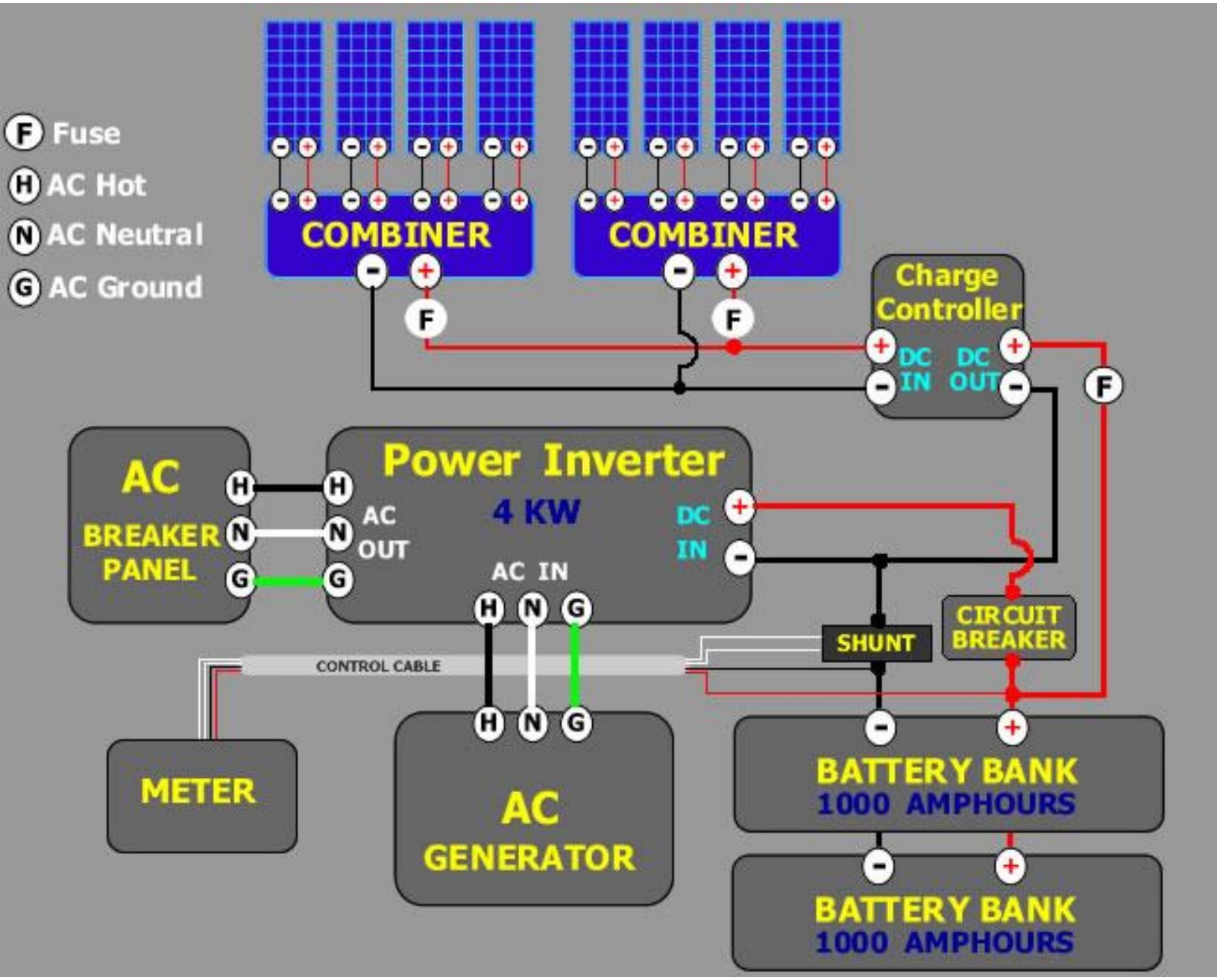
Feed in grid Invertor 3000W

Hex Solarlink 3000W Grid Feed Inverter
Max Power Output: 3000W AC
Max Solar Input: 3300W DC
Max Voltage Input: 500V DC
MPPT Voltage Range: 150-450V DC

(A) EXAMPLE OF A FEED IN RESIDENTIAL SOLAR SYSTEM



These diagram examples could represent 12, 24, or 48 volts systems. The basic wiring configuration would be the same for any voltage system. These diagrams are meant to give a general idea of typical system wiring.

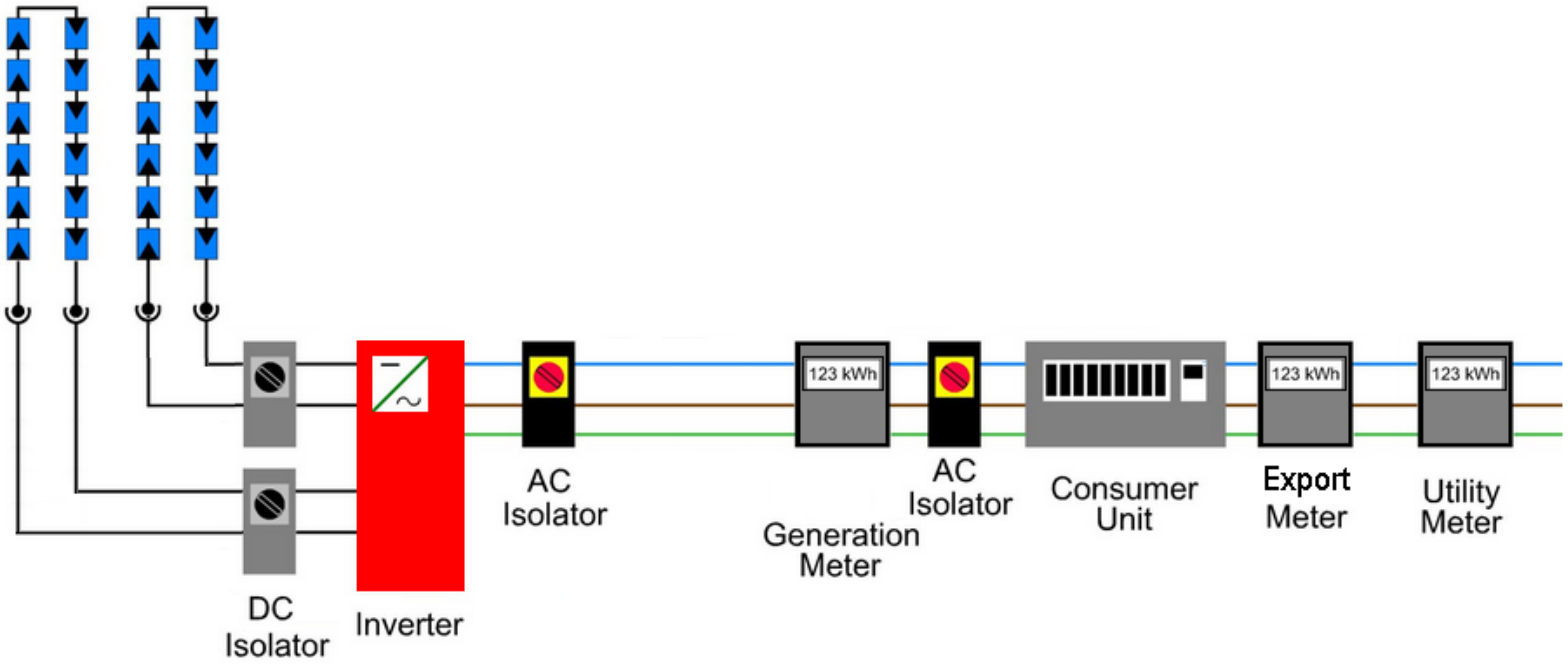

F Fuse
H AC Hot
N AC Neutral
G AC Ground
COMBINER
COMBINER
F
F
Charge Controller
DC IN
DC OUT
F
AC
BREAKER PANEL
H
N
G
Power Inverter
4 KW
AC OUT
AC IN
DC IN
SHUNT
CIRCUIT BREAKER
CONTROL CABLE
METER
AC GENERATOR
BATTERY BANK
1000 AMPHOURS
BATTERY BANK
1000 AMPHOURS

Micro-Inverter :240-72 Mono (240-72-MC4)

EXAMPLE OF (A)

Pv wiring diagram.

A basic wiring diagram of Grid Tie PV system.


123 kWh
123 kWh
123 kWh
DC
Isolator
Inverter
AC
Isolator
Generation
Meter
AC
Isolator
Consumer
Unit
Export
Meter
Utility
Meter

Residential ground project Layout

Commercial project Layout

Commercial and Utility project Layout :A SOLAR POWER PLANT

The installation of the system vary, because the most expensive system we install solar motion sensors, this system get the most accurate position of the sunlight.

In Conclusion

By the End of the decade we aim to put Zimbabwe as one of the leading countries globally in the use of solar energy. We also aim to be one of the main employment companies in Zimbabwe, if we get tenders across Africa we are also determined to create job opportunities for Zimbabweans.

We expect each and every household to have access to solar energy as soon as possible depending on the agreement, both urban and rural communities. This project is the best for the country in terms of renewable energy, employment creation and black empowerment, The company shall be registered in Zimbabwe.

2. APPROVALS

Sign-off Sheet

I have read the above Project Plan and will abide by its terms and conditions and pledge my full commitment and support for the Project Plan.

Project Sponsor: _____

Date

Project Manager: _____

Date

Steering Committee: _____

Date

Steering Committee: _____

Date

Steering Committee: _____

Date

Steering Committee: _____

Date

Steering Committee: _____

Date

Steering Committee: _____

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Steering Committee: _____

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Steering Committee: _____

Date

Steering Committee: _____

Date

Steering Committee: _____

Date

A Renewable Source of Energy:
Prepared by: Esau and Bernard Madzura