ILLUMINA

THE POWER OF THE SUN

Introduction to Illumina Africa's Solar Energy Solutions

ERC Solar PV Contractor, Vendor, Importer and Manufacturer licenses.

C1 – ERC/SPVC/00585; V1 -ERC/SPVC/00589; V2 – ERC/SPVC/00584

About Illumina Africa

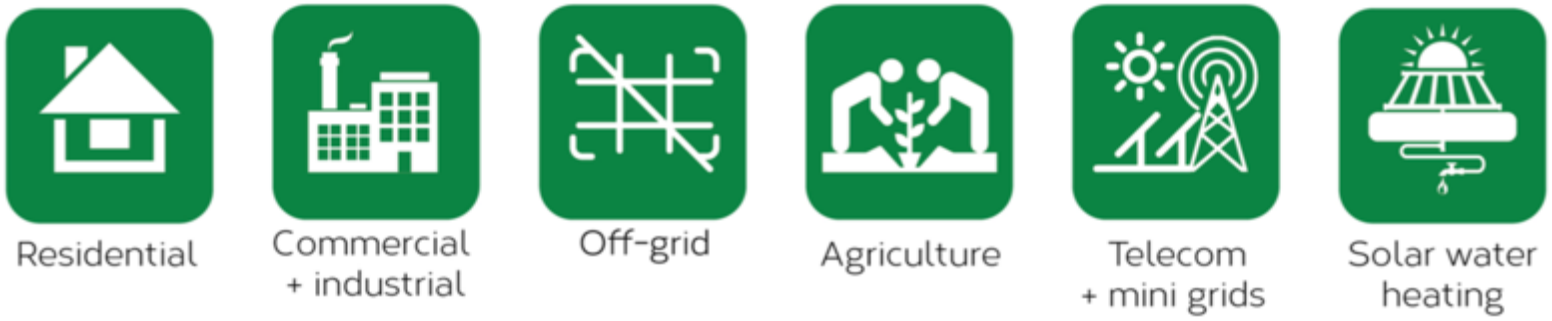
- We are focused on **optimizing designs and installations of solar PV** with storage for residential applications, as well as grid tied solar for commercial applications. Our goal is to utilize the most efficient design that produces the **lowest possible levelised cost of electricity (LCOE).** We are advancing energy storage with Lithium Ion.

- Illumina is proud to position ourselves as a **technology agnostic** company with ties to every major solar equipment provider and Tier 1 solar panel manufacturing companies. We source each and every component that is most optimal for your particular situation

- Illumina is proud to have the support from established companies for system integration, installation and financing for projects of all sizes. Our partners have the experience to handle projects in the scale of multiple MWp. Because of Illumina's lean team and overheads, we can deliver projects at the lowest cost and highest quality for our clients

Solar Energy

APPLICATIONS



WE MAKE GOING SOLAR EASY

Why Go Solar?

There is an answer for all; **energy independence, reduce electricity costs and go green.**

Own your energy

Be **energy independent** by producing your **own** electricity.

Manage your blackouts

Overcome issues of Grid Instability

Lower Electric costs

Control your cost of electricity (solar produces at 5-9 Kshs/KWh compared to 15-19 Kshs/KWh highly fluctuating grid)

Payback your initial investment within 5- 8 years

Enjoy 20 years of **free electricity** after payback

Go Green

Go Green while **saving money**

When you use solar power, you reduce the demand of electricity from toxic power plants, and **help conserve the earth's natural resources and ecosystems and take a step forward in fight against global warming**

Why Choose Illumina?

Delivery

We are a **fully vertically integrated company**. You sign with us, we handle everything

Experienced teams during design and system integration, through our partners – H Young, Schneider Electric, Shah Timber, Warree Energies (India).

Safety of your premises is our priority. We follow NEC 2017 (US PV electric standards)

We take pride in our unmatched **customer service and customer satisfaction**

Technology

We use a **genetic algorithm to optimize and customize** a solar solution just for your needs

More advanced storage and monitoring

Never compromise quality for cost. Use Tier 1 Solar Panel companies and other respected companies. We are **Technology Agnostic,** we custom design each solution according to your needs regardless of technology or company

Advanced Energy Storage

We engineer your solution with the best turn-key storage

- Illumina is working with companies such as Tesla, Daimler/SK Innovations, LG Chem and Axitec to bring the most advanced Lithium Ion Storage into Kenya
- We design longer lasting battery banks such that the cost per usable kWh per cycle over the lifetime of the solar system is lower
- Benefits include higher round trip efficiencies, lower voltage sag, longer cycle life, can discharge up to 100%, outdoor rated, low heat loss coefficient (see next table)
- For grid-connected you can integrate seamlessly with solar, perform peak shaving (to reduce demand charges) and load shifting
- For off-grid: Replace or prevent the need for Generators, save on diesel (extremely high IRR)
- 5-10 year warranty depending on manufacturer

Li-Ion – The Storage of Choice

Characteristic for comparison	Lithium Ion	Lead Acid
Initial Investment	Higher upfront investment	Lower upfront investment
Maturity of technology	Newer	Older
Number of cycles	Up to 5000 cycles at 80% Depth of Discharge (DoD)	Up to 3000 cycles at 50% DoD
Recycling facilities	Coming Up, but there will be a large recycling market for Li-Ion batteries installed today	Recycling facilities already exist
Energy Density	Much higher	Much lower
Deep cycling capability	100% DoD capability, so a smaller battery bank size required for the same kWh of storage. We design for 80% DoD.	Recommended at 50% DoD, so needs 60% more battery size vs. Li-Ion for the same kWh of storage
Cost per usable Kwh per cycle	Lower	Higher
Ability to add more batteries to existing in future	Yes, using AC-coupled design	Yes, using AC-coupled design.
Performance when voltage level drops (at a lower state of charge/ SoC)	The voltage vs state of charge curve of lithium batteries (especially relative to lead acid) is essentially flat – means that a 20% charged battery will be providing nearly the same output voltage as an 80% charged battery	Discharge performance drops as voltage level reduces with the state of charge of the battery
Effect of higher currents (larger loads)	Li-Ion is better suited to deliver at full rated capacity and power for higher discharge current loads such as A/C, refrigerators etc.	Peurkert's losses mean that lead acid is not really suitable for loads requiring a higher current
Charge Efficiency/Round Trip Losses	Higher charge efficiency of ~90%	Lower charge efficiency of ~85%
Performance under higher operating temperatures	Low heat losses – beneficial in climates such as Kenya.	Experiences greater efficiency reduction for higher temperatures
Charge and discharge speed	Can charge and discharge faster, retaining capacity (unlike lead acid)	Fast charging/discharging can significantly damage the battery

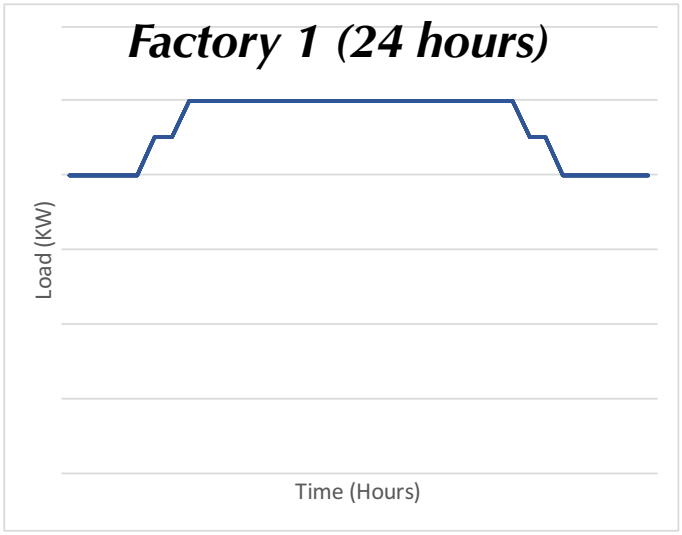
We make Going Solar Easy

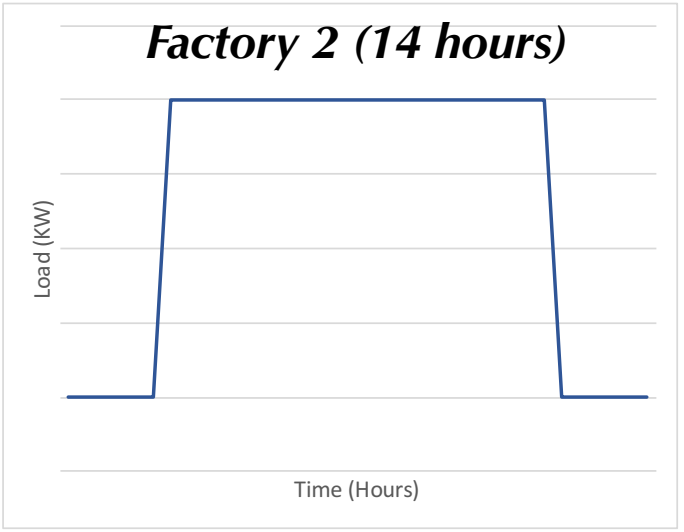
You Sign, You Enjoy, We take care of the rest

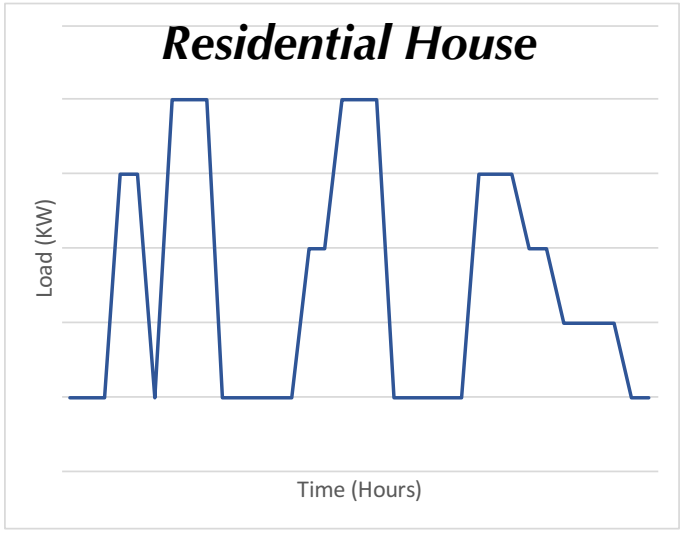
- **Introductory Presentation/ Information transfer**
- **We gather preliminary data –** Size of generators, size of UPS/batteries, Safety equipment, MCB's, meter sizes, monthly bills (preferably last 12 months), roof area (using Google maps) and customer specifications
- **We give you a preliminary report -** based on the above data
- ***We track your loads –*** If you approve the preliminary report we fit a load analyzer for around 3 weeks to get a more accurate picture of the load profile
- ***We design a system –*** *Aim to maximize IRR of investment*
- ***We can then provide a customized quotation for the system***
- ***You sign the Agreement –*** Know your cost for electricity will be for the next 20-30 years! We also provide all the necessary warrantees and guarantees, and financing where necessary
- ***We procure, install, test and commission –*** not only do we oversee all the necessary documentation such as permits, but we aim to complete the installation as timely as possible
- ***You can enjoy cleaner, more affordable energy and monitor it from anywhere!***

We Track your loads

We Track your loads for a minimum of 2 weeks

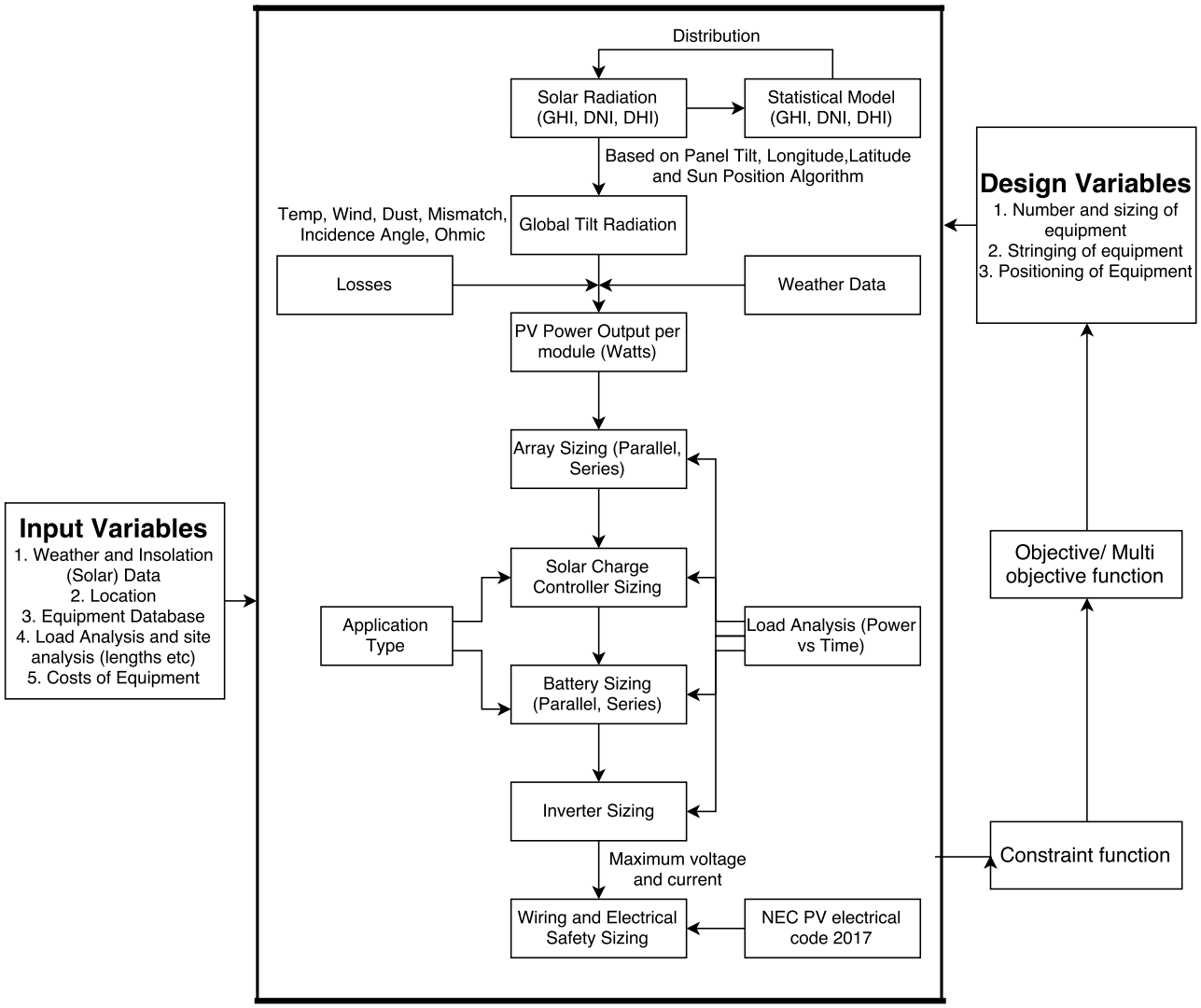






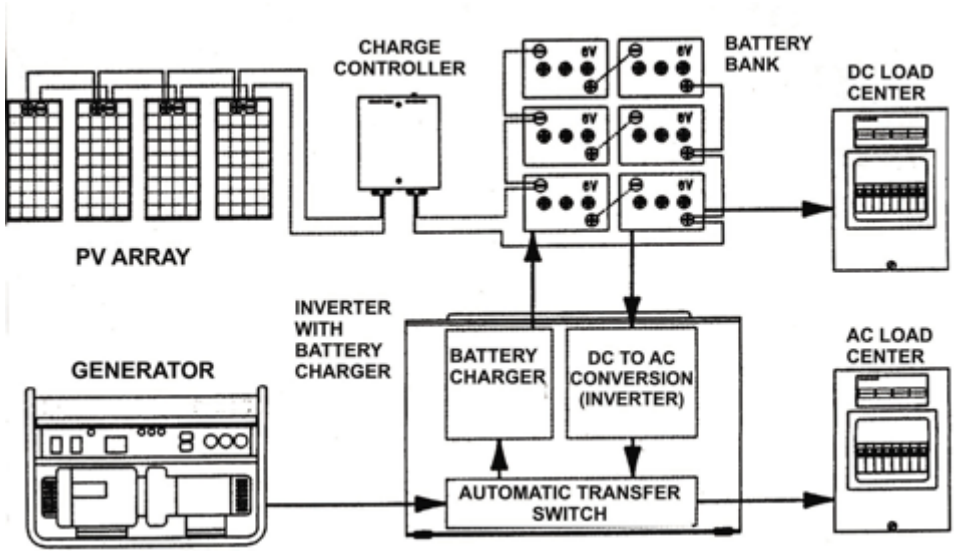
We design a system

Illumina self - developed Design and sizing Algorithm



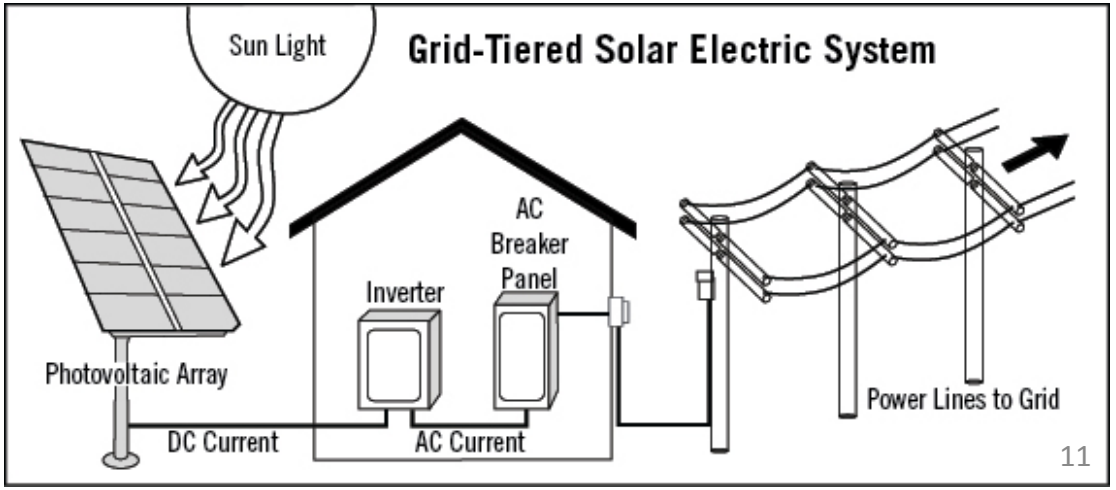
We design a system

Battery Based Vs Grid Tied Solar Solution or a Combination



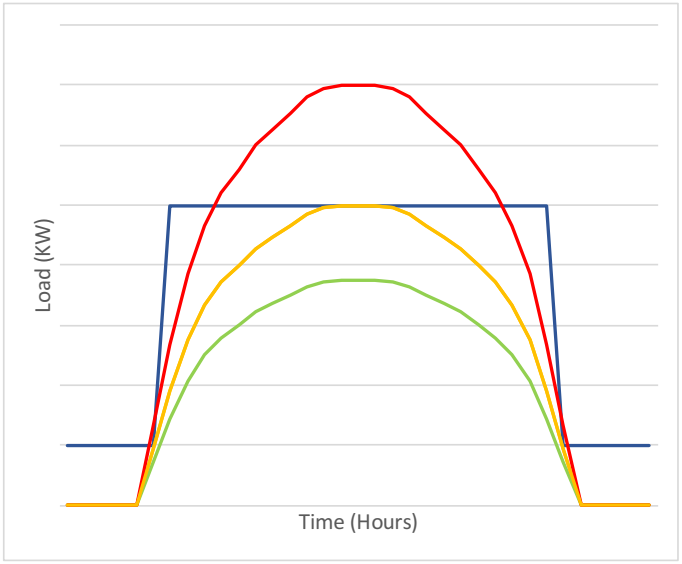
Off- Grid or Hybrid Solution

Grid Tied Solution

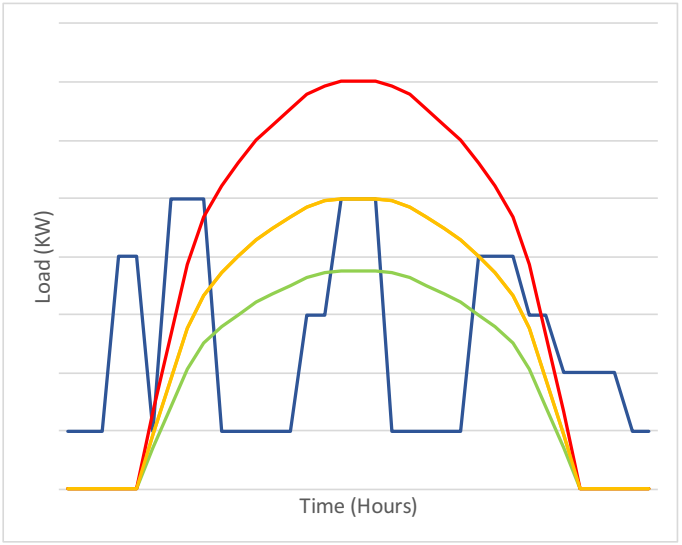


We design a system

Multi-objective optimization using Genetic Algorithm



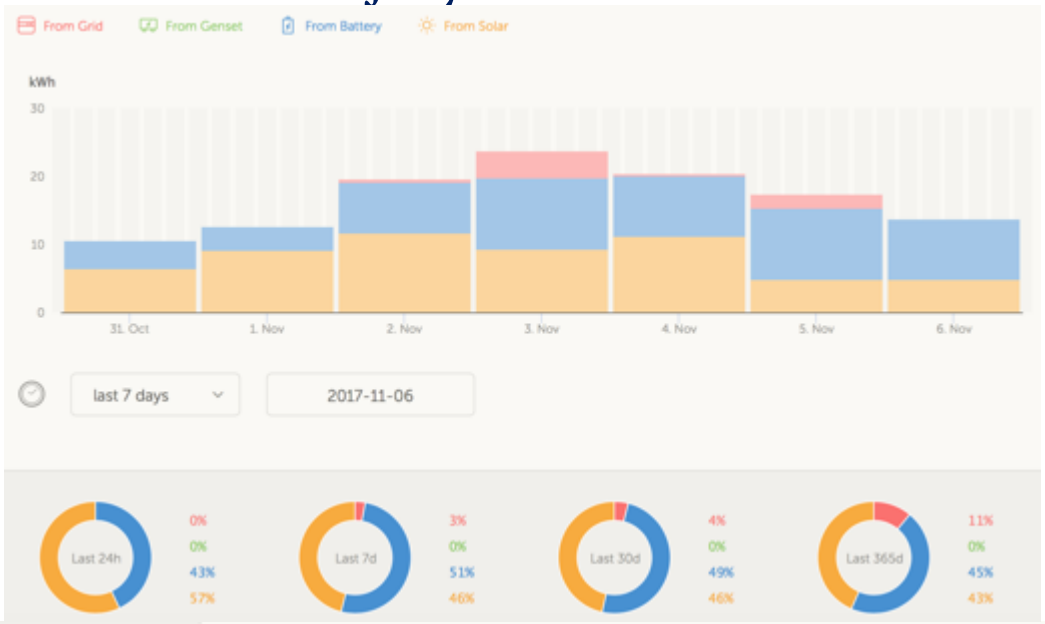
Grid Tied Solution ($1.2 - $1.6/ Wp installed)

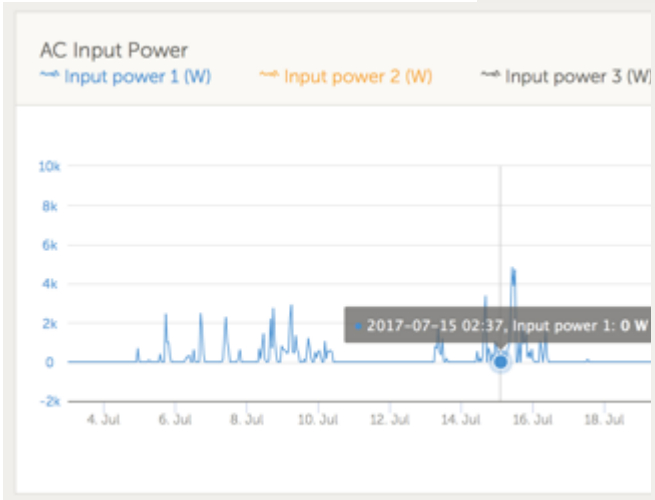


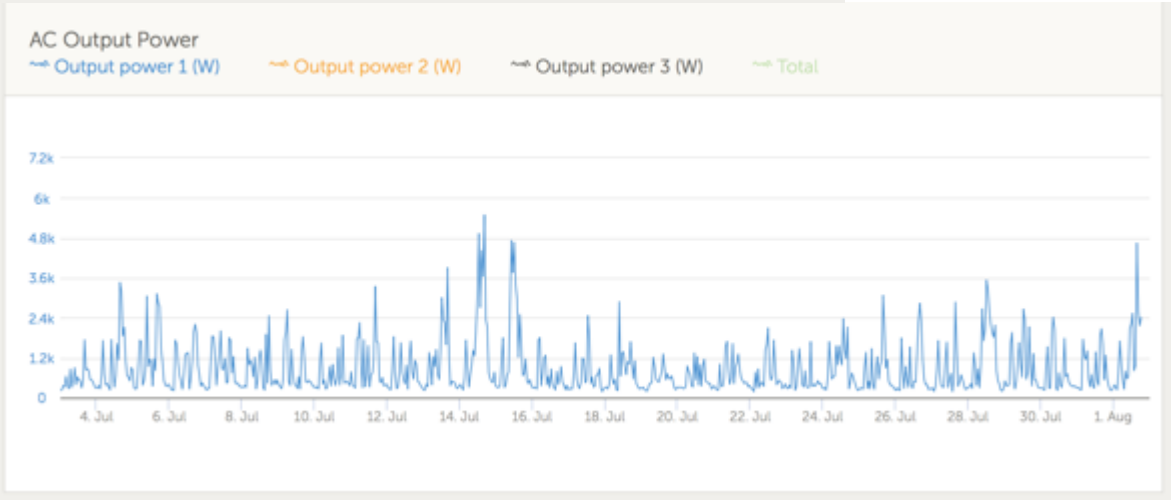
Off- Grid or Hybrid Solution ($2.4 - $2.7/ Wp installed)

We procure, install, test and commission

You Enjoy and Monitor







Financing

- After design and customer acceptance of the system proposed, we will bring on a financing third party depending on the customer needs

- We can offer a fixed lease, PPA, or solar loan

- The choice of financing depends both on the client preference as well as financing availability in the market

Financing

	Cash Purchase	Loan	Lease
Contract Term	N/A	4-10 Years	4-10 years
Down Payment	Paid in full	30% upfront	$0 upfront, but option to pre-pay part of lease
Estimated cost per kWh over life of system (for Grid-tied). Cost is lower for larger projects	$0.05 - $0.09	$0.09 - $0.15	$0.09-0.15
Tax Benefits (see page 6 for more detail)	Depreciation	Depreciation and interest payments on loan	Depreciation and interest portions if finance lease, otherwise operating lease payments
Interest Rate	N/A	6-9% (Depends on financier and who you bank with)	Implied interest rate usually 6-9%
Monthly installment	N/A	Fixed	Fixed, may have an annual escalator
Monitoring Software	✔	✔	✔
Roof and System Warrantee during installation	✔	✔	✔
Maintenance	O&M contract	O&M contract	O&M contract
System Ownership	YOU	YOU	YOU for finance lease, LESSOR for operating lease (may have bargain purchase option at end of operating lease)

Our Partners

Engineering, Procurement, commissioning and Developing Partners

H YOUNG

Shah Timber

WAAREE

Component Manufacturing Partners

Schneider Electric

JinKO Solar

University Alumni

Massachusetts Institute of Technology

UNIVERSITY OF CAMBRIDGE

MANCHESTER 1824
The University of Manchester

UBC

Thank You