



**PROJECT
EVEREST**

ENERGY ASSESSMENT

BUSINESS PLAN

ENERGY ASSESSMENT: CAMBODIA

July 2017

Team Leader: Rhys O'Brien
Group Leader: Ryan White
2IC: Polina Pashkov

Trekkers:

- Luke Burnett*
- Nima Dehghani*
- Ieva Daenke*
- Ramy Hasham*
- Joann Lin*
- Ramtin Momen*
- Bailey Sadedin-Wood*
- Amanda Tan*
- Thi Tran*



EXECUTIVE SUMMARY

During July 2017, the Energy Assessment team built on the work handed over by previous groups. These groups focussed on the development and prototyping of a thermoelectric generator (TEGs). However, upon further research it was decided that the TEG was not a viable option in Cambodia as it did not fulfil the UN Sustainable Goals of providing clean energy. As a result, the July team was pushed back to the empathising and ideating stages of Design Thinking.

The July team developed two prototype ideas throughout the month. The first idea the group has devised is named Solar Light, which is a solar powered LED connected to a battery. The battery is charged throughout the day and lasts an entire night. The main target audience is low income villages, which are largely off grid or do not have access to reliable electricity. It is a self-sustainable product that does not require any payment after the initial purchase, and provides light to those that need it.

The second idea, PowerNow, is a battery kit that can be charged either by solar power or through the grid. The battery is paid for in instalments via mobile phone. Power, stored in the battery, is only accessible after entering a unique code into the keypad on the device. The code is received as a text message after a monthly payment is made. The financial summary of the businesses is incomplete as the costs of the operations and logistics are yet to be determined, however the team believes these products are viable as similar products have proven to be successful in different countries and they satisfy the needs of the target audiences.

Before further reading, please watch the handover video. This can be found in the link below: [170727 Energy Assessment Handover Video ND 01](#)





TABLE OF CONTENTS

PROBLEM	1
Solution 1: PowerNow	1
INTRODUCTION	1
Ownership Structure	1
Products and Services	1
THE MARKET	3
Customer Interaction with Product	3
MARKET RESEARCH	5
Empathise and Define Breakdown	5
Nature of the needs PowerNow will satisfy	6
SWOT Analysis	6
MARKETING STRATEGY	7
Channels of Communication	7
COMPETITOR ANALYSIS	7
Near Identical Competitors	7
Unique Value Proposition	7
OPERATIONS AND LOGISTICS	7
COST AND PRICING STRATEGY	8
CONTINGENCY PLANNING	8
Solution 2: SolarLight	9
INTRODUCTION	9
Ownership Structure	9
Products and Services	9
THE MARKET	10
MARKET RESEARCH	10
SWOT Analysis	11





MARKETING STRATEGY	12
COMPETITOR ANALYSIS	12
OPERATIONS AND LOGISTICS	12
COST AND PRICING STRATEGY	13
Competitor Price Points	13
Financial Analysis and Reporting	13
CONTINGENCY PLANNING	14
FUTURE ACTIONS	14



PROBLEM

After conducting interviews with locals, it has been concluded that the foremost barrier for access to reliable electricity is cost. The grid connection costs are too high and there is a stigma surrounding the high upfront costs of renewable energy. Another outstanding issue with electricity is the frequent power outages prevalent in the country, in which each outage can last for hours.

SOLUTION 1: POWERNOW

INTRODUCTION

The PowerNow idea has been taken from an implemented subscription battery system in Uganda, called ReadyPay. This is a battery kit that can be charged either by solar power or through the grid. The battery is paid for in instalments via mobile phone. Power, stored in the battery, is only accessible after entering a unique code into the keypad on the device. The unique code is received as a text message after a monthly payment is made.

OWNERSHIP STRUCTURE

Project Everest owns the business of PowerNow. There are currently no shareholders for the business.

PRODUCTS AND SERVICES

The PowerNow business sells a battery kit that can be charged from the grid or from solar power. After an initial deposit, installation services would be provided for battery setup at the customer's home. The customer would then pay for the battery in instalments through a mobile phone, using an existing financial inclusion provider such as WING, Unity (ACLEDA bank), or AMK (microfinance deposit institution).

WING uses point of sale devices (POS) such as cash registers to provide access to financial service such as local money transfer, phone top up, bill payment, WING Ket Luy and online payment.

ACLEDA Unity offers access to financial services to all mobile phone networks, that





allows a wide range of transactions to be securely performed through mobile phones anywhere in the country and overseas without having to visit a branch.

AMK - is a social enterprise and largest microfinance deposit-taking institution cover 80% of villages in Cambodia that offers financial inclusion programs.

The battery will be a lithium iron phosphate [lithium iron phosphate battery](#) (LiFePO₄). This battery is the safest and most suitable for Cambodian weather and usage purposes. The battery will have one charging input, which can be connected to solar panels or to the grid. There will be several outputs to the battery, where these outputs will supply electricity to small household appliances. The battery unit will also be equipped with a keypad and a screen for entering in the unique codes that are sent via SMS. The code will activate access to electricity until the next payment is due. These codes must be pre-installed into the unit before purchase. At the end of the product's life, providing a financial incentive for customers to sell their used battery back to Project Everest was considered. This would ensure batteries are disposed of safely, via [reconditioning and recycling](#). [Approximate calculations](#) to further determine the required capacity were made, however the calculations are only preliminary and further research and analysis should be made.

In the beginning of business, it is suggested that only one battery capacity is provided. After confirming this is a viable business, more options for battery capacities and solar panels should be considered. If or when the business is expanded, a variety of products can be provided.





THE MARKET

The [target customers](#) for PowerNow are people who do not have access to safe, affordable, and reliable electricity. At different stages of growth different market segments will be targeted, however; Cambodians who sit within a higher income bracket and have overpriced electricity from the grid will be the first target market. It is believed this group will likely provide us with enough revenue to help propel the business before it can be branched out to other customer segments.

CUSTOMER INTERACTION WITH PRODUCT

A number of different marketing strategies were considered. It is believed the product can be offered to people in the following structures:

1. Internet and Social Media

Facebook can be used to market the product. There are free promotional services provided by Facebook if budget was a concern. Blog posts about the state of the development of the product range can be used. There could also 'be a page for PowerNow on the Project Everest website for ordering and advertisement purposes, thus making the sales process easier.

2. Face to Face Marketing with Sales Groups

The training of salesman should be given to Khmer people, the main idea of door to door services can be promoting products to customers as well as gathering information from them, e.g. how they think about the products, what price will trigger them and what they need from us. It is also suggested to use schools and teachers to spread the word to their students. This could prove successful as education is highly rated in the Cambodian community.

3. Classic Advertising Strategies

Advertising strategies such as implementing billboards, tuk tuk posters and flyers and radio advertisements can be considered, however it should be noted that this is likely the most expensive option.

Based on surveys conducted and expressions of interest received, it has been concluded that the target customers would greatly appreciate what PowerNow has to offer.

It should be noted that the July team was focussing on lowering the cost to provide electricity to Cambodians at around 10USD a month, however after our four EOI results came through, it was found that some Cambodians are happy to pay 30-50USD a month for reliable energy.



MARKET RESEARCH

To further understand the market, additional research was required. By exploring an existing product similar to PowerNow such as ReadyPay, it was hoped that a better understanding of the market would be gained. The idea that people can pay through a mobile phone to receive an access code proved to be a viable business plan for Uganda.

The Energy Team also explored various areas across Cambodia that either do not have access to the grid or have expensive electricity prices near Siem Reap. The group decided to particularly focus on targeting villages with higher income. Some of the [provinces](#) believed to be a suitable target for PowerNow can be found in the table below. It should be noted that these provinces only include those that are not connected to the grid, however Expressions of Interest results showed that those who are connected to the grid may also be interested in PowerNow.

City/Province
Stung Treng
Kampong Thom
Kratie
Mondulkiri
Pursat
Kampong Chhang
Koh Kong

EMPATHISE AND DEFINE BREAKDOWN

Through extensive surveying in the Cambodian energy community throughout December 2016 to February 2017 [December 2016 to February 2017](#) and [July 2017](#), it was concluded that residents use electricity most commonly for lighting, fans and water pumps as air conditioning and refrigeration are rarely used.

For those villages that are not connected to the grid generators supplied by private companies are used. This is however quite expensive for many Cambodians and many cannot afford even this. Those who do not even use a generator use candles or kerosene lamps instead, which have risks associated with health and safety. This is important as a marketing standpoint due to the fire-safety of solar products





would provide a great incentive for people to buy.

A lack of education on electricity and alternate sources has been prevalent in many villages. For many, there is a negative stigma surrounding solar energy, it is often labelled as unreliable and expensive to maintain. Due to these reasons, some locals may be resistant to getting solar panels, even if they are able to afford it. This may prove to be an obstacle when trying to market and promote PowerNow as a product.

NATURE OF THE NEEDS POWERNOW WILL SATISFY

Currently 67% of Cambodia's total population does not have access to electricity, as a result, Cambodians are in need of reliable, safe and affordable electricity. In addition, the cost of connecting to the grid is large and often does not supply customers with reliable power source. Finally, a sustainable source of energy (e.g. solar power) would benefit the health of the environment and people, but does carry a negative stigma of unreliability.

SWOT ANALYSIS

The SWOT Analysis for PowerNow is shown below. A more detailed explanation of the SWOT analysis can be found at [here](#).

Strengths: <ul style="list-style-type: none">- Affordable & safe energy- Easy payment process- Renewable/sustainable energy- Can be used for multiple applications- Works for people on and off-grid- Electricity on demand- Suitable for hot climates- Incentive to pay quicker Similar product already proven to be commercially viable in Uganda	Weaknesses: <ul style="list-style-type: none">- Minimal variety- Payment plans- Batteries degrade over time- Recycling batteries consume large amounts of energy- Warranty could incur significant costs- Requires large upfront investments- Risk of people not fulfilling their payment obligations
Opportunities: <ul style="list-style-type: none">- Regular blackouts- Expensive traditional sources of electricity- Lack of safety in current electrical systems (electrocution is common)	Threats: <ul style="list-style-type: none">- Competition- Customers' poor perception of solar power due to lack of education- People rejecting the idea- Lack of available and reliable suppliers- Lack of sponsors and partners- Weather- Government connecting grid systems





MARKETING STRATEGY

PowerNow should be marketed as an affordable, sustainable, reliable, good quality and safe form of alternative energy.

CHANNELS OF COMMUNICATION

The main channels of communication will be digital, as this mitigates waste and is effective in the Cambodian community. Village to village salesmen should also be used as many of the villagers may not regularly use internet. Using school principals and teachers is also a good form of communication. Education is highly regarded in Cambodia and many of the parents have not received the education children are currently. A more in depth analysis of the marketing strategy can be found [here](#).

COMPETITOR ANALYSIS

NEAR IDENTICAL COMPETITORS

There are a number of solar competitors in Cambodia, most notably Khmer Solar, Kamworks, Solar Green Energy Cambodia, NRG Solutions, and IMB Cambodia Group. More information on potential competition can be found [here](#).

UNIQUE VALUE PROPOSITION

PowerNow is unique in the fact that it enables customers to pay in instalments over a specified timeframe, thus making it more affordable. Furthermore, the payments are made via mobile phones (potentially through WING), which is convenient and efficient.

OPERATIONS AND LOGISTICS

The specifics of the business operations and logistics have not been discussed. The only manufacturing that is required might be for the payment method. There are options to consider 3D printing for creating the box with the keypad to enter the code. Another option is to make our own charge controller and put the keypad and screen on this as it already controls the flow of energy. Our [list of materials](#), has a list of 3D printing companies and other potential suppliers for the remaining parts.

Delivery has not been explored, but will likely be done with installation. Overheads, legal and insurance requirements, and organisational structure need to be further considered once a product has been finalised. The ERS team were unable to sell



anything as they are not a registered business, so this legal requirement will need to be investigated.

COST AND PRICING STRATEGY

Cost breakdown, with exact price points along with net and gross profit margins will need to be further investigated once there is a prototype. To assist the pricing decision, the outright costs and instalment packages for the near identical Ugandan product, ReadyPay, can be found in [170710 PowerNow Research and Answers AT JL ID 01](#).

CONTINGENCY PLANNING

Many risks occur when setting up a business, it is important to determine mitigation strategies if these risks do eventuate. It has been decided that the foremost risk to the business is if customers are unable to pay their instalments. This risk could be mitigated with financial background checks or through the accessibility of their product upon their regular payment. Another outstanding risk is the low turnover of inventory. To avoid such risk, it is important to find investors who are interested in long term business, instead of those seeking a quick return on investment. The business should also be expanded at a stable pace.





SOLUTION 2: SOLARLIGHT

INTRODUCTION

SolarLight is a solar powered lighting solution aimed at delivering sustainable, low cost and effective lighting to some of Cambodia's most rural villages. The product is a portable, self-enclosed unit comprising of a battery, solar panel and LED bulb that charges through the day to provide a reliable source of light during night time and power outages. SolarLight will be available for a small unit cost, enabling effective market penetration in an area where there are numerous options currently operating. See the prototype design [here](#).

OWNERSHIP STRUCTURE

Project Everest owns the business. There's currently no shareholder and Project Everest being the only major shareholder, provides for all expenses. Project Everest will supply the money for parts and distribution, as well as its vast knowledge and experience working in developing countries and running businesses.

PRODUCTS AND SERVICES

The business is effective because SolarLight offers a product that is self-sustaining, does not require payment after the initial purchase, and provides villages with light. It uses renewable energy that they have access to, in addition to its small scale per unit. The product is a solar powered LED light connected to a battery that charges throughout the day and then lasts the entire night. It can be installed on the roof or window with a switch to turn it off and on. Services to install the product for maximises solar efficiency will be provided.

There are many lights and solar panels in the market, however they are all large in scale and are only affordable to people in higher income brackets. SolarLight utilises the same renewable energy technology to create a product that is reliable, affordable and sustainable for low income villages.





THE MARKET

The main target customers are low income villages that are not connected to the grid and only have access to expensive electricity, households with inconsistent electricity, and small businesses. The aim is to begin by targeting low income villages with no access to electricity before branching out to other customer segments. Prototypes of SolarLight have not been made, however after successful prototypes are produced, it is hoped that the market will grow.

MARKET RESEARCH

Based on past surveys, the key finding showed that people are mainly using electricity for lights, fans and water pumps. Many people do not use air-conditioners or refrigerators due to their high costs. Some villages that are not connected to the grid system use power generators supplied by private companies, which can be expensive. In addition, the lack of education on electricity and its alternate sources could be an obstacle when trying to market SolarLight.

Additional marketing research, including meetings with NGOs, other business partners, and surveys with distributors (village chiefs, convenience stores) is recommended. It has however been found that some villages, which are not connected to the grid, use generators supplied by expensive private companies. For example, Kampong Phluk residents use privately owned generators, and the companies charge 1 USD per kWh. This is enormous compared to Australia's average electricity price of 29 US cents per kWh. Cambodians pay these large prices as it is believed to be cheaper than purchasing generators or solar panels. This displays the serious lack of education on electricity and alternative energy sources, and may be an obstacle when trying to market the product.

It has also been found that villages who have no access to electricity use candles or kerosene lamps instead, which are dangerous fire hazards. This provides a great incentive for customers to purchase SolarLight, as it is a fire-safe product and provides no health concerns.

Required components for the production of SolarLight, can be found in the table



below. Additional information on approximate pricings can be found in [170718 Cost of SolarLight Prototype TT 01](#). It should however be noted that these are initial estimates, and further research is required before a final decision is made.

Circuit parts	Bulb parts	Other
<ul style="list-style-type: none"> - PCB copper board 1000 microfarad capacitor 1N4001 Diode Voltage regulator Lead wire Resistors Electrical wires Solar panel Battery Light Bulb LED light 	<ul style="list-style-type: none"> Rivets Rubber sealant 	<ul style="list-style-type: none"> Cutter Glue gun Hand drill Soldering iron Soldering sucker Riveter Chisel

The components can both be sourced from local businesses in Cambodia and from overseas suppliers. A list of contacts has also been created to keep note of potential suppliers, previous contacts and potential stakeholders.

SWOT ANALYSIS

The SWOT Analysis for SolarLight is shown below. For an in depth analysis of each point see the following document: [170726 SWOT Analysis Solar RM TT 01](#).

Strengths: <ul style="list-style-type: none"> - Renewable energy and innovative source of light - Provide light poor villages - Cheap and no ongoing cost - Low maintenance - Easy to sell - No infrastructure needed - Viable product 	Weaknesses: <ul style="list-style-type: none"> - Prices might be high for customers - Brightness - Labour cost - Initial cost (multiples around the house) - Too simplistic (easy to make)
Opportunities: <ul style="list-style-type: none"> - Social impact - Cheap and effective electricity in Cambodia - Viable solution for project in other countries - Solar expanding market 	Threats: <ul style="list-style-type: none"> - Many competitions - Changes in technology - Existing products - Weather (rain season) - Government connect grid to all villages.

MARKETING STRATEGY

SolarLight should be marketed as an affordable, sustainable, and reliable source of light.

The main [channels of communication](#) are:

1. Through the internet and social media
2. Through face to face marketing with well-developed sales groups
3. Through classic advertising strategies

This section should focus on the costs of the product, cost of any advertising technique, costs of each sort of electricity. These numbers will assist us in explaining the positive points of the project to people in an easy to understand way.

After some research, it is believed that the most effective way to make sales is through face to face. There are many ways to make this possible, as detailed below.

1. Employing tuk tuk drivers to promote SolarLight on a commission basis
2. Create partnerships with smaller businesses
3. Promote SolarLight at community events

In order to have any of these approaches successful, the business must establish well trained sales teams.

COMPETITOR ANALYSIS

Kerosene lamps are often used in rural villages at night. Furthermore, there are numerous solar lighting options ranging from full off-grid systems to small, self-contained lighting units that pose as competitors. For more in-depth information on competitors please use this link: [170726 SolarLight Competitor Analysis RM 01](#).

OPERATIONS AND LOGISTICS

The operations and logistics of the SolarLight business are yet to be detailed. However, it is believed that the products are likely to be delivered and installed by Project Everest at each household. Transportation for products distribution is mentioned in expenses but the shipping of equipment and parts are not included in the cost structure. A suppliers list for materials has been created, which can be found [here](#).





Legal requirements, insurance requirements and employees are yet to be looked at. This is required once the prototype design is finalised. The December team will then need to contact with suppliers and work out how the project would introduce local employee on board with operation process.

COST AND PRICING STRATEGY

A cost breakdown, including [exact price points](#), net and gross profit margins, will need to be further investigated. This stage can only be started after prototyping has been completed.

The aim is to sell the SolarLight product at \$25 a unit, this will achieve the [breakeven point](#).

COMPETITOR PRICE POINTS

The approximate price points of SolarLight's competitors are summarised in the table below. It should be noted that the prices are obtained from past survey results.

<i>Competitor</i>	<i>Price</i>
Government grid	820 Riel/kWh
Private electricity company	1200 Riel/kWh
Litre of Light	N/A
Solar panel electricity	\$300 - \$400
Gravity Light	\$60

The net and gross profit margins are yet to be determined as the final prototype design is incomplete.

FINANCIAL ANALYSIS AND REPORTING

As the July Energy Team focused on the Empathising and Ideating stages of Design Thinking, the financial analyses of the SolarLight business are yet to be completed.

For any business start-up, initial upfront costs are required. As a small business SolarLight will incur some of initial business expenses. These may include advertising, transportation of goods, office and workshop rent costs. Additional



information on the business expenses can be accessed [here](#).

CONTINGENCY PLANNING

Many risks occur when setting up a business, it is important to determine mitigation strategies if these risks do eventuate. Low turnover of inventory is a common risk to new businesses and could affect SolarLight. To mitigate such a risk, it is suggested to find investors in long term businesses and expand on business at a rate that is sustainable. Another risk associated with SolarLight is the risk of partnership with local companies. To mitigate this, SolarLight as a business should be legalised as soon as possible and business partner background checks should be performed.

FUTURE ACTIONS

Future Actions detail the next stages of the project determined by July 2017 Team. Firstly, it is imperative that the next team read the documents labelled as important, to ensure the two prototype ideas are fully understood.

The next step is to complete more accurate calculations for both PowerNow and SolarLight as current calculations are only preliminary. From these calculations, important results such as battery capacity, voltage and wattage of the solar panels can be found. Finding the exact technical requirements for both products will allow the next team to proceed to the prototyping stage. The financials can then be completed as required products and their prices are known.

Additional research into the payment system and programming of PowerNow is required. Based on the Expressions of Interest, PowerNow's potential customers express interest in using the battery kit to power refrigerators and water pumps. Therefore, it is suggested that the next Energy Team explore this possibility using larger batteries and/or solar panels. The July team has also found a solar panel company in Siem Reap called Motech Cell USA that sells panels at competitive prices (relative to what has been found online). It should be noted that the July team was focussing on providing energy at very low costs (8 USD/month), yet Cambodians are happy to pay more than originally initiated (up to 50 USD/month).



For SolarLight, it will be important to get in contact with a village chief from a rural village with no grid access. Surveys and interviews in areas like these will help assure these products are viable in Cambodia and allow for entry level products have the right specifications.

It is also highly recommended that the next group uses their first two weeks of project to focus on collecting more EOIs to further define the prototype design.

In general, it is recommended that the next team spend a day or two going through July's documents to learn as much as they can about the problems and the proposed prototypes. Obtaining contacts with local suppliers and comparing them with international suppliers will also be important for entering the prototyping stage and should be an early goal.