FIJI FUEL SUSTAINABILITY

February 2018

1. Executive Summary

1.1 Business Summary and Aims

The business aims of Fuel Sustainability is to address the UN sustainable development goals, specifically:

- Goal 12: Ensure sustainable consumption and production patterns
- Goal 13: Take urgent action to combat climate change and its impacts.

Approximately 3 billion people worldwide use biomass open fire for cooking and heating; a method associated with a host of environmental and health implications, (World Health Organization, WHO, 2016). Inefficient burning contributes to carbon emissions and releases excessive quantities of smoke containing particulate matter (carbon soot) and carbon monoxide, a toxic gas that is colorless, odourless, and tasteless. Over 1 billion tonnes of Carbon dioxide is produced each year as a result of inefficient cooking and it is estimated that an annual premature death of 4 million people from illness associated with household air pollution (WHO, 2016).

Fuel sustainability team is keenly interested in reducing the production of greenhouse gases, increasing the efficiency of fuel use for cooking and heating, and reducing the negative impact on the health of those who depend on unsustainable and inefficient fuels use in Fiji.

The Buka Stove aims to address the multiple issues associated with inefficient open fire cooking methods, as only 10% - 40% of heat energy released is transferred to the pot (Venter, 2011). The Buka Stove design allows efficient burning entailing shorter cooking times, the use of less firewood, and reduced smoke emissions; potentially improving the health and lifestyles of users.

The business follows a two-pronged approach aiming to alleviate health issues associated with excessive smoke inhalation and reduce carbon emissions associated with traditional cooking methods. The Buka Stove is made from recycled refrigerant tanks that are sourced locally. The design, which is based on a rocket stove, allows for efficient flow of oxygen into the main chamber yielding complete combustion and therefore low smoke production. By reducing the smoke generation the Buka stove can help lower health risks associated with excessive smoke inhalation. In addition through heat retention the Buka Stove decreases the amount of fuel resources need. The Buka Stove is a one time payment as firewood is a free resource collected from the

surroundings, thus the customer is not faced with the recurring payments associated with electric, gas and kerosene stoves.

The aim of the business is to further investigate the issue at the local level, formalise data in the form of a market analysis, continuing to test the proposed Buka Stove Prototype and to establish a supply chain and distribution channel.

1.2 Financial Summary

Refer to Fuel Financial Model. Based on current supply chain acquisitions the average cost of producing a stove is calculated at FJD$32.77 (see here for cost breakdown). This includes fixed and variable costs and potential transportation cost from manufacturer to market, however this cost is estimated to decrease within the next few years. The business will sell the current stove for FJD$60, yielding a contribution margin of around 50%. A conservative estimate for the break even point would be achieved after the sale of 265 stoves.

Considering the market penetration rate of 0.5% in urban areas and 0.2% in rural areas we estimate production of 713 stoves in 2018 with a profit of FJD$12,486.60 being made in the first year of business in the scenario we are successful in acquiring a distribution partner. Furthermore, assuming that the market penetration rate increases to 5% in urban and 2% in rural areas in 2019 and then 20% in Urban and 10% in rural by 2020 we can predict a 3 year prediction for the business. Using these assumption the net profit is estimated to be FJD$627,634.04 by the end of 2020.

This figure is based on the assumptions that there will be an overall fee of $3,456.28 involved with business registration costs, with no assumptions made for other fixed costs such as insurance and legal services. This figure is also based on the assumption that Project Everest covers all fixed costs including vehicle rent, project related accommodation, and petrol.

In addition, plans for extensive development of key revenue streams within the financial year are necessary. Potential revenue streams include the production of a larger model stove; training programs for stove production within villages and developing a recycling collection service for refrigerant tanks. The charcoal briquettes are important to consider as a revenue stream for an alternative fuel during wet season. The stabilisation of revenue streams will permit a shift in focus, requiring further research and financial analysis.

2. Ownership Structure

2.1 Owner profile

Fuel sustainability is currently a subsidiary of Project Everest (XYZ For Good Pty Ltd T/A Project Everest). As of February 2018, Project Everest is the current owner of this business.

At this stage, there are currently no major shareholders of Fuel Sustainability as a business. Project Everest intends to offer equity in return for a qualified team to take this business on full time, with a plan to only retain between 5-10% of the business.

3. Products and Services

3.1 About the Business

The business currently sells a High Efficiency Metal Stove (referred to as the Buka Stove).

Potential future revenue streams are the High Efficiency Clay Stove (see here for test results on the clay stove conducted by the February 2018 Fuel team).

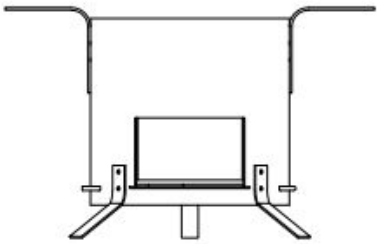
Buka Stove

The Buka Stove is a stove that was based off the rocket stove design. A rocket stove is a stove that uses small chunks of wood or other matter as fuel, which is burned in the inner combustion chamber containing an insulated vertical chimney. The volatile compounds released in the burning process are trapped within the insulation chamber until they combust, releasing even more heat energy. Depending on the design, the chimney helps ensure an almost complete combustion before the flame reaches the pot, which in turn reduces harmful emissions as well as the amount of fuel needed per use compared to the traditional two or three stone cookstoves.

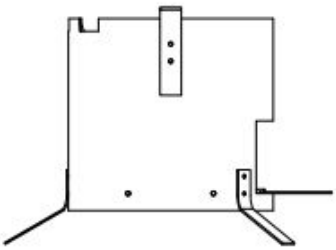
The Buka Stove is lightweight, portable, and early tests indicate a significant reduction in cooking time and fuel required. An image of the Buka Stove is shown below.

3.2 Product Specifications

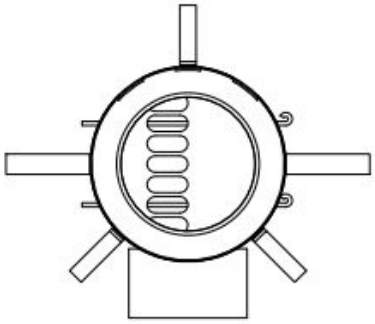
Buka Stove



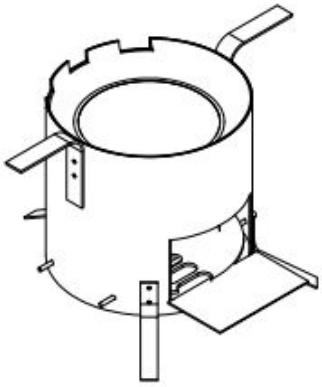
Front view



Side view



Top view



The Buka stove design consists of two concentric cylinders of 240mm and 160mm diameters. Ignition occurs at the bottom of the inner cylinder, with the air gap between the cylinder walls acting as a thermal insulator. Most of the parts are simply supported or riveted together, in order to reduce the labour intensive welding. These joining methods also facilitate replacement of parts should they ever fail.

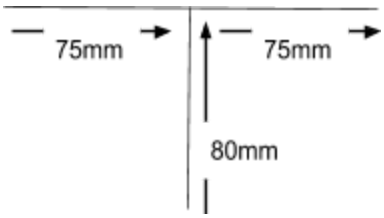
The Buka Stove is comprised of the following components:

1. 240mm Cylinder. Cut from a recycled refrigerant tank. Has a 145mm X 85mm piece cut out 20mm from the bottom. This piece is flattened and then arc-welded onto the lower edge of the opening as a lip to support fuel.

2. Ashtray. The curved bottom offcut from the refrigerant tank. Reduces unwanted ash mess when using the stove.

3. Concave Top-Ring. Cut from the top of the refrigerant tank, with the handle section also removed. This is then inverted and arc-welded to the 240mm cylinder, with 4 'V' vents cut into the rear of the tank to direct emissions away from the user. Fast and easy to implement with an angle grinder.

4. Inner Cylinder. Made from a 500mm X 200mm piece of 0.44mm thick zinc iron sheet. A 'T-cut' in the middle of the bottom edge forms two 'door' sections. The whole piece is then curled and inserted from the top into the Top-ring, where it 'springs' out ready for MIG welding to the top-ring.



5. Legs. Riveted on in a tripod design for stability. Made from 150mm lengths of 25mm X 3mm flat bar, bent at roughly 120^0. Easy and cheap to replace.

6. Handles. Riveted on opposite sides, made from 200mm lengths of 25mm X 3mm flat bar, bent at 90^0. Easy and cheap to replace

7. Removable Grate. Galvanised Gothic Mesh cut into a roughly 200mm x 200mm piece. Supports fuel during combustion, and allows waste to fall through onto ashtray for disposal. Can be removed for cleaning of the stove or replacement.

8. Grate Pins. Two 300mm lengths of 5mm steel rod, bent into a 'tent peg' shape. Supports the grate when inserted through an opposing pair of holes 15mm above the bottom of the tank cylinder.

9. Heat Resistant Black Paint. Applied to the entire tank, after appropriate preparation. Helps reduce corrosion, fast drying and allows for a high contrast white PE logo to be stenciled onto the tank rear for brand recognition.

Joining methods.

The original Buka stove had a welded grate plate and legs. The welding was replaced by pop rivets for joining the legs and handles. This increased production speed and corrosion protection whilst lowering labour costs, due to the relative ease of applying pop rivets over welding. Whilst the customers had some initial concerns about the durability of the new handles and legs, they are seen to be more viable than the welded versions. This is due to their ease of replacement (only requiring 30 seconds of time and $0.05 per rivet). Provided the rivet pilot holes in the tank cylinder have small tolerances relative to the rivets used, they should not ‘pull-out’ or fail in shear.

Ventilations

The original Buka stove had square vents around the top of the tank to allow the toxic gases from incomplete combustion to rise. Buka 4.0 uses ‘V’ vents cut only into only the rear of the stove to help direct smoke away from the user. The two images below show the air vents on version 4.0 alongside version 2.0.

3.3 Additional Goods and Services

High Efficiency Clay Stove

The clay stove prototype consists of 3 individual components: a clay base, a metal grate, and a cylindrical clay tower. The grate rests on the clay base, with the cylindrical tower placed on top. A ‘wave’ pattern or ‘castle blocks’ in the top-rear of the clay tower will facilitate smoke ventilation away from the user.

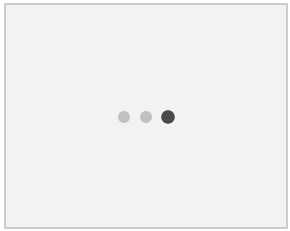
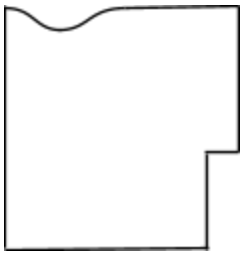
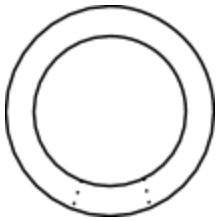
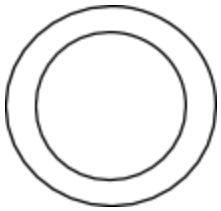
Also designed as a Rocket Stove, the clay stove facilitates a similar reduction in emissions and fuel usage through a vertical combustion chamber. The clay itself acts as an insulator, with early tests showing an approximate 160^{o}C difference between inner (60^{o}C) and outer (220^{o}C) surfaces. These results are promising in demonstrating the thermal properties of clay and show definite potential for future prototyping and testing.

Beyond its promising thermal properties, clay stoves provide more freedom compared to refrigerant tanks in terms of stove diameter, as refrigerant tanks only come in one size. The demand for stoves capable of heating pots with diameters beyond 50cm has been identified with relative consistency across multiple villages the fuel team has empathised at. Such stoves for ceremonies and village gatherings have been identified as not requiring the portability aspect of the metal Buka Stove.

Thermal expansion needs to be accounted for in the construction of the clay stove, and chicken wire is currently being investigated as a possible material to counter thermal expansion with it's tensile strength, to be added on the inside and outside of the clay stove. However, due to the lack of knowledge in the relevant area, we have not been able to incorporate chicken wire into our test clay stove as of February 2018.

Production of the stove is somewhat environmentally sustainable, with supplies being limited by accessibility and the amount of available clay and sand. Several different sized moulds could be created once the design is finalised, allowing for faster production and different sizes to accommodate the needs for communal cooking in villages.

This design is less rugged than the metal Buka Stove, due to the fragility of ceramics, and a proper kilning process must be sourced before sales can be made.

Component	Front View	Left Side View	Top View
Clay Tower			
Clay Base Tray			

4. The Market

4.1 Target Customers

Currently, the primary market are individuals who live in rural Fiji, specifically women who reside in rural inland areas with limited exposure to city areas and people from Nadroga-Navosa and neighbouring regions. The plan is to expand the operation to target everyone who cooks from the rest of Republic of Fiji, and possibly extending the distribution to other countries. Women have been identified as being responsible for the majority of the cooking for their families and currently rely on inefficient practices of using open fires and kerosene stoves.

The disposable income of these village women is largely reliant on subsistence farming which is mostly used for personal consumption. Therefore the goal is to design a stove that is cheap whilst eliminating the ongoing cost of kerosene or gas refills, while allowing firewood users to cook in a more efficient in a healthier environment.

During our empathize session, we discovered that the portability of the stove is liked by many because this allows the user to take the stove to the farms. The improved

efficiency also reduces the amount of firewood used to cook the same amount of food, thus reducing the time needed to collect firewood.

4.2 Market Segments and Growth

To obtain customers, empathising with villagers is a vital process in accessing the market. Fijian culture is largely based on family kinship and verbal expression, by creating a personal-professional connection with villages and individuals, the company can establish trust and brand recognition.

Consumer interaction between various villagers and Project Everest has occurred from December to February to obtain customer interest in the stove during project operation in Fiji, as well as increase advertising of the stove through word of mouth. This includes phones calls to village headmen, and buka stove demonstrations when visiting villages to educate individuals on how to use the stove, and show them why it is viable to them. This initial startup aims to introduce the concept to villagers. Once there is an interest in buying the stove, customers are entered into a contractual agreement through expression of interest forms, where women and men are integrated into our data collection that shows short term demand (see EOI Spreadsheet). This includes agreeing into continuous correspondence through phone calls, surveys and visits with Project Everest over a period of time to maintain their interest. When a customer buys a stove, they also sign a memorandum of understanding so customers know that the product is not the final prototype. This will allow Project Everest to get feedback on the stove. This includes data about efficiency, durability and the lifespan of the stoves. This in turn will improve warranty and customer satisfaction.

Data collected for eight villages that have signed Expression of Interest forms are summarised below.

Village Name	**Family (approx.)**	**Population (approx.)**	**Date of data collection/date updated**
Nawairabe	25	100	2017
Korolevu	54	500	2017
Nubuyanitu	70	250-300	2017
Korovou	25	100	2017

Nukuilau	80	320	2017
Nawairabe	31	100	2017
Wema	16	50	2017
Keiyasi	79	475	2017
Tivalevu	32	82	2018

There are approximately 412 families (~1900 people) in the eight identified villages. There is a potential for over 412 stoves to be sold in these villages, and it is expected to grow once Project Everest expands into surrounding villages. The list of villages in the Central Division from the Fiji Bureau of Statistics will be a guide of central villages that can be accessed throughout the business period.

The business is at the stage where the need to scale up production, as well as gathering further data and testing are priority. This is due to the large amount of EOIs and general interest in various villages and cities which have been visited, indicating a larger production will be required to meet the new demands. Since there is a large demand, the product will need to be further refined to ensure its safety and to prove its efficiency and reduction in emissions, making testing a priority.

4.3 Product Demand

The Buka Stove is already in high demand, with a total of 35 sales and 85 EOI's collected across December 2017 and January 2018 (see customer database and EOI Spreadsheet for further information).

5. Market Research

5.1 Relevant Secondary Research

In 2017, 45.1% of the total Fijian population is stated to live in rural areas (World Bank Collection of Development Indicators). Of these people, 77% cook with firewood, according to the Fiji Bureau of Statistics 2008-09, signifying our target market as approximately 34.7% of the total Fijian population.

This practice of using firewood is tradition in Fijian culture, as it adds to the flavour of food, and is a resource that is readily available. However, the Environmental Protection Agency warn that as well as accelerating respiratory issues, smoke inhalation from open fires can lead to heart and lung diseases.

In an article written by Prasad, Bansal & Raturi in 2017, “A review of Fiji's energy situation: Challenges and strategies as a small island developing state”, the number of electric and gas stoves remained relatively unchanged from 2002 to 2008, reiterating that Fuel Sustainability has long-term potential in Fiji.

5.2 SWOT Analysis

Strengths	**Weaknesses**
• Access to firsthand & primary data from village visits. • List of contacts and established relationships with local partners. • Support from experts in the field e.g. Dr. Cris Birzer and Associate Prof. Paul Madwell (University of Adelaide). • Stove well received by villagers, due to intuitive use. • PE has a good reputation in the villages. • Able to reuse refrigeration tanks, therefore minimising landfill. • Stove can be produced quickly by welders/handymen due to its simple design. • Villages prefer the Buka stove over kerosene stoves due to taste preference and cost.	• Budgetary constraints regarding prototyping, manufacturing and advertising. • Lack of professional knowledge and experience within the team • Limited access to resources geographically, due to shipping costs, import laws and time constraints. • Team unaccustomed to lighting fires and are inefficient at demonstrating and testing stoves. • Transition between Fuel Teams can be time consuming and confusing. • Weather conditions prevented the team from visiting inland villages due to flooding. • Lack of a patent means others could copy the Buka Stove design without legal ramifications.

Opportunities	Threats
● Large target market within/beyond Fiji ● Many expressions of interest and sales already achieved. ● Local community and government support. ● Willingness of more university students to take part in PE and continue the project ● Demand for products of different sizes. ● Possibility of significantly altering design and materials, e.g. clay stove. ● Villages are showing interest in producing the stoves themselves, e.g. Nayawa. ● Demand for briquettes as wood is damp in the wet season. ● Ability of the Buka Stove to be built in other developing countries, possibly expanding the business on an international scale. ● Expansion of the supply chain to Suva.	● Competitors such as Potential Energy who have established projects in Uganda and Sudan. While Potential Energy operate in a different region, there is a possibility that they may decide to target the Fijian market in the future. ● The Fijian government has their own stove program. ● Potential of contacts along the supply chain copying the Buka Stove design and using it as their own. ● Fiji government planning to expand their electricity grid. Could result in some villages switching to electric stoves. ● Government potentially phasing out non-reusable tanks. ● Idea of a rocket stove is not unique, and if another company makes one at a lower cost PE would suffer. ● Materials unobtainable/rise in prices of current supply.

6. Marketing Strategy

6.1 Brand

Fiji Fuel Sustainability (Fuel team) is focused on improving health standards and environmental sustainability within both rural and coastal villages in Fiji. By applying business principles to existing social issues, the team aims to provide a product that is affordable, efficient, and sustainable, whilst still respecting the traditional Fijian cultural cooking methods.

The benefits of the Buka Stove, such as the accelerated cooking time and smoke reductions, have been demonstrated within villages, resulting in validation of the brand throughout Fiji. This has built a reputation for Project Everest and, in particular Fiji Fuel Sustainability, as a brand of loyalty and trust. Maintaining this reputation will provide an excellent foundation for future growth of the company.

6.2 Channels of communication

The primary channel of communication is direct, face-to-face communication between the Fuel Team and Fijian villages. This has created consistent customer relationships and built rapport with communities. However, there is often limited contact with villages due to weather conditions, resulting in a dependence on word of mouth marketing. Since access to technology is scarce within the rural villages, word of mouth is a highly viable marketing technique, allowing the success of the Buka Stove to be shared between friends and family.

Recently, the potential of using brochures as a channel of communication has been explored. These will be distributed to those who express interest in learning more about the work of Project Everest and, in particular, the social, economic and environmental benefits of the Buka Stove. The viability of these brochures as a successful marketing strategy is yet to be determined.

6.3 Marketing Costs

As the predominant form of communication is currently face-to-face pitching and word of mouth, there are minimal costs associated with marketing beyond printing of brochures and travel costs associated with traveling to villages.

However in the future, renting a space in the Sigatoka market for a stove demonstration as well as making sales will be an additional one off cost that can be determined after submitting a proposal to the town council. Further advertising costs such as billboards, posters and radio advertising is also possible but are yet to be determined.

6.4 Planned Campaigns

As sales increase, retail outlets are intended to represent the primary interaction with customers in conjunction with word of mouth. These include establishments at Sigatoka market, local grocery stores, and the fruit sellers on the side of the road.

Further advertising and awareness raising of the Buka stove can be achieved by reaching out to churches, mothers' groups, and other community groups. To scale up production, there needs to be a legitimate welding and metal works producer that can make more stoves in a time efficient and cost effective manner.

For medium-long term growth, it's is aimed that 100 stoves a month can be produced. Once production exceeds this level, Project Everest can expand the product to neighbouring islands and to other developing countries.

Future channels for education and awareness will expand to include the church, schools, health centres, local governments and district officers. These influential channels of communication will ideally become highly respected opinion leaders for the product. Ultimately, utilising these additional communication channels will strengthen the positive reputation of the Buka Stove throughout Fiji.

7. Competitor Analysis

7.1 Current Service

Based on data collected from inland villages, the main source of fuel for cooking is firewood. Reasons for the widespread use of firewood are as follows:

- No cost
- Generally constant supply (less available during wet season)
- Smokey flavour from wood

The most common form of traditional cooking in Fiji entails the three-stone stove. It is comprised of three bricks arranged to support a metal grate to hold a cooking pot above an open fire.

This cooking method is consistent among all the villages visited, however there are individuals who will also cook with kerosene or gas tanks. The fuel and stove used is mainly dependant on the availability of dry firewood and the income of individuals.
While kerosene is not preferred, it is used as an alternative during the wet season. Widespread adoption of kerosene is unlikely due to its unaffordability ($40 per stove with ongoing fuel costs) and lack of the preferred smokey taste.

In addition to gas stoves and electric stoves may become more widespread with electricity lines being expanded further into rural areas by the Fiji Electricity Authority (FEA). This expansion has been reported by a few villagers and the construction of power lines has been visibally observed during village visits. Solar panels have also been observed within villages, from small portable panels to larger permanent structures. However, the use of electric stoves is unlikely in the near future due to their expensive construction and installation.

7.2 Organisational Competitors

Potential Energy

Potential Energy is a global distributor of cookstoves, focused on the market in Sudan. The stove resembles the Rocket Stove, however modified to fit the requirements of Sudanese cooking and climate. They have also launched a social enterprise aimed at improving access to stoves and renewable fuels in Uganda.

While Potential Energy could be considered a competitor to Project Everest, there could be room for a future partnership, as a manufacturer of our Buka Stove design.

EnviroFit

EnviroFit is another company that sells and distributes cookstoves which utilise various fuels including firewood. They are based in Colorado and operate across west Africa, East Africa, Latin America and Asia. Their business design is based around SMAAART Thinking (Adaptation, Affordability, Access). This means they have the capacity to adapt their cookstove designs to be suitable for Fiji. Having said this, EnviroFit are unable to cater for lower income communities as they are producing high quality cookstoves at a price that is unaffordable.

The cookstove can be bought online for $109 USD. Regardless of the higher cost, they could still be a strong competitor in the future for Project Everest.

The Ministry of Women, Children and Poverty

The government run program through the Ministry of Women, Children and Poverty have been working with women to provide cooking assistance for those in need. The Ministry has produced its own rocket stove, with training on the production of the stoves provided to local women in villages. The stoves produced have an expected selling price of $40 FJD and are produced from recycled food tins. The Rocket Stove Project was launched in 2014, however its current status is undetermined.

Considering the similarities in the Fijian Rocket Stove to the Buka Stove, this is considered a major competitor. However, there is also a possibility of a future partnership with the Ministry of Women, Children and Poverty if the program has concluded.

7.3 Unique Value Proposition

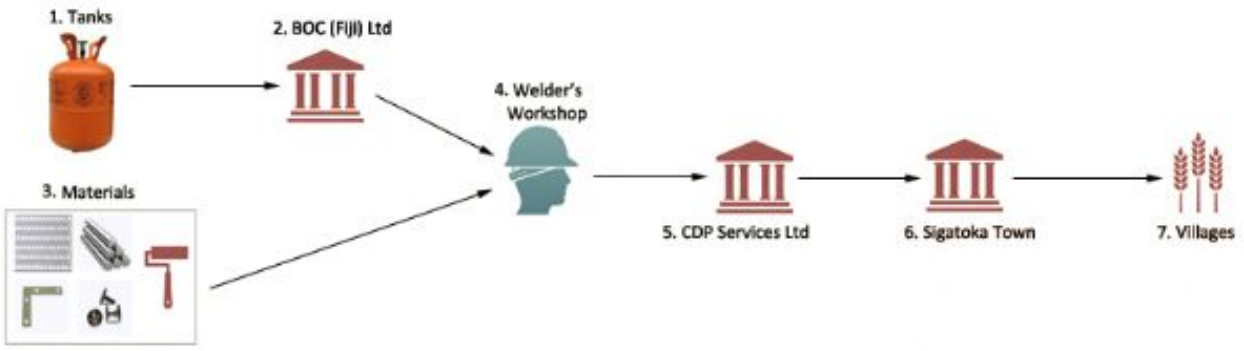
The greatest value from the Buka stove is the higher efficiency that not only reduces the time required to cook, but also reduces the amount of firewood used. The following outlines further value from the product:

- Reduction in smoke emitted
- Reduced impact on health
- Reduced carbon emissions (yet to be quantitatively tested)
- No ongoing fuel costs
- Portability`
- Maintains smokey flavour in food

8. Operations and Logistics

8.1 Production and Supply Chain

The diagram below provides an illustration of the intended supply chain. This is the ideal supply chain which will be pursued and implemented by July 2018 team.



Order	Description
1.	Refrigerant tanks are supplied for free by companies such as Lincoln Refrigeration Ltd and Kooline Airconditioning Ltd. These tanks are to be collected by the welder, who will deliver them to BOC (Fiji) Ltd. Refer to the full list of current and potential suppliers here.
2.	The tanks will be checked (and emptied, if necessary) by the employees of BOC (Fiji) Ltd, which is the leading gas company in Pacific Islands region who have the equipment and knowledge to safely and responsibly dispose of the content of refrigerant tanks. They will issue paperwork to certify that the tanks are empty.
3.	Raw materials are ordered from hardware stores such as Vinod Patel and/or Kasabias. There is potential to get better rates for the same amount of materials through bulk buying. Materials are delivered to the welder's workshop for free. This will include the heat resistant paint from Multiline.
4.	After the tanks are emptied and certificate issued, th welders will deliver the tanks from BOC (Fiji) to their workshop and commence production, which begins with cutting the refrigerant tanks, and finishes with the painting process.
5.	The finished stoves will be collected by CDP Services Ltd, (Fijian Courier service) and delivered by land to their warehouses in Sigatoka Town. The welder will be responsible for contacting CDP Services Ltd to collect the finished stove.
6.	The stoves will be stored in CDP warehouse in Sigatoka town for up to 5 days before additional costs, which is dependent on quantity and weight of goods, will be charged for storage.
7.	The stoves will be transported by Carrier drivers to the rural villages, or be sold in local stores where the customer will receive the stove directly.

The previous Supply chain utilised by the February 2018 team and further information can be found here.

The February team has confirmed the tank supply from the providers in Suva (Kooline Air conditioning Ltd, Lincoln Refrigeration Ltd, Iceman Fiji Pvt Ltd, and Mechanical Services Ltd), who can supply the tanks for free. No permit is required from the Ministry of Environment.

The February team have also narrowed down the list of possible welders who are willing to fulfil the labour component of our supply chain. Skylite Engineering Ltd's manager, has verbally agreed to take on the job at an $20.00 per stove provided that it is an ongoing work over a period of time, instead of being a one-off deal. They have all the necessary tools, including mig and arc welder, and are willing to collect the tanks from the supplier. In addition, they are potentially able to obtain a more favorable price for the materials, provided they are reimbursed.

Before production can begin, we must find a business that can safely and responsibly dispose of any remaining refrigerant agents left in the tank. This is because the common refrigerant tank today contains Hydrofluorocarbons (HFC), which is a greenhouse gas with long lifespan. Cutting open tanks that are not completely empty will release these gas into the atmosphere. We are currently in negotiation with BOC (Fiji) Ltd, a third party business who is able to safely and responsibly dispose of any remaining content and issue paperwork to certify that a tank is empty. However, this needs to be followed up by the July team as the manager requires more time before they can arrange a meeting with us.

An alternative would be to calculate the weight of empty refrigerant tank across a number of samples and obtaining the average. We can then determine, with decent amount of certainty, that a tank is empty if their weight is within the acceptable range. However, keep in mind that some workshop will not operate on tanks without certificate, so we will be limited to sourcing labour from handymans or workshops who does not care.

At this point, we have been unable to establish and finalise a supply chain. However, contact details regarding the various suppliers have been supplied (180220 Registered Refrigeration&Air-conditioning Contractors 01 VK). These contacts will need to be followed up on to confirm prices and details.

8.2 Delivery of Product and Services

Currently, the team is delivering the product by hand to purposefully develop a relationship with the customer. In the long run, we aim to sell the stove at popular and more accessible establishments, such as the Sigatoka Market.

The February team has not made much progress into finalising the distribution plan segment of the supply chain as we are more focused on testing and improving the current stove design, production segment of the supply chain, as well as fulfilling the orders for deposits made between December 2017 and January 2018.

9. Costs and Pricing Strategy

9.1 Service Cost Breakdown

All the materials utilised in the current Buka stove design are sourced in Fiji. The refrigerant tanks that are used as the main body of the stove are supplied by 3 suppliers these tanks are at this time being provided for free, as alternate disposal is costly. All other materials were sourced from various hardware stores, namely Vinod Patel, Kasabias Hardware, and Multiline distributors.

Materials used in the construction	
Company Name	**Product**
Vinod Patel (Market St, Sigatoka, Fiji)	• Flat Bar (Mild S/Flat 25mmx3mm x 6m) • Pop Rivets (Hardy Aluminium 4x16mm 70pc) • Metal Grate (Gothic Mesh Galv 2400mmx1200mm) • 5mm Rod (Round Mild Steel 5mmx5.5m) • Cutting discs • Drill bits • Welding rods
Kasabias Hardware (Queens Rd, Sigatoka, Fiji)	• Zinc Flat Iron (2400mmx1200mm)
Multiline Distributors Limited (16 Lalita Bhindi St, Vatuwaga, Suva)	• Bosney Hi-Temp Resistant 400cc Paint (1200F) Black • Bosney Hi-Temp Resistant 400cc Paint (1200F) White

Variable Costs

The variable cost are all cost that are dependent and subject to change throughout in accordance to the volume of the production activity.

Current Costs per tanks	
Materials	*$8.24*
Labour	*$22.54*
Transport	*$2*

Fixed costs

The fixed costs are the costs in which generally stay they same when the volume of activity changes (short term). These are costs that must be paid regardless of the business production situation. Such costs include:

- Insurance
- Taxes
- Salaries
- Utilities (i.e. Electricity, Gas, Phone etc)
- Rent (storage space/ working space)
- Certifications/licenses

9.2 Price and Justifications

Currently, price point determined per Buka stove 4.0 is FJD$60. This price was previously established during the empathising phase and gaining understanding of the villager's financial positions and gaining an idea of their disposable income and the amount they are willing to pay for the stove. This price point would ideally not change given it is the upper limit that many villagers can afford whilst still covering costs relating to raw materials, labour, transportation and other fixed costs.

In order to access greater profit margins, another Buka Stove design can be created which modifications to justify a higher price point as it has been found people from coastal villages are willing to pay $75 for the same product. Therefore, further empathising and prototyping will need to be carried out to determine and design such a stove.

9.3 Competing Prices

From previously mentioned competitors, kerosene stoves represent the largest competitors as many of the villagers already own one of these stoves. Kerosene stoves are usually sold for FJD$35-$42, however this price is just the initial price whilst the kerosene fuel costs are ongoing. Each kerosene canister costs roughly $2 each which needs to be replaced every 3 days. However, many of the villagers prefer not to use the kerosene stove because of the large quantities of smoke produced in the process and its effect on the taste of the food being cooked.

Some potential customers would have gas stove in which they use for cooking. However, the number of villagers that regularly use gas stoves is extremely small given the cost of a gas stove in addition to gas tanks.

During a visit to a village in July 2017, the fuel team came across another ‘rocket stove’ created by an unknown business which was being sold for FJD$80. During the empathizing stage it was found that this price was considered too expensive for the size of the stove and a lot of the villagers would not be able to afford it.

9.4 Gross Profit Margin

Current costs based on Buka Stove 4.0 (per unit):

Revenue	**$60.00**
Raw Materials	*$8.24*
Labour (including welding rods, drill bits and cutting discs)	*$22.54*
COGS	**$30.78**
Gross Profit	**$29.22**

Materials have been broken down into separate components, these material prices could be subject to change at the digression of the companies purchased from, buying in bulk could also potentially decrease the materials cost.

Currently, labour costs are at $22.54 ($10 for welding with Hassan, $8 cutting and assembly from Raj and $4.54 in materials) but this will change and reduced to $20

(Skylite Engineering) as production increases in scale. This new $20 price point encompasses drilling, welding, cutting, and all the tools that are needed. This price also includes the construction materials as well including the welding rods and cutting discs which is currently accounted for in raw materials.

Current gross profit margin is at approximately 48.7%, which is feasible for the short term but not ideal in the long term. Further examination of the supply chain needs to be undertaken as considerations such as storage, employees/wages need to be evaluated among other fixed costs previously mentioned.

10. Financial Analysis and Reporting

10.1 Break Even Analysis

Cost Type	Composition	Total
Fixed Cost	Business Registration (approximately $2,355.76 - $3,456.28). This is subject to change depending on area of operation, refer here.	$3,456.28
Unit Selling Price	-	$60
Variable Cost	Raw materials ($8.24) + Labour ($22.54)	$30.78

$$\textbf{Break Even Point (BEP)} = \frac{3456.28}{60-30.78} = 118.28$$

From these figures, the **BEP = 119 (nearest whole)**

If we're to factor in the cost of transportation using the figures provided by January team, it is an additional $2 per stove on the variable cost, increasing the COGS to $32.78, and reducing the gross profit margin to 45.4%.

10.2 Profit and Loss statement

Refer to Fuel Financial Model. This document includes scenarios with and without a distribution partner which impacts market penetration, as well as varying degrees of production capacity realisation. All projected revenues, COGS, expenses and tax have been included with projects based on Fiji population data and extrapolated growth rates.

Profit and Loss statement (without distribution partner)

Projected Profit and Loss Statement

	2017	2018	2019	2020
Total Revenue	**$2,040.00**	**$4,067.83**	**$8,111.76**	**$16,176.57**
COGS	$1,078.48	$2,218.32	$3,682.74	$6,535.34
Gross Profit	**$961.52**	**$1,849.51**	**$4,429.02**	**$9,641.24**
Gross Margin (%)	*47.13%*	*45.47%*	*54.60%*	*59.60%*
Total Expenses	$504.32	$930.11	$1,292.76	$2,490.49
EBIT	**$1,535.68**	**$3,137.72**	**$6,818.99**	**$13,686.09**
Tax (20%)	$307.14	$627.54	$1,363.80	$2,737.22
NPAT	**$1,228.54**	**$2,510.18**	**$5,455.19**	**$10,948.87**

Profit and Loss statement (with distribution partner)

Projected Profit and Loss Statement

	2017	2018	2019	2020
Total Revenue	**$2,040.00**	**$42,758.84**	**$432,018.82**	**$1,846,133.06**
COGS	$1,078.48	$23,317.82	$196,136.55	$745,837.76
Gross Profit	**$961.52**	**$19,441.02**	**$235,882.28**	**$1,100,295.31**
Gross Margin (%)	*47.13%*	*45.47%*	*54.60%*	*59.60%*
Total Expenses	$504.32	$8,977.84	$64,878.82	$276,983.96
EBIT	**$1,535.68**	**$33,781.00**	**$367,140.00**	**$1,569,149.10**
Tax (20%)	$307.14	$6,756.20	$73,428.00	$313,829.82
NPAT	**$1,228.54**	**$27,024.80**	**$293,712.00**	**$1,255,319.28**

11. Contingency Planning

Risk Explanation	Mitigation Strategy
Underdeveloped operational infrastructure May result in inability to sustain growth when company is scaling up, causing excessive strain on liquidity, damaged customer relationship and reputation and missed market opportunities.	Establish systems for work procedures, communication channels, rules & policies, training, research & development, etc.
Inability to maintain consistent product quality when scaling up Product quality will start to vary when the business is scaled up, resulting in inconsistencies within the product	Regular quality assurance tests, implementing quality control, internal audits, testing of raw materials before assembly, employee training, seek constant customer feedback.
Strategic risks - Customers and competitors Changing customer preferences or competitors entering the market may impact sales and demand and undermine our social business	Seek constant feedback from customers and continually refine the product. Utilise CRM software.
Compliance risks - Legal issues Potential issues relating to compliance to regulations, workplace health and safety and Fiji specific industry laws and standards	Ensuring that all relevant regulations and procedures are followed and taken into account.
Reputational Risks Negative publicity, lawsuits or product failures may tarnish company reputation and Project Everest	Ensure all products are tested and safe for use before sales. Act respectfully towards the company's brand and image.
Financial Risks Issues with having access to sufficient funds for upfront costs such as various fixed and manufacturing related costs. Liquidity issues may place the company in unsustainable debt which needs to be monitored and managed	Ensuring budget and business expenses are monitored and sustainable in the long term. This would include managing operational expenditures in line with conservative revenue extrapolations. This also includes allocating resources and costs both upstream and downstream such as R&D, manufacturing and customer services.

Sourcing and supply chain disruptions Raw materials and labour will be sourced both internationally and locally, meaning that potential disruptions will have a bullwhip effect, leading to severe bottlenecks in the production process	Source materials from a variety of sources and manage supply chain effectively through various communication channels and potentially various SCM software
Environmental Risks Engineering companies not willing to produce Buka Stoves because of environmental risks attached to opening of refrigerant tanks.	Have alternative plans to make Buka Stoves with materials other than refrigerant tanks. Seek third party to responsibly empty refrigerant tanks.
Employees Increase in employee costs or manufacturing costs may result in inconsistencies within the business plan and increase the production cost of Buka Stoves.	Contracts need to be written, checked by a lawyer and signed by employees to mitigate the risk. Include a certain percentage within the budget to account for contingency risk.
Product Failure Despite promising outlook towards the Buka Stove, technical failure or a lack of market may pose a risk to business development	Stringent testing and experimenting of Buka Stove need to continue. Need hard and soft data regarding the benefits of Buka Stove

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