

Project Summary for Research, Development & Commercialisation Team

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Project:	Sustainable Fuel Consulting		

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Executive Summary

Over the course of February 2019, the Sustainable Fuel Consulting team in Fiji sought to finalise elements of PEV's rocket stove business developed by previous teams. This meant focusing on developing autonomy to ensure business is continued sustainably until the July team arrives. The following document includes the progress made by the February team and advice for future teams actions in country.

The December and January teams were successful in finalising the scalable Buka Dragon design and initiating the process of obtaining a contract for its production. A multitude of suggested manufacturers from both Nadi and Suva were contacted and met with. The two most favourable companies included Jack's of Fiji and J. Kevi Group both from Nadi Of these we received 2 new prototypes but it was determined that cost would be too great and no sustainable production of the Buka Dragon was validated. This led us to solidify an updated contract with Lincoln Refrigeration, the manufacturer of the Buka 4.0. Research should still be conducted into whether importing from larger overseas companies is viable for long-term scaling outside of Fiji. However, it is simpler to use local Fijian manufacturers with access to their own steel supply.

The January team validated Retailers as a channel to stock the Buka Stove. Advice was given to pursue independent sales agents to on sell the Buka Stove, therefore both were tested as revenue streams to the business. Both require optimisation as neither achieved their respective success point, yet there are definite future actions for both as channels and revenue streams. These were difficult to test with delays in forming a supply chain contract, advice for future actions for each are included on crowdicity.

The Fuel Team in Fiji had an existing Facebook page entitled Project Buka that was used to connect with potential customers. This Facebook page was updated and an automatic messenger service was trialled with mixed success. The chatbot was developed to the point that it could receive orders and notify PEV through an email. It could even automate an invoice to be approved and sent to sales agents to be paid. It was challenging getting sales agents on board and connected to the service despite their enthusiasm towards the Buka Stoves. Further testing of the Facebook Messenger ChatBot is required with more focus given to the ordering/payment system for sales agents and light promotion for consumers.



Background

The Sustainable Fuel Consulting team in Fiji aims to address the following UN Sustainable Development Goals:

- Goal 3: Good health and well-being.
- Goal 12: Ensure sustainable consumption and production patterns.
- Goal 13: Take urgent action to combat climate change and its impacts.

The Fuel Sustainability team are interested in reducing the production of greenhouse gases, increasing the efficiency of fuel used for cooking and heating, and reducing the negative impact

on the health of those who depend on unsustainable and inefficient fuels used in Fiji. A brief summary of Project Everest Ventures work on the Sustainable Fuel Consulting team is included below:

- <u>July 2017</u> Initial empathising with villagers and locals which lead to the development of the first version of the Buka stove.
- <u>December 2017</u> Continued empathising and further development of the stove lead to altered design ready for some sales.
- January 2018 New design for stove, and extensive sales were made.
- <u>February 2018</u> Bad weather meant many orders could not be fulfilled. New design (4.0) and many stoves were made.
- <u>July 2018</u> Established supply chain options with potential retailers, lack of business license meant no contracts were signed. New Buka Stove (5.0) designed to negate the reliance on refrigerant tanks.
- <u>December 2018</u> Obtained a business license, was able to establish a manufacturer for the Buka 4.0 (Lincoln Refrigeration Ltd), tested the Buka Stove 5.0 and 22 sales were Made.
- <u>January 2019</u> Established retailers to stock the Buka 4.0 and signed MOUs for potential Buka Dragon manufacturers (Mechanical Services and Lincoln Refrigeration). Determined the benefits and the customer value price point of the Buka Dragon.

The activities in February consisted of travelling to both Nadi and Suva in an effort to secure a manufacturing contract for the Buka Dragon. An effort was also made to secure updated MOU's with retailers and new agreements with local sales agents to purchase and resell the Buka Dragon stock. For the time between delivery from manufacturers and pickup by sales agents and delivery to retailers a storage location was sought after and secured. The facebook page was also updated and an automatic messenger service was installed to promote autonomy.



The Problem

Some of the most well-known causes of death in developing countries include issues such as unclean drinking water, malnutrition and HIV infection. Cooking, probably would not make the list of recognized killers. However, for the more than 3 billion people who stand over fires to cook every day, preparing food poses just such, a life-threatening risk. For many Fijians, clean, safe and affordable cooking methods are not easily accessible with many continuing to use the traditional stone or kerosene cook stoves. 48% of Fijians cook using firewood on a regular basis (Global Alliance for Clean Cookstoves, 2018), as it keeps the smokey flavour, and because of its traditional use in communal cooking and ceremonies. This is especially seen in people who live in rural villages or are of a low socioeconomic status. Women spend large parts of their days over cooking fires, heating water and preparing family meals, thus most of the issues surrounding open fires affect women and children.

Smoke Emissions

The emissions released during the burning of firewood have been linked to causing many diseases. 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 colourless, odourless, and tasteless. These fires pollute air outdoors as well as indoors, and poor ventilation results in gritty, eye-watering smoke, that sticks in the throat and provokes deep, scratchy coughs. It is estimated that 4 million people worldwide die prematurely from illness associated with household air pollution. A majority of these deaths occur among women and children due to their prolonged exposure to these harmful particles that get trapped inside the home which leads to respiratory issues including; respiratory infections, eye damage, pneumonia, asthma, heart/lung disease and lung cancer. All of these health consequences are exacerbated by the fact that access to good healthcare is severely limited, so having an alternate cooking method would lessen the burden of living with these various conditions.

Environmental Degradation

Not only does open fire cooking promote deforestation (especially in developing countries), in order to attain the raw materials needed to create a fire, but it is also a major source of black carbon (sunlight absorbing pollutant), due to incomplete combustion, which is accelerating the effects of climate change. This affects individuals all over the world but especially smaller islands, thus they would benefit greatly from an alternate cooking method.

Firewood Inefficiency

Open fires consume great amounts of wood, and during the wet season when access to dry



material is limited, this poses as a great challenge. This issue is particularly felt by rural villagers or underprivileged members of society who do not have access to gas or kerosene as alternatives to cook with. This issue is reasonably well spread, affecting the 44.1% of the Fijian population living in rural villages across Fiji (Fijian Bureau of Statistics, 2017).

Ongoing Cost of Kerosene

During the wet season, kerosene is used to fuel fires consisting of wet firewood. This is an expensive ongoing cost which financially burdens many of these women and their families. The average cost of a litre of kerosene is \$1.54 FJD according to villagers living in Nayawa, which is over half the average hourly wage in Fiji (Koya 2018). From this, it is evident that the cost of kerosene is especially demanding for impoverished and disadvantaged families and individuals, where 43% of the Fijian population in rural areas were considered to be living in poverty in 2009 (Fijian Bureau of Statistics, 2009).

Lack of Portability

Currently, many farmers in Fiji make temporary dirt stoves in the ground to cook meals when out in the field. These dirt stoves not only take time and energy to make, but are generally ineffective during rainfall. Rectifying this issue would be beneficial to farmers and employers alike. With 45% of the Fijian workforce involved in the agricultural sector, this is deemed to be a widespread issue. (CIA World Factbook 2018).



Proposed Solution

The Current Solution (Before PEV)

The current cooking solution for villagers is open firewood fires. The fuel consumption is highly inefficient due to heat loss to the environment and lack of sufficient and consistent oxygen supply. Moreover, respiratory issues can arise from the use of open fires, particularly when used indoors, as a result of buildup of excess smoke due to incomplete combustion. In contrast, villages with higher income earners have access to gas, electric or kerosene stoves. These stoves lack the desirable smoky flavour that comes with cooking with an open fire. These shortcomings revealed an opening in the market for a solution such as the Buka stove.

Solutions Considered by PEV

PEV has developed five iterations of the Buka stove - an efficient, portable stove that uses small diameter firewood as the fuel source. The fuel is burnt in a simple combustion chamber which contains a vertical insulated chimney. As a result, it guarantees a higher percentage combustion before the flame reaches the cooking surface. The fifth iteration (Buka 5.3, known as the Dragon) of the stove aims to move away from the reliance on the use of refrigerant tanks and to a simplistic flat-pack design.

Supply Chain - There are four possible manufacturing avenues for the Buka stove:

- local manufacturers sourcing their own sheet metal,
- local manufacturers using sheet metal sourced by us,
- either pre-cut or not at all, or
- production and then the importing of stoves from overseas.

This month, we aimed to develop an autonomous system for the Dragon consisting of a manufacturer autonomously connecting to the retailers/sales agents. This was considered through the use of an automatic ordering system that was set up through the facebook page. The system seemed promising, however due to cost challenges with the manufacturers this solution had to be put on hold. See <u>Supply Chain Experiment Results</u> for more details.

Most Promising Solution

At this point in time, production and distribution of the Buka 4.0 is the most viable solution to the problem. This is due to the fact that it is currently being produced by Lincoln Refrigeration, and also has a more affordable FJD\$90 price point.



Implementation of Solution

Supply Chain - Currently, Lincoln Refrigerant has been the manufacturer for the Buka 4.0. The February team investigated other <u>potential manufacturers</u> to mass produce a monthly amount of Buka Dragons. Each manufacturer contacted was asked to make a prototype, and each received were tested against a <u>Prototype Testing Procedure</u>. Due to a red light on our <u>Supply Chain</u> <u>Experiment Results</u> the supply chain was solidified with Lincoln Refrigeration for production and delivery of the Buka 4.0 instead.

Retailers - The Buka 4.0 is currently stocked at the following retailers in the Sigatoka area:

- Foodhall Supermarkets
- Shop2Save
- B.L Naidu Supermarket

See the <u>Retailer MOU</u> for details. Contact details and past interactions can be found on <u>HubSpot</u>

Sales Agents - Sales agents were defined as independent parties who were to purchase the stove (Buka 4.0 or Buka Dragon) from Project Everest to sell to members of our customer archetypes. Sales Agents were recruited during the month and a list of <u>Sales Agent Leads</u> was compiled. Sales agents are required to place their monthly orders through the facebook page in order to promote autonomy. More details on the sales agent agreement can be found in the <u>Sales Agent MOU</u>.

Facebook - Facebook has been seen to be an excellent opportunity to advertise Buka stoves. The <u>Project Buka</u> Facebook page was established by the January team and expanded upon by the February team by uploading new information and media videos about, as well as introducing an automated messaging system. See the <u>Facebook ordering SOP</u> for more details.

Key issues that may occur

- Increased pricing may result in a decrease in sales.
- Unreliable production may result in a lack of supply.
- New contract with Lincoln highlighting distribution and storage options is yet to be signed but the terms have been promised. This needs to be followed up upon.
- Liability risks for PEV associated with customers using a stove.
- Expansion of electricity grid.
- More issues outlined in this <u>SWOT Analysis</u>.



Alternative Solution/Competitive Analysis

After looking into other stoves in the market, current woodfire stoves are available for purchase but have limited sizes with smaller fires and longer cooking times. Because they are imported from overseas they are generally cheaper. For our Buka stoves, we aimed to have them made locally, benefiting the economy and appealing to customers.

When visiting Suva to research potential sales agents, it was established that there wasn't a large market in the city for the Buka Stove as many stores stocked gas/kerosene stoves ranging from \$40-\$180. In Nadi there was more interest in the stoves from people in the local markets, even though some gas stoves where being stocked in stores for as low as \$25, many locals and villagers have showed an interest in woodfire cooking.

There are a vast number of international competitors that manufacture rocket stoves. A significant number of key competitors operate in developing countries and particularly in African regions, indicating a high demand in these areas. More information about international stove competitors can be found <u>here</u>.

Backing Data

Retailer Interviews

The results of the February team's sales agent system survey tended to be relatively similar within each city. The full table of data can be found <u>here</u>, and the results are summarised below.

Sigatoka - A majority of the stores in Sigatoka were part of a larger chain with a head office in Suva. Typically either an order would be sent to the head office or the process would be handled by a buyer. Stock was usually managed by an in-store tracking system and delivered by the supplier. Payment also tended to be managed by the head offices.

Nadi - Similar to Sigatoka, many of the stores visited in Nadi were also managed by a head office, but a lot of the smaller ones were managed independently. Either a buyer from the head office would order and pay for stock or the shop owner would order the stock online. Stock is typically managed in store via stocktake and delivered from a warehouse when necessary. Bosses tend to pay for stock upfront, although a couple of stores that don't order wholesale are only invoiced when a sale is made.

Suva - Most of stores visited in Suva were run independently as they ordered their stock directly from overseas manufacturers and managed stock through visual inspection or on a as-needed



basis. The shipping companies would also deliver the stock and the store managers would pay for the items upon delivery.

Prototype testing

The manufacturers that were contacted throughout the month were asked to provide a prototype as well as a rough quote of a months worth of stoves. In order to effectively choose the correct manufacturer these two variables were considered. To ensure quality, the prototype received was put through the <u>Prototype Testing Procedure</u> that was crafted during the month. The results of the testing can also be found in the document.

Chatbot testing

Market stall - A market stall in the Sigatoka markets was conducted to promote the Chatbot and to look for Expressions of interest about becoming a sales agent. 3 different teams ran the stall during the day promoting these topics however most of the attention was drawn towards the sales agent job opportunity. The Chatbot was advertised to make the customers aware of the system. This was done by the trekkers demonstrating the procedure of the Chatbot.

Retailer interviews - Originally there was a retailer branch integrated into the Chatbot. When this option was available, it was taken to town and tested on 3 different retailers. The <u>feedback</u> (retailers interviewed are highlighted in yellow) received was identical for all 3 which indicated that the emailing function should be removed and that the process needed to be much simpler and shorter. They did like the idea of the ordering system however. The retailer branch of the chatbot was a good option for the chatbot as it enabled the retailer to contact PEV through and order a quantity of stoves. This method was later deemed unneeded as a it was thought that the retailer should contact PEV directly once they wanted more stoves. Once the business is larger and the Chatbot is popular, the retailer branch may be a good inclusion.

Flier Distribution -

In an effort to increase awareness around the Chatbot, <u>small fliers</u> were made promoting the facebook page. When handed out, the trekker pitched the facebook page, the Chatbot, the stoves and stores where you can buy them. The distribution of the flyers did not prove to be an issue however getting the locals to actually like the facebook page became a recurring problem. Minimal new likes were generated as many locals did not own facebook or they would postpone the process saying that they will like it in the near future. Thus it became apparent that a more direct strategy of gaining followers is required. The most successful technique from other interactions outside of these sessions was to first pitch the stove to get interest, ask if they have facebook and show them the facebook media videos **on their own device**. This ensures people are on the facebook page and it makes it much easier to get them to like the page.



Critical Future Actions

Highest Priority Actions (for July 2019 team):

- Validate the system has been working in the months between February to July. This includes:
 - Current Sales Agents should be contacted to follow up on sales and to ensure that the system is working autonomously. It is important to ensure that PEV has a constant stream of stoves being sold to sales agents and that the sales agents distribution channel continues.
 - Ensuring that the manufacturers and delivery processes have been working efficiently and optimally.
 - Check on the facebook Chatbot logs to ensure it has been running smoothly and connecting people correctly.
- Look into possibilities to reduce production costs of stoves:
 - Continue on with the January team's effort to Investigate new production methods for the Buka Dragon that can lower costs. This may require a new experiment which looks into overseas methods, be that sheet metal or all stages of the production. It is worth noting that Jacks of Fiji let us know that if their metal supplier could pre cut their metal for our stoves it would lower costs, so pre-cut metal from overseas and then assembly by Jacks seems an attractive solution.
 - Develop/iterate on the design for the Buka stove. Currently the Dragon has a very high performance, however the sheer amount of sheet metal is one of the main obstacles to achieving the ideal price point. This can be combated by possible changes such as removing the outer shell, or somehow minimising the amount of materials used.
- Follow up on pending deals with <u>manufacturers</u> (Air Design) and <u>sales agents (refer to</u> hubspot and contact to get contracts signed).

General Future Actions:

- Continuing the focus on sales agents as a distribution channel: Sales agents will provide exposure to numerous coastal and inland villages, as well as breakdown language and culture barriers that exist.
 - Ensure a market stall is held in Sigatoka Market in week one of project to obtain new EOIs - preferably on Friday or Saturday as many people come from out of town.
 - Aim to sell stoves that PEV already have in stock to fast track signing contracts and validate the distribution channel.

- The July Team should follow up with current sales agents that have signed MOUs to
 ensure that stoves are being sold and that orders and payments are running as planned
 via the Facebook chatbot. A list of sales agents (current and potential) can be found <u>here</u>.
 Renew the contracts with the sales agents as they will be expiring at the end of July.
- Expand reach from Sigatoka, generate more demand for the stoves.
- Investigate SPBD bank. Follow up with SPBD bank about their loan system to local Fijian women. It would be a worthy channel to explore. Whether it be gaining their contracts with the women or partnering with the bank itself as the Social Consulting team is already in the know with them. More information can be found <u>here</u>
- Keep up to date with the facebook page, posting media and promotions every 3-4 days during the month. Keep trying to get increase likes and engagement on the facebook page.f
- Explore business licensing for the project, as the current license expires December 31st.
- Maintain established manufacturer relationships such as Lincoln Refrigeration, who currently have a contract for producing Buka 4.0's, as well as Jacks of Fiji and J.Kevi. Shiva from Jacks of Fiji offered to us free promotion for our product and produced a Dragon prototype. Jacks also have around 80-90 refrigeration tanks that they do not yet have clearance from the Health department to use. They are willing to give them to us to free, so they can be used to get Lincoln to produce more 4.0's, or even used by Jacks to produce 4.0s, should they get clearance.
- Explore designing a new stove that is viable for the market. Although the Buka Dragon is efficient, it has proven to be an expensive option. Potential design improvements for the Buka dragon design were discussed and recorded in this document <u>here.</u> A design change may be what is needed to lower costs.
- Explore further in terms of importing options, a number of quotes for laser cut sheets can be found here: <u>Laser Cut Sheet Pricing</u>. If this option is pursued, a customs broker will need to be consulted to manage the import (<u>Customs Broker Info</u>).

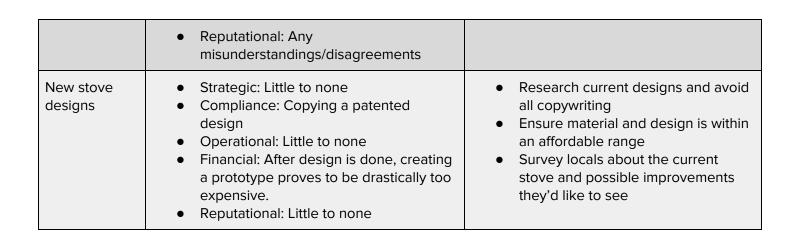


Risks

Action	Risks	Mitigation
Validating the system	 Strategic: Our business system is not working. Compliance: Little to no risk for this task Operational: The system linking PEV to retailers and Sales agents is not working Financial: The business is not meeting our financial goals Reputational: PEV's namesake is being tarnished by a failing system 	 Need to revise the system and investigate the link between manufacturers and retailers. Get feedback from sales agents and retailers to aid in revision Solidify the role PEV needs to have from Australia to keep the business running autonomously Investigate the major costs in the channel and look into ways of reducing it. Ensure the people interacting with our business are satisfied and make an effort to get feedback.
Continuing in exploring the sales agent channel and renew Contracts with the existing Sales agents	 Strategic: New sales agents are not interested in the selling stove Compliance: Sales agent avenue clashes with local regulations Operational: Having so many sales agents becomes difficult to manage Financial: Sales agents are struggling to selling the stoves and want to return them Reputational: Sales agents that dislike the product look at PEV negatively 	 Get feedback from existing sales agents to see why stoves are poorly selling Ensuring MOU's/Contracts that are made cover all legal bases and doesn't put PEV at legal risk. Ensure that communication between PEV and sales agents is clear and consistent. Solidify a simple system to manage an increase in sales agents.
Expanding reach from Sigatoka	 Strategic: Struggling to expand due to lack of interest out of town Compliance: When expanding to other retailers, new local laws and operations inhibit progress Operational: More retailers/sales agents become harder to manage Financial: The business doesn't grow enough to warrant expansion 	 Hosting a market stall in Nadi to keep getting more Sales agents. Pursue Facebook page advertising options to keep gaining more interest in the project. Ensuring that the places being expanded to have a need for the product through surveys and market research.



	 Reputational: The business may be seen as pointless if proper market 	
	surveys and target markets are not approached properly.	
Investigate SPBD Bank	 Strategic: SPBD refuses to partner with PEV Compliance: SPBD are legally not allowed to partner/ give out customer details Operational: An SPBD bank partnership could require too much work to handle Financial: SPBD requires a financial requirement to partner up with them. Reputational: Attempting to partner with SPBD tarnishes the relationship and inhibits the work of the Social Consulting team too 	 If SPBD bank does refuses to partner with PEV fuel, do not continue down this avenue to eliminate the risk of interference with other projects. Sales/agents will be the primary channel for the project. If SPBD bank allows for us to contact their loan recipients, manage them using the same organisational system as sales agents.
Keep up to date with the Facebook page	 Strategic: Little to None Compliance: A facebook post breaches a facebook policy Operational: Facebook page gets shut down for an unknown reason Financial: Little to None Reputational: People negatively react to a facebook post 	 Ensuring that all posts that are made fit within the community guidelines of facebook. Ensuring that posts made from the facebook page are respectful to the local community. DO NOT have a fake facebook account as an admin on the facebook page. If the account gets taken down so will the page.
Explore Business Licensing	 Strategic: Little to None Compliance: Laws affect the operations of our business and limit what we can do Operational: Financial: Obtaining a business license becomes costly unexpectedly Reputational: Little to none 	 Refer to the business licence obtained by the December team See if there are ways to simply extend the existing business licence instead of creating a new one.
Maintain established manufacturer relationships	 Strategic: Little to None Compliance: Breach of contract Operational: Manufacturer shuts down or pulls out Financial: Costs increase and business can not be continued 	 Ensure that all actions lie within the business licence Focus on clear communication with manufacturers in person and in writing Outline expected costs and limits pre-production



Next Team Goals

The main goal that the July Team should focus on is further development of autonomy within the business. Thus, the aim should be to have a seamless system connecting the manufacturers to the customers via sales agents and retailers. Therefore, the ambitions of the next team should include:

- A contract signed with a Buka stove manufacturer utilising imported pre-cut metal or a new design.
- Greenlight on Sales Agent + Retailer System Experiment
- Operational, tested and proven Facebook Messenger ChatBot

Other Useful Documents

Appendix: <u>Handover Appendix</u>

Master contact database: Hubspot

Details of the Buka Dragon: Details

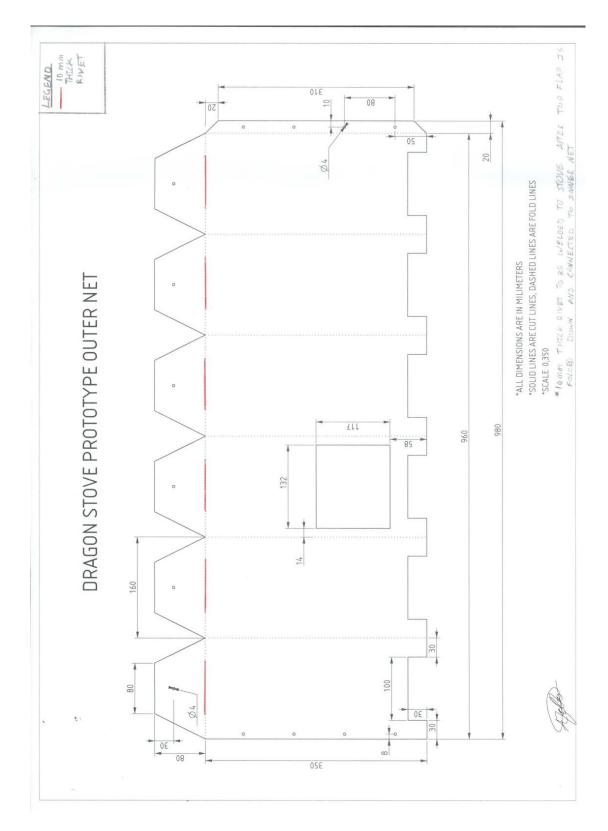
Impact Assessment: Impact Assessment Document

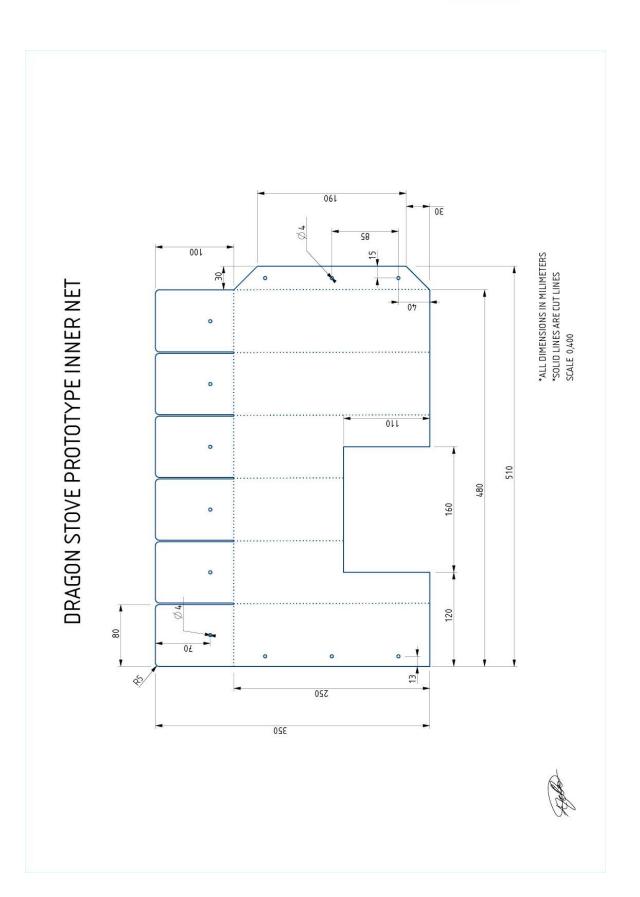
Assessment Rubric

Cost Analysis: Cost Analysis

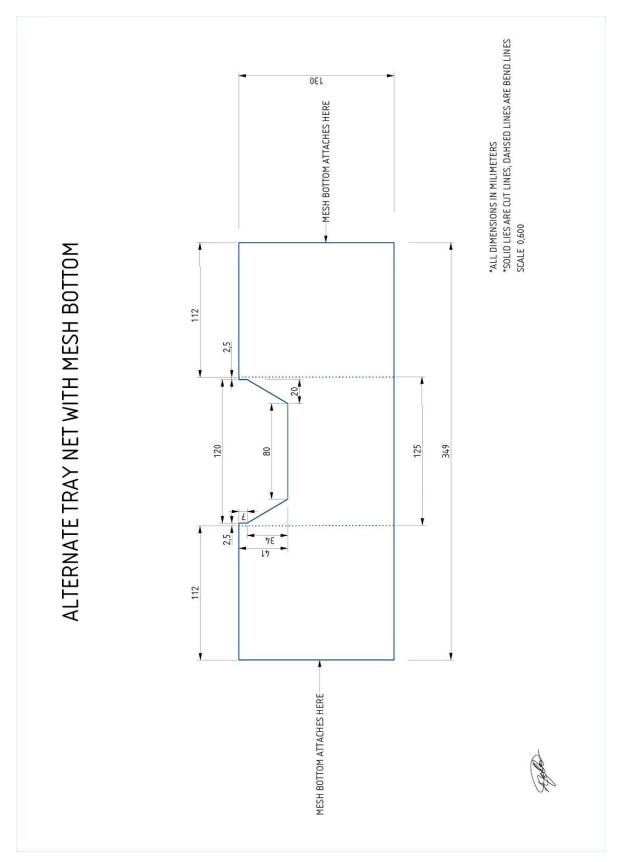


Buka Dragon Design Drawings:

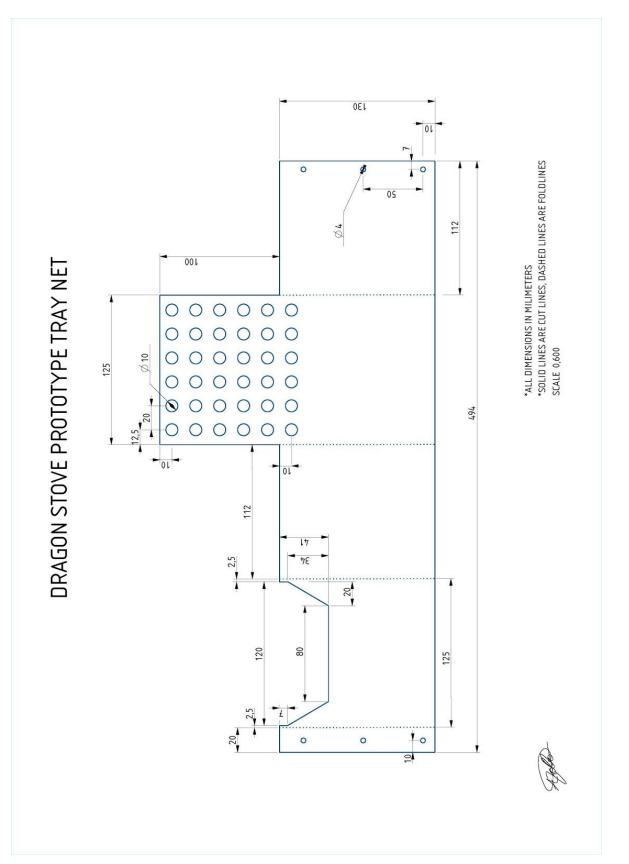




PROJECT EVEREST



PROJECT EVEREST



VENTURES