



# Final Feasibility Portfolio APEC 3551

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RENEWABLE ENERGY FOR EVERYONE!

MANUFACTURER OF SMALL -SCALE BIODIGESTER

## **Executive Summary**

### **Concept Description**

Eco-Green is a small-scale biodigester that is perfect for a typical U.S household and small enough to be placed in the backyard. It is cheap to buy and more comfortable to install and transport to rural areas. It produces biogas that converts waste to clean energy. It is a 100% natural, clean-burning solution. The resulting firepower from biogas is mostly used on-site. Eco-Green can be the steppingstone for many people around the world for acquiring free energy. Users can buy Eco-Green online, and the product will be shipped. It will be packaged like IKEA style where users can assemble the components of Eco-Green with solution manual and everything. Furthermore, making a website for the product on Google site is free and easy to execute.

### **Opportunity**

Hundreds of millions of people lacking access to electricity and clean cooking fuels. This affordable energy is the solution for many people who suffer from a significant energy deficit. 1.2 billion people have no access to electricity. Many people are not connected to the power grid, and Eco-Green can solve this problem by giving them access to clean energy at a low price. The market size is enormous. Imagine everyone has access to clean energy. Revenue size would be margin times volume, and for my case, this can easily reach \$1 million in revenue (target for this class).

### **Innovative Solution**

In the future, we will be independent of fossil fuels and harness 100% of our energy through renewable energy like biogas. There's no intellectual property. Eco-Green will take a week until the biogas can be harvested, and the consumer will be able to use the biogas to generate fire. This is viable and feasible. The application of this super low-cost, small-scale biodigester is significant. The idea is not new. It's just widely used on a large-scale, and not on a small-scale that I intended. This is where the dramatic difference will come in. I will be packaging my Eco-Green biodigester like the IKEA style, where the only thing the user needs to do is assembling. This can overcome the natural adoption hurdles and make it easier for everyone to use the product. I sincerely feel that we do not have to change our consumption, we need to make sustainable improvements. This is how I moved the idea forward and developing a sustainable transaction process. Research already shows that we are moving towards renewable energy, and the U.S. is planning to build thousands of biogas plants in the future.

### **Value Proposition**

Currently, customers use electricity from their household. When they can't pay for their electricity bills, many of them go through with it. They conserve whatever little capacity they have to make sure they can survive. To have Eco-Green in the household would mean that free energy can be harvested. We have proofs from around the world where people use biodigester to replace their gas pipe (easy to connect). Those who live in rural areas can be targeted, and those who live in urban areas and want to switch to a more sustainable energy consumption can be a target. This is a sustainable product that consumers recognize and then change behavior to buy and use. The unit price is \$60. They would think that Eco-Green is the next level product. This operation will be a small-scale operation, and I will be leveraging all the seekers to create a bandwagon

effect to attract possible sideliners.

### **Competitive Advantage**

The only thing I am worried about is that my competitors will recreate my product, make it better, and sell it for cheaper through economies of scale. Based on my research, biodigesters are expensive, and the cheap ones are just composing tools and do not produce any energy for the household. I am coming into the market with a low-cost, high-efficiency product that I know will work (most differentiated). A single online search in Google.com would show no product like mine, at least not at a manageable level that can make an identifiable impact (IKEA style is more transactional). For the target market that I am after, most of them are not wealthy and benefit significantly from free energy. I need to secure the first batch of buyers for my product so that I can be ahead.

### **Entrepreneurial Team**

I am using multiply different suppliers for my materials component, and these materials will be assembled in my warehouse. I will do the ordering, and my two team members will do the entire warehousing tasks. These are the primary skills I need apart from my skills in handling the vendors and consumers. If we see how big Amazon's warehouses are, we know that warehousing tasks are skills that are especially important in their supply chain. I hold the same circumstances.

### **Financial Highlights and/or MBV Outcomes**

This IKEA style assembly would mean that the design has to be flawless, and all the materials must come from vendors precisely as ordered. We need to make sure that vendors take the specifications and correctly produce each part. Currently, my concept is in the stage of a working prototype. The product has a basic version of creating biogas, but the design is still incomplete and still needs updates. For financial investment, I need materials, labor, and a warehouse to do the operation. I will summarize the research I gathered on my MBV inputs.

Price: \$60, Material cost: \$27.81

Labor cost: \$15/hour, 2 people = 30 mins each (0.5 hour) to assemble products.

Labor hours: 2 \* 5 hours (per shift) \* \$15/hour = \$150

Labor hours/unit = \$7.5 (\$150 \* 0.5 hour / 10 total hours)

Direct cost: \$35.31, Burn rate: \$488/month, Margin: \$24.69

Breakeven point: 1 per day, 5 per week, 20 per month, 237 per year.

Volume = Target Revenue / Selling Price = \$1000,000 / 60 = 16,666 units

### **Feasibility Plan**

1. Consumer problem

**Main consumer concept:** provide renewable energy source to everyone that needs using a small-scale biodigester

### **Narrative direction**

My inspiration for this project is the future world that I am envisioning. I want us to be completely independent of fossil fuels. I won't bore you guys with details why fossil fuel is extremely bad for our planet, but we will harness 100% of our energy from renewable sources in the future. Currently, we are using fossil fuels to generate electricity such as coal and oil. They are not efficient for our planet and it is irrefutable that many countries are trying to eliminate the use of fossil fuels.

It's for a certain that in the future we will be independent of fossil fuel, and harness 100% of our energy through renewable energy like biogas. My product name is Eco-Green. You guys can see the product design on the appendix. It will be assembled like IKEA style furniture. We can see so many examples of small-scale biodigesters that people are already using. My product turn waste into Biogas, it's a process called anaerobic reaction. The consumer archetype for Eco-Green would be the Detectives and the Seeker. The Seekers are early adopters for innovation. They are always looking for the latest new benefit. Their mindset is about performance and design. Eco-Green is easy to use and can function as advertised. The Detectives are also important because they are the skeptical consumers that are always trying to figure out how everything works. Their consumer mindset is about information, they want it the moment they start interacting with the product. Ideally, they are homeowners who are looking at a more sustainable solution. I need to make sure that my questions can encourage them to switch behavior to actually buy and use my product.

## 2. Product problem

This year we have seen so many new green technology products. We saw electric planes, hydrogen cars, and even robotic boats that automatically clean the oceans, among the previous products that I already mentioned. Green technology is the future, it is up there with quantum computing and microchips.

### **What solution you are providing?**

There's a lot of alternative source of energy, and I will focus specifically on Biogas solution. Just understand that, Biogas is under the umbrella of biofuel – this is a huge topic to cover, and I want us to focus on just Biogas. Many solutions have been created from other renewable resources like solar and wind. For my solution to free energy, I am going to make a small-scale biodigester that is low cost and high margin.

The application for Eco-Green is endless, if more than anything it will inspire future generation to achieve the impossible: independence from fossil fuels. Remember, what we need is a product that consumers recognize and switch behavior to buy and use. I took the big global ideal and operationalize it on a manageable level (smaller scale). In this way, I can show an identifiable impact through my product.

### **Stage of development**

In week 9, I had to redefine my product concept. The professor mentioned in week 8 that what is needed is a sustainable product that consumers actually recognize and then switch behavior to actually buy and use. How we can take the big global ideal and operationalize it on a manageable level (smaller scale) to show an identifiable impact. I took the suggestion very seriously, and I am creating a small-scale biodigester. Sincerely, it is a very daunting task this week to figure out how to make one. However, professor said that everything will work out fine once we start doing the research. That is exactly what happened. As I started writing down the materials, everything turned out so cheap, and it is no longer a daunting task. I will be packaging my

biodigester like IKEA style, where the only thing that the user needs to do is assembling. I actually moved the idea forward and I am developing a sustainable transaction process. The process will take a week until the biogas can be harvested, and the consumer will be able to use the biogas to generate fire. This is viable and feasible. The application of this super low-cost, small-scale biodigester is significant.

### 3. Market problem

I am aiming at the renewable energy market. The opportunity is massive. The U.S. will create thousands of biogas plants in the future. Biogas is not a new concept; it is under a bigger umbrella of renewable energy called biofuel. Many people know its applications and it has been used widely around the world. Those who are looking for biodigesters, understand what Biogas is and how anaerobic reaction operates. The consumers have to figure out what to put, I am not supplying the digester seed material and feed stock to create the Biogas. Other solution currently only stores compost products in the backyard, but they don't have the ability to turn waste to energy. Other small-scale biodigesters are also too expensive to purchase. My product will be low-cost, low margin, most differentiated in the market (**Laws of opportunity**).

### 4. Business model problem

The renewable energy market is massive. This year we saw a boom in the green technology sector. We have electric planes, hydrogen-fueled cars, and automatic robotic boats that clean ocean waste. We also have small scale solar panels, and wind turbines that can be installed in a household. There are so many products out there that are using renewable energy sources. Eco-green is no different.

### **MBV assumption**

I will first list all the materials and what they will be used for. This will be like IKEA style, where users can assemble the products with instruction manual (see appendix for details).

1. **20-liter water bottle:** this comes already with holes on three sides. This water bottle will be used to store the organic matter (\$9.88).
2. **PVC pipe:** this will be placed in two of the holes. They are already cut with measurement to guide the users. One of them will be used to inject the organic matter (can be adjusted with size), the other one will be used to eject excess organic matter that overflows to the top. The pipe already comes with different ends (\$2.48).
3. **Gas pipe.** This is where the biogas will come from. This gas pipe will be attached at the top of the water bottle and be connected to a T-valve (2.95).
4. **T-valve:** This T-valve from the previous gas pipes go through two separate gas pipes (\$2.40).
5. **Tyretube:** One of gas pipe is connected to a Black Tyretube where it will store the biogas (\$4.99).
6. **Gas Valve:** The other gas pipe has a Gas-valve at the end where biogas will be released from the Tyretube through the T-valve and be released to produce fire for users (\$2.40).
7. **Shipping box:** This will be used to ship the product (2.71)

Two labors are required for doing all warehousing activities such as packing, labelling, shipping, adding instruction manual, etc. This is IKEA style, so everything has to be packaged nicely. Direct costs include all materials and labor costs. Burn rate is the warehouse office that I found on the internet for about 1600 sq feet (\$488). I will not be supplying the biodigester feedstock and seed materials. The consumers will need to buy it themselves.

### Required Volume Prediction

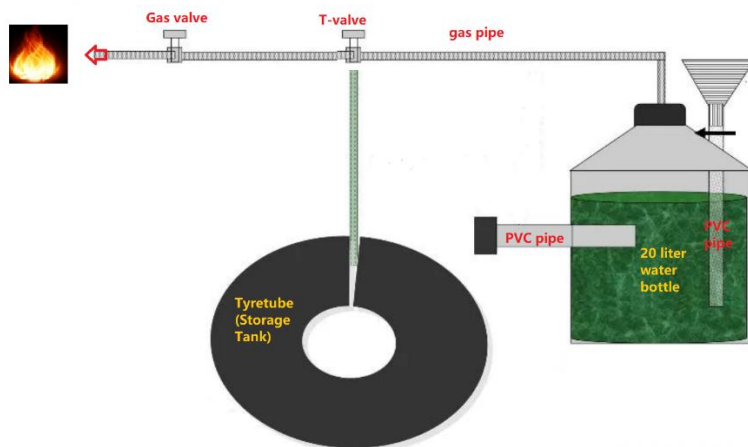
Breakeven point: 1 per day, 5 per week, 20 per month, 237 per year.

Volume = Target Revenue / Selling Price = \$1000,000 / 60 = 16,666 units

### 5. Operations problem

We need to make sure that all the products coming from vendors are received on a timely manner and with the right specifications. As mentioned before multiple times, the product will be assembled by the consumers like IKEA products.

### Product concept diagram

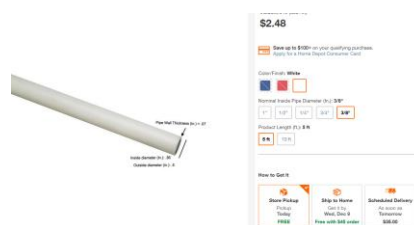


### Direct Materials for manufacturing process

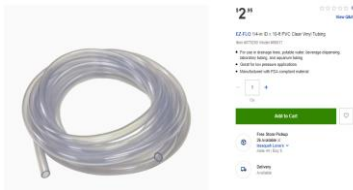
#### Walmart



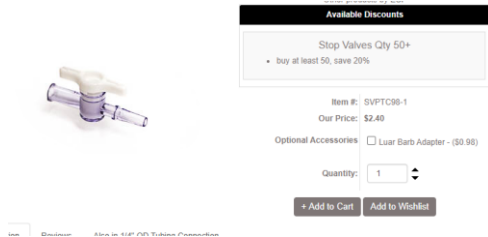
#### Home Depot



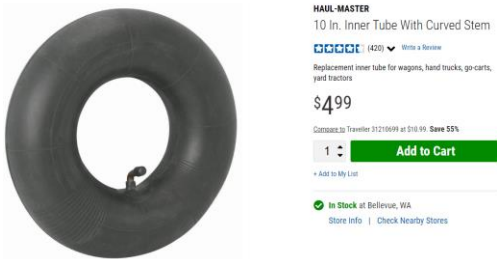
## Lowes



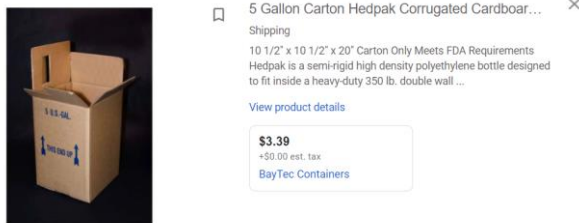
## ESP Supply



## Harbor Freight



## Bay Tec Containers to ship the product



## 6. Recommendation


My recommendation is a GO. Currently, the product is in a prototype stage. We need to create more products to reduce cost and capitalize on economies of scale. My strategy moving forward is to position my product as low-cost, high-margin product with the most differentiation in the market place.

## Concept Portfolio (Appendix)

### Infographics

#### Persona

### Matt (he/him/his)



#### Lifestyle

1. Risk-taker that is open to trying new things
2. eco-conscious lifestyle
3. high consumption of resources

#### Personal Care Pain Points

Always look for renewable energy sources to reduce high electricity costs, frustration from being deceived by deceptive advertising and marketing, terrible experience with energy product, he's not sure whom to trust

#### Personal Background

Age 40, married with 2 kids, consider himself 'environmentally friendly' and has huge interests in sustainability, live in Manhattan.

#### Career Background

Master in Finance, possess high purchasing power, work in blue chip management consulting firm.

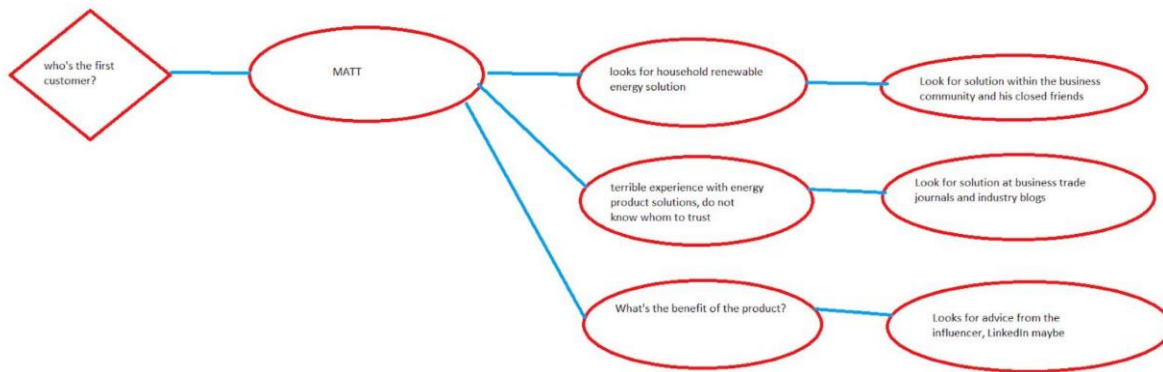
#### Where does he go for information?

He's well networked in the business community. He has a few close friends he relies on for recommendations. He reads a few business trade journals and industry blogs. He has a LinkedIn account. He's not on Facebook or Twitter.

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## Decision Tree

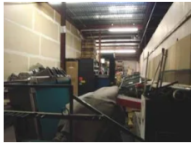


## Infographic





## Warehouse office space example for the assumption of Burn rate.



Warehouse/office space 1,674 sq feet Superior, Wis

WAREHOUSE SPACE – 1,674 square feet. The space measures 84.5' by 19'-10". Contact donal...

\$487.69

ARCO coffee co.

## Biodigester can be used to power stoves (application example)



## Images of the Eco-Green



## MBV analysis

Module A		METRICS				
<b>BASELINE 1:</b>	<i>If We Charge This:</i>	\$60.00				<b>Your Biz Idea</b>
<b>BASELINE 2:</b>	<i>And Our Costs Are:</i>	\$7.50	LABOR + COMMISSIONS + ROYALTIES			
		\$27.81	MATERIALS + DIRECT MFG COSTS			
		<b>\$35.31</b>	<b>TOTAL DIRECT COSTS</b>			
<b>BASELINE 3:</b>	<i>Gross Profit per unit:</i>	\$24.69	41.2%	<i>Gross Contribution Margin</i>		
<b>BASELINE 4:</b>	<i>Monthly Burn Rate is:</i>	\$488				
<b>BASELINE 5:</b>	<i>Breakeven at:</i>	237	59	20	5	1
		Per : YEAR	QTR	MONTH	WEEK	DAY

Labor hours:  $2 * 5 \text{ hours (per shift)} * \$15/\text{hour} = \$150$

Labor hours/unit =  $\$7.5 (\$150 * 0.5 \text{ hour} / 10 \text{ total hours})$

Direct cost: \$35.31

Burn rate: \$488/month

Margin: \$24.69

### **VOC research**

The book mentioned that the questions should avoid bad data like false positives, compliments, and fluffs. They should be able to anchor or dig further on concrete facts like the consumers' constraints and goals. When we have identified a strong signal, then we can zoom in, but it is recommended to not talk about our ideas in the beginning. This is what I hope to gain from the discussion. I would like to know the motivation behind their answers.

1. How's everything with your new schedule working from home?
2. Do you spend more time home this year?
3. You get to spend more time with your family?
4. Does your home consume a lot of resources like electricity?
5. How much electricity on average do you consume monthly?
6. What about composting? Do you do a lot of that?
7. Tell me more about that, what makes it so high?
8. Do your neighbors have the same problem?
9. Have they tried searching for solutions?
10. How do you deal with that?
11. How much does it cost for that?
12. Have you looked into what your options are?
13. Walk me through what happened the last time you reached this problem?
14. You would like to produce your own energy, why do you want that feature?
15. How would your day be different?
16. What parts you love and hate about it?
17. What would that let you do?
18. You can feel more sustainable, but how seriously do you take sustainability?
19. Is this a must-solve problem?
20. Is there a budget for better ones?
21. I am building a product that creates renewable energy for your home. How would that fit into your life?

# Problem structure

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1. Inspiration: in the future we will be independent of fossil fuels, and harness energy naturally
2. Current problem: millions of people have no access to electricity, many people are struggling to pay for it, and many wants to have a cheaper electricity bill.
3. Current solution: Coal and Oil as the main source of electricity.
4. Alternative solution to obtain electricity: Solar, Wind,Biogas, Hydro.
5. Focus of the pitch: I would like to talk about alternative energy solution further, especially Biogas.

## Renewable Energy

1. Solar
2. Wind
3. Biogas

### Sustainable product solution:

- I will be making a small scale biodigesters that can be placed in any household's backyard.
- This will be assembled like IKEA style products and will create free electricity for the users.

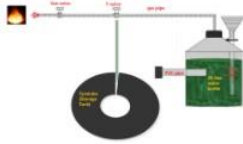
### Examples of current products in the market

1. We have solar tiles and roofs that many people use to generate free electricity. One product for example it's a solar panel that you can hang on the window and charge your phone from it.
2. We have wind turbine tree, where people would install fake tree with multiple wind turbines leaves that are made from plastics and generate free electricity
3. We have Biofuels, which can be derived from Biomass or Biogas. Many people use this in the underdeveloped countries to create electricity The US is building many largescale biodigesters plants in the future. Thousands of them.

# Small scale biodigester

Product name: Eco-Green

Initial product design



1. The biogas will come from anaerobic reaction on the water bottle
2. It will be stored at the storage tank, and release via gas valve at the end
3. The product will be assembled IKEA style, and it comes with instructions

## How we will make it & sell it

### MATERIALS (WEEK 11 ASSIGNMENT)

**Walmart**

**Home Depot**

**Lowes**

**ESP Supply**

**Harbor Freight**

**Bay Tec Containers to ship the product**

### MBV ANALYSIS

Module 8		METRICS				
BASLINE 1:	If We Charge Price	\$60.00	Your Biz Idea			
BASLINE 2:	And Our Costs Are:	\$7.50	LABOR + COMMISSIONS + ROYALTIES			
		\$27.81	MATERIALS + DIRECT MFG COSTS			
		\$36.31	TOTAL DIRECT COSTS			
BASLINE 3:	Gross Profit per unit:	\$24.69	41.2%	Gross Contribution Margin		
BASLINE 4:	Monthly Sales Revenue	\$488				
BASLINE 5:	Break even at:	237	69	20	5	1
		PER YEAR	QTR	MONTH	WEEK	DAY

POSSIBLE SALES PLATFORM: AMAZON AND EBAY

To summarize, this year we have seen so many new green technology products. We saw electric planes, hydrogen cars, and even robotic boats that automatically clean the oceans, among the previous products that I already mentioned. Green technology is the future, it is up there with quantum computing and microchips.

The application for Eco-Green is endless, if more than anything it will inspire future generation to achieve the impossible independence from fossil fuels. Remember, what we need is a product that consumers recognize and switch behavior to buy and use. I took the big global ideal and operationalize it on a manageable level (smaller scale). In this way, I can show an identifiable impact through my product

**My MBV analysis shows that I will need to sell 16,000 units to reach my \$1 million goal.**

#### QUESTIONS?

1. APPLICATION
2. CLEANLINESS
3. MAINTENANCE

## Answers to questions



**MegaMicrobes Dry Premium Organic Waste Digester 25L Jar**

Product description

24471

Price

Buy

View

**PODS Small Home Use Dry Compost Biogasifier Available Dig...**

The above information will be used to generate a list of products that are similar to the one you are viewing.

Product details

24471

Price

Buy

View



Maintenance wise, I am not supplying the input requirements for my product. Consumers can buy their own or use their food waste as input. We can see many products being sold in the market to provide that anaerobic reaction that's required. Competitors charge very high price, and mine is very cheap (\$70).

In terms of cleanliness, the product doesn't necessarily smell since they are sealed completely. Ideally, biogasifiers are located outside in the backyard, and they are low maintenance since the main idea is to turn compost into energy. They will need to be constantly supplied and the storage tank will inflate when the Biogas is harvested.

For its application, most people who buy the product already know how biogas works. They have plans to use it (those in rural areas for example). We can see from the picture how people use biogas to cook. This is just one example from one household. Instructions manual will be provided.