Penn State – Collegiate Wind Competition Business Plan

Remote Wind Power Systems Unit

April 18, 2014

Remote Wind PSU Organization		
Teams	**Team Contact**	**Number of Members**
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Lifetime Analysis	Nick Ward - njw5071@psu.edu	3
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Test Turbine		
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Drivetrain	Jeremy Ogorzalek - jpo5063@psu.edu	4

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Sponsors:	
	The U.S. Department of Energy, National Renewable Energy Laboratory
	Roscoe Blyler Fund for Excellence in the College of Engineering
	The Penn State Institutes of Energy and the Environment
	The Penn State Sustainability Institute
	Penn State Department of Aerospace Engineering

Executive Summary

The Pennsylvania State University's team, Remote Wind Power Systems Unit (PSU), is focused on developing a sustainable, portable wind turbine that can provide power to those in need during the aftermath of natural disasters in the United States. Approximately 25 engineering students from Energy Engineering, Aerospace Engineering, Mechanical Engineering, and Electrical Engineering backgrounds have played a role in the design process. Six students pursuing degrees in Energy, Business, and Finance, Energy Engineering, and Communications have developed the business plan and financial analysis to demonstrate the viability of the team's product.

Remote Wind PSU is a Limited Liability Corporation that was formed in order to provide a portable and sustainable solution to power loss in the aftermath of natural disasters. Remote Wind PSU will design and sell small-scale, portable wind turbines to first responders and community centers. This product is designed to be a sustainable and affordable alternative to diesel generators and solar panels. As of now, Remote Wind PSU has designed and built a prototype, designed a turbine for market scale production, and conducted a preliminary market analysis. Remote Wind PSU was formed in State College, Pennsylvania in 2013.

Figure 1: Deployed Market Turbine (Guy Wires Not Shown)

Remote Wind PSU has identified a market gap in the mobile electricity generation products for the natural disaster response market. While portable diesel generators and portable solar devices can provide mobile power, they both have disadvantages that can be overcome by a portable wind turbine in the natural disaster response market. Remote Wind PSU's M152 turbine can provide power to 5 to 10 people at a time so people can charge communication devices at your local community center, church, or fire station.

Unlike most micro-wind turbines on the market, the M152 is built into a compact and ergonomic carrying case for transport to virtually any location. To ensure that the system has a small volume, the tower utilizes a telescoping arrangement reducing the height of 13 feet during use to 40 inches during transport and storage. Once erected, the tower is stabilized by guy wires eliminating the need for bulky struts or limiting base area. The turbine itself is designed to operate in a downwind orientation on a horizontal axis to achieve the low cut-in wind speed of 4 m/s and have the capability to direct itself into the wind, allowing it to always maximize the windswept area without the need of a tail.

Each blade of the micro-turbine can be detached for storage in a convenient carrying case, and when assembled, has a rotor diameter of 1.52 m. This allows the M152 blades to rotate at 650 rpm at rated wind speed of 11 m/s generating

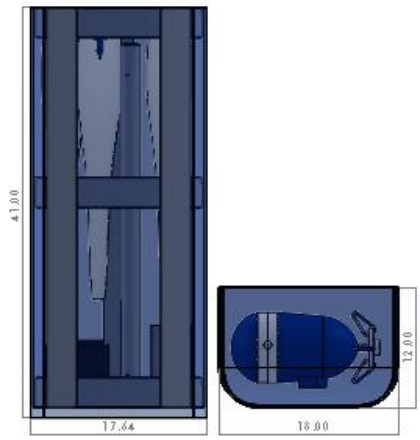


Figure 2: Packaged Market Turbine

441 W via a permanent magnet generator. While the wind is blowing, the power generated is stored at the base of the turbine in a 396 Watt hour (Wh) battery. The electricity produced can then be discharged through one USB outlets as well as two 12 V universal outlets.

Remote Wind PSU is in the organizational phase of development at this time. The company plans to take advantage of economic incentives to aid its development such as the Keystone Innovation Network grant program and Ben Franklin Technology Partners. Additionally, the company will seek investment during its second year of production. Remote Wins PSU begins producing turbines during its third month of operation after marketing and collecting orders for the first two months. Marketing consists of email lists, conventions, and magazine and newspaper ads. Breakeven occurs at the beginning of the second year of operation. The company's net present value is $163,000 after three years of projections.

Business Overview

Business Model: Remote Wind PSU plans to address the consumer problem of power outages due to natural disasters by designing and producing portable wind turbines to be used to generate electricity to power necessary communication and emergency tools, such as phones, tablet computers, batteries, radios, defibrillators, and even laptops. We propose to target emergency responders as our customers through demonstrations of product reliability and usefulness. Our product is unlike other emergency response tools in that it is portable, easily assembled, and independent of fuel costs. We aim to provide electricity and some peace of mind to the public after experiencing natural disasters.

Mission Statement and Values: To aid people by providing portable, sustainable, energy solutions. We strive to meet our company values which include integrity, innovation, social responsibility, sustainability, and partnership.

Company's Value Propositions: Remote Wind PSU operates with a triple bottom line in mind. We recognize the importance of financial, social, and environmental values and run our business according to these values. First, we aim to make a profit to sustain operations and achieve growth. Second, we

promote consumer well-being by aiding our customers in providing small scale power to those in need. Additionally, we have an established presence in our communities of operation where we conduct service projects and provide educational demonstrations. Third, we strive to be environmentally conscientious by developing a sustainable product that utilizes a renewable resource and is made of recyclable material as well as ensuring that our supply chain operations include only those companies that conduct business sustainably.

Market Opportunity

A major issue in the aftermath of a natural disaster is finding a reliable power supply for fundamental communication and comfort needs. A portable wind turbine can provide communities the opportunity to charge small devices such as cell phones, laptops, and batteries while the electricity grid is down. This turbine would be used as a community turbine that approximately five to ten individuals can utilize simultaneously until power is restored.

Remote Wind PSU plans to compete in the mobile electricity product market. The target customers for this market are organizations that deliver aid in emergency situations. These include local and state police and fire departments, municipalities, relief organizations such as the American Red Cross, and community and religious centers. Ideally, these organizations would purchase a supply of turbines in advance of a disaster occurrence, but likely many would be purchased during an emergency. **Error! Reference source not found.** indicates our estimated market size.

Table 1: Target Market Size

Target Customer	Number of Offices in the United States
Local Police Departments	48,800
Fire Departments	12,501
Municipalities	19,519
Township Governments	16,300
Religious Centers	16,300
American Red Cross	519
Total	114,059

The strongest incentives for purchasing this product include its portability, collective use ability, and renewable energy use. Since the turbine is portable and designed to have multiple charging outlets,

the product's benefits can be spread over multiple users. The system will come with one built-in USB charging port and two 12 V universal charging ports which can each support a variety of adapter outlet plugs for flexible charging options. For instance, each of the 12 V ports could be split into two additional USB outlets, allowing for five individuals to charge their USB devices at one time. On a single full battery charge (33 Ah x 12 V battery), this can be sustained over a six hour period. With continual wind energy charging the battery, this charge period is ongoing.

Dependence on renewable energy allows a portable wind turbine to provide energy over an extended period at different locations without need to refuel. In times of disaster, fuel for diesel generators is in short supply and at a high cost compared to non-disaster periods. For example, in the aftermath of Hurricane Sandy in 2012, power outages caused fuel distribution problems which led to fuel shortages and increased prices. While demand for some fuels waned during the period of power outages, demand for vehicle and generator fuels did not decline.[2] In disaster response, technology decisions depend upon the severity and length of impact.

There are two mobile electricity products that can enter our selected market, natural disaster aid response. These competitors are portable PV devices and portable diesel generators. Both products have captured market share in the mobile electricity market and have the advantage of reputation; however, these products also paved the way for the creation of this market and do not meet all of the needs that a portable wind turbine does.

Portable PV devices include lamps, radios, flashlights, and battery, phone, or laptop chargers. These products vary in price, but are usually offered on the scale of a few hundred dollars ("Earthtech Products," 2014.). A 400 W solar charger runs for $600 to $1,425 ("Complete kit 400W. . .," n.d.; "Grape solar 400 Watt off-grid solar panel kit Home Depot," n.d.).

Diesel generators are often the go-to product for back-up generation when electricity grids lose power due to their durability, reliability, and quick response time. A diesel generator with a rated power of 900 W and four outlets can run for 3.8 hours at maximum load and is priced at approximately $800 ("Diesel Generators: A Reliable Source of Power," n.d.). However, this excludes the fuel and portability

features. Comparatively, Remote Wind PSU M1 is priced at $1200 which falls within the range of solar chargers of the same size and is more than the diesel generator.

Remote Wind PSU plans to capture market share through email marketing, trade shows and conventions geared toward target customers, and local newspapers and magazines. See Appendix for more detailed marketing plans. Remote Wind PSU will take orders during its first two months of operation and then beginning producing turbines during its third month. Table 2 shows the customer value analysis.

Table 2: Customer Value Proposition

All Product Benefits	***Favorable Points of Difference from Competitors***	
	Portable Diesel Generator	Portable Solar Charger
1. Power generation without grid connection	1. No fuel costs or wait for fuel transportation	1. Can generate power regardless of time of day or weather
2. Portable	2. Ability to charge more devices simultaneously	2. More durable material
3. No fuel costs	3. Low fire hazard	3. Ability to charge more devices simultaneously
4. 5-10 devices can be charged simultaneously		
5. Durable Material		
6. Protective carrying device		
7. Quick and easy assembly		

Remote Wind PSU will use a pricing strategy that sets production costs as a base cost and then adds a 50% profit margin to cover operating expenses and a small profit. This price is positioned to cover monthly operating expenses. The customer value analysis shows all the product benefits of the wind turbine as well as a comparison of benefits with the two main competitors. According to the table, Remote Wind PSU M1has important characteristics pertaining to the target market that the portable solar charging devices do not have. As for comparing a diesel generator to Remote Wind PSU M1, a generator is priced lower, but this price does not include costs associated with fuel such as delivery and storage.

Management Team

Remote Wind PSU's management team consists of President, Bridget Dougherty, and Vice President, Ken Palamara, as well as a variety of consultants with diverse specializations. Experience and rationale for company members and consultants follows.

President: Bridget Dougherty is a 2014 Pennsylvania State University (PSU) graduate with degrees in Energy, Business, and Finance and International Politics as well as a minor in Chinese. Her senior thesis was based on the business plan development and financial analysis of Remote Wind PSU's product. Through her work in a Hess Corporation sponsored case study, Bridget has experience in business venture analysis and valuation. Additionally, she has experience recruiting investment for service projects.

Vice President: Ken Palamara is a 2014 PSU graduate with a degree in Energy Engineering. He has extensive experience in design and product marketing. He is the lead product designer and engineering coordinator. Ken has experience in entrepreneurship and business development through GreenTowers, a recycled aquaponic greenhouse initiative in State College, Pennsylvania.

Table 3: Consultants

	Rationale for Membership
Peter Tarantowicz	Materials and Supply Chain Analyst
Kody Viet	Base Design Consultant and Materials analyst
Justin Lehrer	Funding and Supply Chain analyst
Katelyn Mixer	Communications and Marketing specialist
Parth Patel	Aerodynamic specialist
Michael Popp	Lead Aerodynamic specialist
Nick Ward	Applications specialist
Sahil Desai	Structures specialist
Russell Hedrick	Applications specialist
Armstrong Liu	Controls systems design specialist
Spark Ma	Energy storage specialist
Jeremy Orgozalek	Structures specialist
Greg Liptak	CAD Design specialist
Steven Flinchbaugh	Aerodynamic specialist
Evan Masters	Supply chain analyst
Tyler Druce	Supply chain analyst

Product Development and Operations

In order to ensure quality and consistency in the final product, a buildability, or preconstruction plan, was established. This consists of the sequence of steps that occur on and off site as well as instituting dimensional criteria space allowances. Remote Wind PSU plans to use contract manufacturing for the first few years of operation to take advantage of manufacturers' expertise and economics of scale. Onsite steps involve managing inventory, marketing, and operating an online retail store.

After acquiring debt financing, Remote Wind PSU will spend the first two months of operation marketing and collecting orders. During the third month, the company will start filling orders. Suppliers have already been established and secondary suppliers have been investigated. Table 4 indicates the current list of suppliers for each component.

Table 4: Nominal Component Suppliers

Component	*Target Bulk Cost*	*Source1 Company*
Generator	$100.00	Moog
Battery	$100.00	Eagle Pitcher
Controller	$75.00	Coleman Air
Blades (3)	$70.00	Xcentric Mold & Engineering Inc.
Base structure	$60.00	Xcentric Mold & Engineering Inc.
Pole Sections	$50.00	Argyle Industries
Nacelle & Hub	$40.00	Xcentric Mold & Engineering Inc.
Slip-Rings	$15.00	Mercotac
Guy Wires	$10.80	Tessco
Guy wire attachments	$3.00	TBD
Rectifier	$14.23	Ixys
Anchors	$4.77	American Earth Anchors
Electrical Adapters	$4.70	BatterStuff
Total	$547.50	

We will partner with an assembly facility in Philipsburg, Professional Satellite Repair, Inc. that specializes in electronic assembly. The facility provided a quote of $213.20. Sales will be ordered

through an online retail store. Once the turbine has been assembled, the finished product will be stored at Remote Wind PSU's facility in Philipsburg.

As for research and development, Remote Wind PSU has plans to develop diverse models of our wind turbine that will expand upon our initial design during the second year of operation. For the first of the new designs we will be aiming to target the doomsday preppers market. This will not require significant alteration of the current design, but will require the design of additional accessories and adaptors to make the unit even more flexible in its function. A third market that will be pursued is academic researchers and film producers in remote locations. For this market, the turbine container will need to be more durable with a more specialized user interface for the designed application. The other product enhancements will be working on is the further refinement of our current product that includes lighter materials for increased portability and a more protective casing. The second edition of our model will feature an assortment of power options to charge two batteries which can be rotated out in order to provide the client with a constant supply of power.

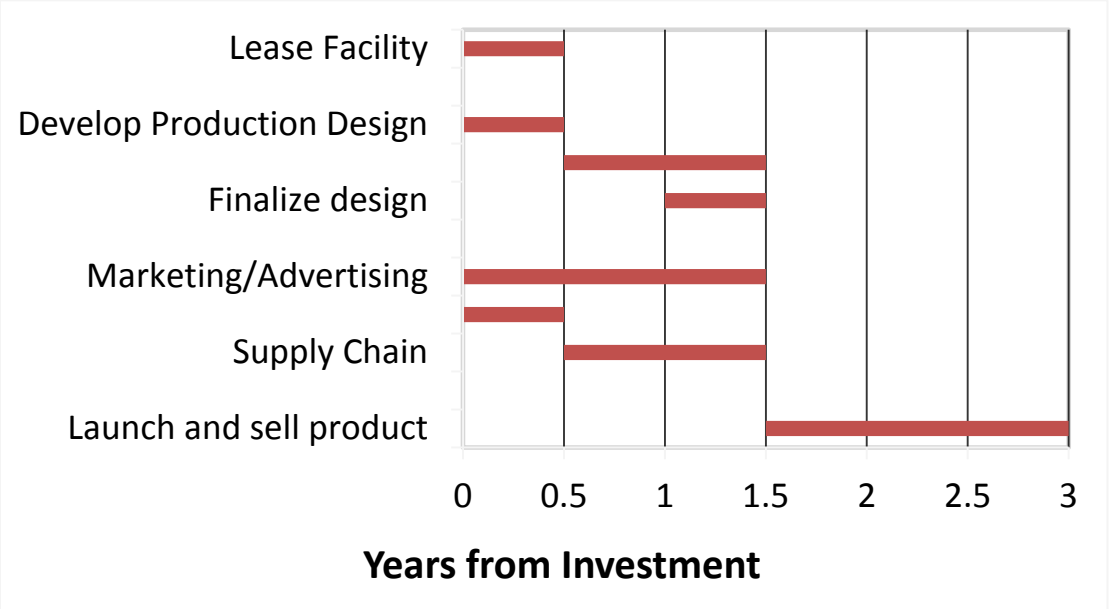


Figure 3: Timeline of Activities

Risks to consider for any start-up company concern cash flow, sales, supply chain, technical, and legal risks. Most important of these for Remote Wind PSU's are sales and supply chain risks.

Financial Analysis

At this point, Remote Wind PSU has developed a commercial turbine and conducted preliminary market analysis. Initial financing of company activities is provided by a loan from the Ben Franklin Technology Partners of $130,000 in addition to $20,000 of personal investment from the owners at the beginning of second year. Remote Wind PSU plans to acquire $20,000 of equity financing from an angel investor(s). The company offers a five to one return on investment at the end of five years in addition to 15% ownership in the company. Investor ownership is negotiable, but the owners will retain majority stake in the company. Table…shows the turbine cost and manufacturing unit costs.

Table 5: Product Pricing

Turbine Components	547.5
Assembly	213.2
Total	760.7
Sales Price	1200
Profit margin	36.61%

During the first year of production, Remote Wind PSU will market the product and gather orders during the first two months. Production will begin during the third month of operation. Sales is estimated to be 20 turbines a month for the first year, 37 per month for the second year, and 47 turbines per month for the third year. The increase in production and sales in related to increased investment in marketing activities.

Table …provides an annual summary over three years and the net present value of the company.

Table 6: Annual Income Statement

	Year 1	Year 2	Year 3
Total Sales	$240,000	$532,800	$676,800
Total Cost of Goods Sold	$152,140	$337,751	$429,035
Total Operating	$88,975	$111,657	$125,195

Expenses			
Net Income	($1,115)	$83,393	$122,570
NPV	$163,814		

Remote Wind PSU will break even during the second year of operation after selling approximately 202 turbines. Our estimations of component prices are from our selected manufacturers and assembly partners. Our estimation for sales growth is conservative, yet the company still breaks even during the beginning the second year of operation and company wealth grows quickly. Figure …displays Remote Wind PSU's cash balance and cash flows during the three year period.

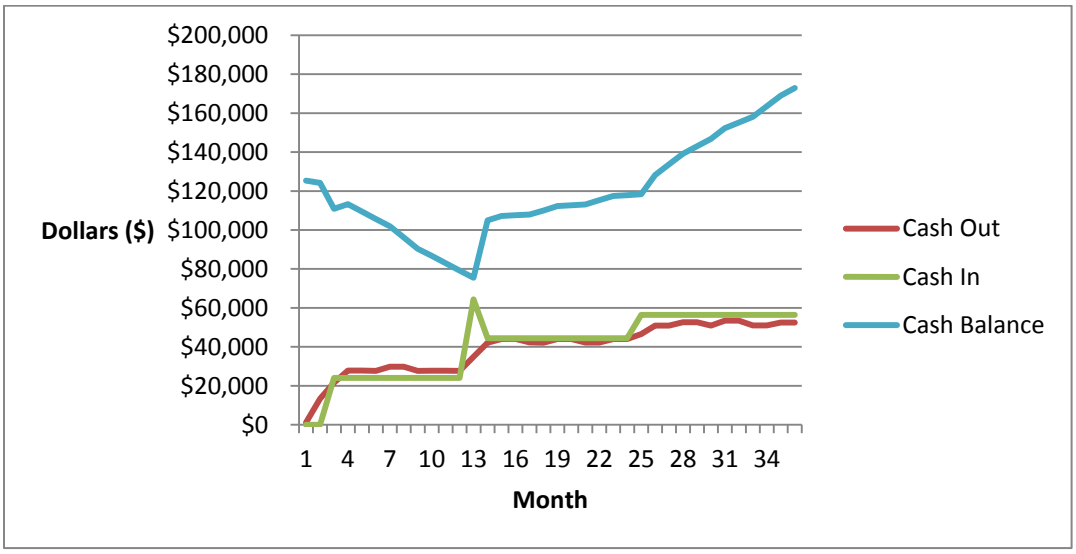


Figure 4: Cash Balance Analysis

At month 13, the cash balance is at its lowest point. At that time, Remote Wind PSU plans to accrue investment which allows growth over the next two years. The graph also indicates that the company breaks even at Month 14 ignoring the investment during the previous month. At the end of five years, Remote Wind PSU will likely sell to one if its manufacturers or a wind turbine manufacturer.

Conclusion

Remote Wind PSU is fueled by desire to provide sustainable, portable power to those in need at a reasonable cost while still remaining profitable. The design is easily assembled and maintained. According to our conservative estimates of market capture, Remote Wind PSU will be able to breakeven during the beginning of year 2. There is opportunity for continued growth..

Appendices

Appendix 1: Assumptions

1. At this stage, Remote Wind PSU has a commercial turbine developed and has conducted preliminary market analysis
2. Remote Wind PSU operates as an Limited Liability Corporation (LLC) during its first three years of operation. While the company is an LLC, the president and vice president will take below market rate salaries of $25,000 each to leave as much money in the company as possible. Beyond three years, the company will likely become an S-Corporation as it continues to grow.
3. Personal investment from company owners equals $20,000.
4. During its first year of operation, Remote Wind PSU requests $20,000 of investment from an angel investor with expertise in the wind energy and manufacturing industry. The company offers a five to one return on investment at the end of five years and 15% membership in the LLC.
5. The Ben Franklin Technology Partners is an organization that provides loans to start-up companies and allows the loan payments to begin after project activities such as hiring and marketing have been completed. The loan payments do not begin until after the three year period noted in the financial statements.
6. Startup costs are estimated to be $27,000. This includes $20,000 for mold development, $5,000 for web design, $1,000 for a trade show booth, and $1,000 for a demo unit and marketing materials.
7. Remote Wind PSU's storage and office facility are located in Philipsburg, PA. The facility is 1,000 square feet and has a cost of $2.75 per square foot which includes electricity costs.
8. Since the facility is located in Philipsburg, PA which is in a Keystone Innovation Zone, payroll taxes are written off.

9. Remote Wind PSU total cost of manufacturing and assembly is $760.70. Component costs are based on quotes from the manufacturing companies listed in the business plan and the assembly quote is by Professional Satellite Repair.
10. The sales price per unit is $1200. This includes a profit margin of approximately 36.6% to account for operating expenses. The profit margin was kept low to retain attractiveness to customers and to be competitive with portable diesel generators and charging devices.
11. The customer acquisition cost is assumed to be approximately $23.
12. During the first year of operation, marketing expenses, which include travel expenses, are approximately $20,000. Marketing expenses increase by $7,000 each year due to attendance at additional conferences and widening our geographic scope of business.

Appendix 2: Resumes and Qualifications

BRIDGET AYN DOUGHERTY

6341 North Powderhorn Road
Mechanicsburg, Pennsylvania 17050
717.395.5898; bad5194@psu.edu

EDUCATION

The Pennsylvania State University, Schreyer Honors College — Graduation: May 2014
Bachelor of Science in Energy, Business, and Finance — GPA: 3.76
Bachelor of Arts in International Politics
Minor in Chinese (Mandarin)

RELEVANT COURSES

- Graduate Course: Advanced Electricity Markets
- Energy Economics
- Risk Management in Energy Industries
- Technical Writing
- Global Management for Earth, Energy, and Materials Industries

RELATED EXPERIENCE

- Partner of Remote Wind PSU — **2013-2014**
  - Company that designs wind turbines for use in emergency situations
  - Focus in business and financial analysis
- Conewago Creek Initiative/Penn State Extension Intern — **Summer 2013**
  - Performed extensive technical writing, community outreach, event planning, water sampling, and data analysis
  - Collaborated with EPA and PADEP members to devise methods to raise awareness and improve water quality
- CHANCE Fellow — **Summer 2013**
  - Conducted conservation research with Smithsonian Tropical Research Institute Ph.D. Candidates in Panama
- Faculty Assistant for Schreyer Distinguished Honors Faculty Program — **2011-2013**
  - Planned logistics and facilitated 100 discussion forums and trips per year; Content and budget liaison
- Hess Corporation Course - Case Studies Analyst — **Fall 2012**
  - Conducted and presented financial analysis for energy company development strategies to Hess employees
- Research Assistant for Political Science Department — **Summer 2012**
  - Furnished critical analyses on journals exploring the relationships among religion, civil war, and culture.
- Environmental Analysis: Deep Water Horizon Course — **Fall 2010**
  - Explored causes, effects, and potential remedies of 2010 Gulf oil spill per engineering, environmental, biological, ecological, geological, business, ethical, legal, and media perspectives.

LEADERSHIP

- Honor Society of Phi Kappa Phi Council of Students NE Regional Rep. — **2012-2014**
  - Planned and implemented national leadership conference for 70 members
- Schreyer Orientation Mentor and Team Leader — **2011-2013**
  - Organized "Afternoon of Service" for 150 scholars to increase involvement in PSU community
  - Faculty/staff liaison for the creation of presentations and networking dinner for 300 scholars
- Schreyer Honors College Day of Service Team Leader — **2012**
- Team Service Project - "Middle Eastern Cultural Enrichment Event" — **2010**
  - Planned and implemented a fundraiser event to promote awareness of Middle Eastern cultures and intercultural acceptance through education, discussion, and experience.

SKILLS

- Computer: Microsoft Office, extensive experience with Excel, foundational C++ and Matlab
- Languages: Proficient in Mandarin

ACCOLADES

- Hess Scholarship for excellence in "Global Management for the Earth, Energy, and Materials Industries" — **2013**
- Academic Merit Awards: Marie Radomsky & Vernon Ellzey, Joseph & Margaret Nesbit Hunt Scholarships — **2012,2013**
  - Chevron Corporation Environmental Systems Scholarship; President's Award — **2010**

KENNETH J. PALAMARA JR.

921 Old Boalsburg Rd.
State College, PA 16801
(412)-780-5972; ken.palamara@gmail.com

EDUCATION

Bachelor of Science in Energy Engineering
The Pennsylvania State University
University Park, PA: Graduation: August 2014

LEADERSHIP ACTIVITIES, COMPETITIONS, & AWARDS

Independent Design: Penn State Team
Green Towers, Fall 2012-Present

- Cooperated with Penn State students in design, development, and implementation of a commercial aquaponic system and business.
- Developed effective communication skills through design presentation in:
  - Mechanical and Nuclear Engineering Design Competition: Fall 2012, First Place
  - College of Ag. Springboard Entrepreneurship and Design Competition: Fall 2012, First Place

Engineers Without Borders: Penn State Chapter
Design Director and Water Project Team Member, Spring 2012 – Present

- Led students in the design and implementation of a water treatment device for Boma, Africa.
- Networked with multiple universities and corporations at national conferences to benefit the Penn State chapter.

Penn State Wind Turbine Design Team
Design, Product Market, and Business Plan Analyst, Fall 2013 – Present

- Assists in the design, CADD modeling, and product market analysis of a micro wind turbine.
- Works with a team of students from different majors at Penn State and compete to travel to the competition Finals in Las Vegas, Nevada at the Wind Energy Conference.

SKILLS & CERTIFICATIONS

- Efficiency and Quality Improvement: Lean Sigma Yellow Belt: Penn State Summer 2012
- Modeling Software Proficiency SolidWorks CSWA: Penn State Fall 2012
- MS Office (Word, Excel, PowerPoint)
- Experience with MATLAB, Mathematica, and CHEMKIN, AutoCAD 123

RELEVANT COURSES

Engineering Design	Statics	Electrical Circuit Design
Programming in C++	Engineering Leadership	Thermodynamics
Heat & Mass Transfer	Combustion	Material Science
Wind/Hydro Energy Conversion	Chemistry of Fuels	Engineering Economics

WORK EXPERIENCE

The Pennsylvania State University College of Engineering
Lab Assistant, Summer 2013 – Present

- Introduced the fundamentals of engineering design software to freshman engineering students.

Appendix 3: Design specs, Product Diagrams and Pictures

	Test Turbine	Market-Scale Turbine
Rated Power (W)	21	375
Rated Wind Speed	13	13
Rated Speed (rpm)	2759	815
Rated Torque (N-m)	0.07	4.4
Rotor Diameter (m)	0.45	1.52
Type	Downwind rotor with stall regulated control	
Rotation Direction	Clockwise looking upwind	
Blades	Solid Concepts PolyJet HD	Fiberglass reinforced composite
Max Tip Speed (m/s)	70.5	80
Alternator	AMMO GPMG5225	MOOG AG-5250-C-1ES
Yaw Control	Passive	
Battery Charging	5V	12V
Braking System	Electronic Stall Regulation with Relay Switch Controls	
Cut-In Wind Speed (m/s)	3.5	4
Survival Wind Speed (m/s)	20	25
Tower Type	N/A	Guyed Tubular
Tower Height (m)	N/A	3.81

Appendix 4: Market Studies

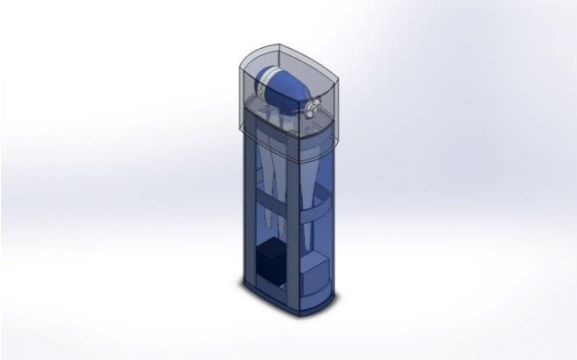
The following is a transcript between a team member and a fireman assessing the potential use of our product and gauging interest in the product.

Transcript of Conversation with a Fireman

Susan: So, I had a question for you as a fireman. I am leading a team of students in a wind turbine design competition and our market is emergency response after a natural disaster. Police/Firemen are one of the potential customers they would market to.

Jonathan: That actually looks pretty cool. How large would it be?

Susan: So, if you could imagine a disaster of some sort hitting Gettysburg, could you imagine finding these useful? About 5-10 people could charge phones, batteries, etc. from one of these. They would be pretty easy to deploy. They are 13 ft tall and the rotor diameter is 5.5 ft.



This is how it would all get stored away. It is kind of unique in that the tower is self - contained. The tower is "telescoping" and then there would actually be guy wires that you would use to secure it to the ground so it wouldn't tip over - that wasn't shown in the first image.

Jonathan: Sounds very handy to me. You might also add to your presentation about the need to charge fire apparatus when not running. 99% of fire apparatus are on shore lines when not in use

Susan: oh really? How much power would this require, any idea? Or what kind of equipment is this?

Jonathan: Everything we have is plugged into a standard 120v line at the station no idea what the truck converts it to charge the batteries I would imagine 12-14v. We have 7 trucks plugged in constantly at our station

Susan: Ok, we would have a 12 V battery in our system to draw from. I will try to look into whether we could justify adding that as a viable marketing line, thanks!!

Jonathan: Just an idea. Most modern trucks are push button start so no electric is baaad
Maybe sell them one of the larger models

Susan: So, if you lost power to your facility, well I assume you have generators which is our competition, but that might be another use for our turbine is to keep the trucks charged?

Jonathan: We have a generator yes however it’s not common around Adams county fds. And it can only run so much. So its main purpose is lights.

In order to reach our target market, there are various techniques that can be used. The least expensive and most effective way to do this is through email marketing. Information can be sent electronically to disaster relief organizations without wasting paper and money on direct mail marketing. Marketing emails will contain an electronic brochure with pictures and product specifications, as well as a personalized message to target customers. If the organizations request more information, they can contact the company directly through email or be directed to a website. This website should provide detailed specifications on the turbine, reviews from satisfied customers, and information on purchasing. An interactive and detailed website will generate more leads than a static website that solely provides contact information.

Another method of gaining attention from organizations is to create awareness at trade shows. This is more costly than other marketing techniques, but can generate genuine leads if executed well. An intriguing booth or display that accurately describes the benefit of the product will be the most effective, especially if interaction is involved. For example, potential customers could see how easy it is to assemble our turbine's tower by putting together a portion of it at the booth. Representatives from organizations attend events such as the National Hurricane Conference and the International Disaster Conference and Expo to find ideas on how to be more prepared.

As far as creating more general awareness for our product, we can reach out to print media for organic placement. Industry magazines such as *Renewable Energy World Magazine* and *Windpower Monthly* can be pitched to write stories on our product. When an organization first starts to use our product to provide aid, the local newspapers and broadcast media can also be pitched to write stories. Inorganic placements can also be acquired by placing paid ads in industry magazines.

Appendix 5: List of Business Consultant

A variety of consultants will be necessary for effective company operation. We plan to enlist the following consultants at this time. This list is not inclusive and will likely expand as the production phase begins.

- Accountant
- Lawyer
- Supply Chain Consultant
- Web Designer
- Sales Consultant
- Travel/Convention Consultant

Appendix 6: Competition Analysis

There are two main competitors in the mobile electricity product market that can enter our selected market, natural disaster aid response. These competitors are portable PV devices and portable diesel generators. Both products have captured market share in the mobile electricity market and have the advantage of their reputations; however, these products also paved the way for the creation of this market and do not provide all of the benefits that a portable wind turbine does.

Portable PV devices include lamps, radios, flashlights, and battery, phone, or laptop chargers. These products vary in price, but are usually offered on the scale of a few hundred dollars ("Earthtech Products," 2014.). A 400 W solar charger runs for $600 to $1,425 ("Complete kit 400W. . .," n.d.; "Grape solar 400 Watt off-grid solar panel kit Home Depot," n.d.). Compared to other renewable and portable energy sources, portable PV appears to have found a niche in basic consumer electronics and lighting.

While sunlight is the most abundant renewable resource and PV is exempt from fuel or feedstock costs, solar energy does have disadvantages which lessens its viability as an energy source in some applications. Sunlight is an intermittent resource that cannot be tapped into at night or during overcast weather. Any kind of shading from the sun such as trees or buildings can significantly reduce generation (EECA, 2010).

Diesel generators are often the go-to product for back-up generation when electricity grids lose power. Diesel generators are durable and reliable in addition to offering a quick response time ("Diesel Generators: A Reliable Source of Power," n.d.). Due to its reputation for reliability and the ease of transporting and storing fuel, consumers tend to look at diesel generators as the first option for off-grid power.

Although portable diesel generators are viewed as reliable and are the top technology for portable power, there are downsides and risks associated with the use of diesel generators. Diesel generators are

fuel dependent so there are operational costs that must be taken into account. As of March 24, 2014 the cost of diesel fuel was $3.988/gallon ("Gasoline and Diesel Fuel Update," 2014). A portable generator with a capacity of 1 kilowatt (kW) has a tank the size of a half-gallon to a gallon ("2014 Best Portable Generators," 2014). Storing fuel would be necessary, although generally inexpensive. Additionally, improper set-up and use of a portable generator can cause fire and carbon monoxide poisoning ("Portable Generator Hazards," 2012).

Wind energy is also growing in popularity as a renewable resource. Wind turbines capture energy from the wind by converting the rotational energy of the turning blades into electricity. Micro turbines for residential use typically have a capacity of 0.3 kW to 20 kW. Like solar panels, wind turbines have high investment costs and low operational costs at the margin since there are no fuel or feedstock expenses. Wind is also an intermittent resource in which proper siting is important for generation; however, unlike solar, wind energy can be available during the day and night (EECA, 2010).

Appendix 6: Financial Statements

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sales:												
Turbine	$0	$0	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000
Total Sales	**$0**	**$0**	**$24,000**	**$24,000**	**$24,000**	**$24,000**	**$24,000**	**$24,000**	**$24,000**	**$24,000**	**$24,000**	**$24,000**
Material and Labor Cost	$0	$0	$15,214	$15,214	$15,214	$15,214	$15,214	$15,214	$15,214	$15,214	$15,214	$15,214
Cost of Goods Sold	**$0**	**$0**	**$15,214**	**$15,214**	**$15,214**	**$15,214**	**$15,214**	**$15,214**	**$15,214**	**$15,214**	**$15,214**	**$15,214**
Gross Margin	**$0**	**$0**	**$8,786**	**$8,786**	**$8,786**	**$8,786**	**$8,786**	**$8,786**	**$8,786**	**$8,786**	**$8,786**	**$8,786**
Percent	0.00%	0.00%	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%
Operating Expenses												
Accounting	$0	$0	$0	$300	$0	$0	$0	$0	$0	$0	$0	$0
Advertising	$833	$5,000	$833	$833	$833	$833	$5,000	$833	$833	$833	$833	$833
Insurance	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500
Legal Professional	$167	$167	$167	$167	$167	$167	$167	$167	$167	$167	$167	$167
Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$150	$0	$0
Office Supplies	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30
Rent	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750
Telephone	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140
Utilities	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85
Website	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8
Other	$510	$510	$510	$510	$510	$510	$510	$510	$510	$510	$510	$510
Loan Interest Expense	$683	$678	$674	$670	$666	$662	$658	$653	$649	$645	$641	$636
Miscellaneous Expense	$0	$0	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200
Total Operating Expenses	**$5,706**	**$9,868**	**$6,897**	**$7,193**	**$6,889**	**$6,885**	**$11,048**	**$6,876**	**$6,872**	**$7,018**	**$6,864**	**$6,859**
Net Income	**($5,706)**	**($9,868)**	**$1,889**	**$1,593**	**$1,897**	**$1,901**	**($2,262)**	**$1,910**	**$1,914**	**$1,768**	**$1,922**	**$1,927**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	D
Sales:												
Turbine	$44,400	$44,400	$44,400	$44,400	$44,400	$44,400	$44,400	$44,400	$44,400	$44,400	$44,400	$
Total Sales	**$44,400**	**$44,400**	**$44,400**	**$44,400**	**$44,400**	**$44,400**	**$44,400**	**$44,400**	**$44,400**	**$44,400**	**$44,400**	**$**
Material Cost	$28,146	$28,146	$28,146	$28,146	$28,146	$28,146	$28,146	$28,146	$28,146	$28,146	$28,146	$
Cost of Goods Sold	**$28,146**	**$28,146**	**$28,146**	**$28,146**	**$28,146**	**$28,146**	**$28,146**	**$28,146**	**$28,146**	**$28,146**	**$28,146**	**$**
Gross Margin	**$16,254**	**$16,254**	**$16,254**	**$16,254**	**$16,254**	**$16,254**	**$16,254**	**$16,254**	**$16,254**	**$16,254**	**$16,254**	**$**
Percent	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%	3
Operating Expenses												
Accounting	$0	$0	$0	$300	$0	$0	$0	$0	$0	$0	$0	
Advertising	$1,333	$1,333	$5,000	$1,333	$1,333	$1,333	$5,000	$1,333	$1,333	$1,333	$5,000	
Insurance	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	
Legal Professional	$167	$167	$167	$167	$167	$167	$167	$167	$167	$167	$167	
Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$150	$0	$0	
Office Supplies	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	
Rent	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	
Telephone	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140	
Utilities	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85	
Website	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	
Other	$510	$510	$510	$510	$510	$510	$510	$510	$510	$510	$510	
Loan Interest Expense	$632	$628	$623	$619	$614	$610	$605	$601	$596	$592	$587	
Miscellaneous Expense	$2,220	$2,220	$2,220	$2,220	$2,220	$2,220	$2,220	$2,220	$2,220	$2,220	$2,220	
Total Operating Expenses	**$8,375**	**$8,371**	**$12,033**	**$8,662**	**$8,357**	**$8,353**	**$12,015**	**$8,344**	**$8,489**	**$8,335**	**$11,997**	
Net Income	**$7,879**	**$7,884**	**$4,221**	**$7,592**	**$7,897**	**$7,901**	**$4,239**	**$7,910**	**$7,765**	**$7,919**	**$4,257**	

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	D
Sales:												
Turbine	$56,400	$56,400	$56,400	$56,400	$56,400	$56,400	$56,400	$56,400	$56,400	$56,400	$56,400	$
Total Sales	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$**
Material Cost	$35,753	$35,753	$35,753	$35,753	$35,753	$35,753	$35,753	$35,753	$35,753	$35,753	$35,753	$
Cost of Goods Sold	**$35,753**	**$35,753**	**$35,753**	**$35,753**	**$35,753**	**$35,753**	**$35,753**	**$35,753**	**$35,753**	**$35,753**	**$35,753**	**$**
Gross Margin	**$20,647**	**$20,647**	**$20,647**	**$20,647**	**$20,647**	**$20,647**	**$20,647**	**$20,647**	**$20,647**	**$20,647**	**$20,647**	**$**
Percent	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%	36.61%	3
Operating Expenses												
Accounting	$0	$0	$0	$300	$0	$0	$0	$0	$0	$0	$0	
Advertising	$1,889	$1,889	$1,889	$5,000	$1,889	$1,889	$7,000	$1,889	$1,889	$1,889	$5,000	
Insurance	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	
Legal Professional	$167	$167	$167	$167	$167	$167	$167	$167	$167	$167	$167	
Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$150	$0	$0	
Office Supplies	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	
Rent	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	
Telephone	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140	
Utilities	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85	
Website	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	
Other	$510	$510	$510	$510	$510	$510	$510	$510	$510	$510	$510	
Loan Interest Expense	$578	$573	$569	$564	$559	$555	$550	$545	$540	$535	$530	
Miscellaneous Expense	$2,820	$2,820	$2,820	$2,820	$2,820	$2,820	$2,820	$2,820	$2,820	$2,820	$2,820	
Total Operating Expenses	**$9,477**	**$9,472**	**$9,468**	**$12,874**	**$9,458**	**$9,454**	**$14,560**	**$9,444**	**$9,589**	**$9,434**	**$12,540**	
Net Profit	**$11,170**	**$11,175**	**$11,179**	**$7,773**	**$11,189**	**$11,194**	**$6,087**	**$11,203**	**$11,058**	**$11,213**	**$8,107**	**$**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Y
Cash Balance	$125,330	$124,235	$110,874	$113,307	$109,466	$105,625	$101,934	$96,159	$90,385	$86,694	$82,928	$79,162	
Cash Receipts													
Product Sales	$0	$0	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000	$
Loans													
Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Cash Receipts	**$0**	**$0**	**$24,000**	**$24,000**	**$24,000**	**$24,000**	**$24,000**	**$24,000**	**$24,000**	**$24,000**	**$24,000**	**$24,000**	**$**
Cash Disbursements													
Material and Labor Costs	$0	$0	$7,607	$15,214	$15,214	$15,214	$15,214	$15,214	$15,214	$15,214	$15,214	$15,214	$
Accounting	$0	$0	$0	$150	$150	$0	$0	$0	$0	$0	$0	$0	
Advertising	$417	$2,917	$2,917	$833	$833	$833	$2,917	$2,917	$833	$833	$833	$833	
Insurance	$250	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	
Legal Professional	$84	$167	$167	$167	$167	$167	$167	$167	$167	$167	$167	$167	
Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$75	$75	$0	
Office Supplies	$15	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	
Rent	$1,375	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	
Telephone	$70	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140	
Utilities	$43	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85	
Website	$4	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	
Other	$255	$510	$510	$510	$510	$510	$510	$510	$510	$510	$510	$510	
Loan Interest Expense	$683	$678	$674	$670	$666	$662	$658	$653	$649	$645	$641	$636	
Loan Principal Expense	$780	$785	$789	$793	$797	$801	$805	$810	$814	$818	$822	$827	
Owner Salaries	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	
Miscellaneous	$0	$0	$600	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	
Change in Inventory	$7,670	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Cash Disbursements	**$1,095**	**$13,360**	**$21,567**	**$27,841**	**$27,841**	**$27,691**	**$29,774**	**$29,774**	**$27,691**	**$27,766**	**$27,766**	**$27,691**	**$**
Net Cash Flow	**($1,095)**	**($13,360)**	**$2,433**	**($3,841)**	**($3,841)**	**($3,691)**	**($5,774)**	**($5,774)**	**($3,691)**	**($3,766)**	**($3,766)**	**($3,691)**	**(**
Cumulative Cash Flow	**($1,095)**	**($14,456)**	**($12,023)**	**($15,864)**	**($19,705)**	**($23,396)**	**($29,171)**	**($34,945)**	**($38,636)**	**($42,402)**	**($46,168)**	**($49,859)**	**(**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Year 2**
Cash Balance	$75,471	$104,954	$107,212	$107,635	$107,909	$110,016	$112,273	$112,697	$113,121	$115,303	$117,485	$117,909	**$117,**
Cash Receipts													
Product Sales	$44,400	$44,400	$44,400	$44,400	$44,400	$44,400	$44,400	$44,400	$44,400	$44,400	$44,400	$44,400	**$532,**
Loans	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Investment	$20,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$20,**
Total Cash Receipts	**$64,400**	**$44,400**	**$44,400**	**$44,400**	**$44,400**	**$44,400**	**$44,400**	**$44,400**	**$44,400**	**$44,400**	**$44,400**	**$44,400**	**$552,**
Cash Disbursements													
Material Costs	$21,680	$28,146	$28,146	$28,146	$28,146	$28,146	$28,146	$28,146	$28,146	$28,146	$28,146	$28,146	**$331,**
Accounting	$0	$0	$0	$150	$150	$0	$0	$0	$0	$0	$0	$0	**$**
Advertising	$1,083	$1,333	$3,167	$3,167	$1,333	$1,333	$3,167	$3,167	$1,333	$1,333	$3,167	$3,167	**$26,**
Insurance	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	**$6,**
Legal Professional	$167	$167	$167	$167	$167	$167	$167	$167	$167	$167	$167	$167	**$2,**
Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$75	$75	$0	$0	**$**
Office Supplies	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	**$**
Rent	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	**$33,**
Telephone	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140	**$1,**
Utilities	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85	**$1,**
Website	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	
Other	$510	$510	$510	$510	$510	$510	$510	$510	$510	$510	$510	$510	**$6,**
Loan Interest Expense	$632	$628	$623	$619	$614	$610	$605	$601	$596	$592	$587	$583	**$7,**
Loan Principal Expense	$831	$835	$840	$844	$849	$853	$858	$862	$867	$871	$876	$880	**$10,**
Owner Salaries	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	**$57,**
Miscellaneous	$1,710	$2,220	$2,220	$2,220	$2,220	$2,220	$2,220	$2,220	$2,220	$2,220	$2,220	$2,220	**$26,**
Change in Inventory	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Cash Disbursements	**$34,917**	**$42,143**	**$43,976**	**$44,126**	**$42,293**	**$42,143**	**$43,976**	**$43,976**	**$42,218**	**$42,218**	**$43,976**	**$43,976**	**$509,**
Net Cash Flow	**$29,483**	**$2,257**	**$424**	**$274**	**$2,107**	**$2,257**	**$424**	**$424**	**$2,182**	**$2,182**	**$424**	**$424**	**$42,**
Cumulative Cash Flow	**$29,483**	**$31,740**	**$32,164**	**$32,438**	**$34,545**	**$36,802**	**$37,226**	**$37,649**	**$39,831**	**$42,014**	**$42,437**	**$42,861**	**$42,**

Months	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Assets:												
Current Assets:												
Cash	$125,330	$124,235	$110,874	$113,205	$109,364	$105,523	$101,832	$96,058	$90,284	$86,593	$82,827	$79,06
Accounts Receivable	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$(
Inventory	$7,670	$0	$0	$3,043	$3,043	$3,043	$3,043	$3,043	$3,043	$3,043	$3,043	$3,04
Total Current Assets	$133,000	$124,235	$110,874	$116,248	$112,407	$108,566	$104,875	$99,101	$93,326	$89,636	$85,870	$82,10
Total Fixed Assets Net	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$(
Total Assets	**$133,000**	**$124,235**	**$110,874**	**$116,248**	**$112,407**	**$108,566**	**$104,875**	**$99,101**	**$93,326**	**$89,636**	**$85,870**	**$82,10**
Liabilities and Equity												
Accounts Payable	$0	$2,512	$4,595	$10,719	$10,869	$10,719	$10,719	$12,802	$10,719	$10,719	$10,794	$10,71
Total Current Liabilities	$0	$2,512	$4,595	$10,719	$10,869	$10,719	$10,719	$12,802	$10,719	$10,719	$10,794	$10,71
Long-Term Liabilities:												
Ben Franklin Technology Partners	$130,000	$129,220	$128,435	$127,646	$126,854	$126,057	$125,256	$124,450	$123,641	$122,827	$122,009	$121,18
Total Long-Term Liabilities	$130,000	$129,220	$128,435	$127,646	$126,854	$126,057	$125,256	$124,450	$123,641	$122,827	$122,009	$121,18
Total Liabilities	**$130,000**	**$131,731**	**$133,030**	**$138,365**	**$137,722**	**$136,775**	**$135,974**	**$137,252**	**$134,359**	**$133,545**	**$132,802**	**$131,90**
Paid in Capital	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,00
Owner Withdrawal	$0	$4,791	$9,582	$14,373	$19,164	$23,955	$28,746	$33,537	$38,328	$43,119	$47,910	$52,70
Total Equity	**$3,000**	**($7,497)**	**($22,156)**	**($25,058)**	**($28,256)**	**($31,150)**	**($34,040)**	**($41,093)**	**($43,974)**	**($46,851)**	**($49,874)**	**($52,743**
Total Liabilities and Equity	**$133,000**	**$124,235**	**$110,874**	**$113,307**	**$109,466**	**$105,625**	**$101,934**	**$96,159**	**$90,385**	**$86,694**	**$82,928**	**$79,16**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Year**
Cash Balance	$118,332	$128,208	$133,702	$139,196	$142,985	$146,774	$152,268	$155,207	$158,145	$163,564	$168,984	$172,922	**$172**
Cash Receipts													
Product Sales	$56,400	$56,400	$56,400	$56,400	$56,400	$56,400	$56,400	$56,400	$56,400	$56,400	$56,400	$56,400	**$676**
Total Cash Receipts	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$56,400**	**$676**
Cash Disbursements													
Material and Labor Costs	$31,949	$35,753	$35,753	$35,753	$35,753	$35,753	$35,753	$35,753	$35,753	$35,753	$35,753	$35,753	**$425**
Accounting	$0	$0	$0	$150	$150	$0	$0	$0	$0	$0	$0	$0	**$**
Advertising	$1,611	$1,889	$1,889	$3,445	$3,445	$1,889	$4,445	$4,445	$1,889	$1,889	$3,445	$3,445	**$33**
Insurance	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	**$6**
Legal Professional	$167	$167	$167	$167	$167	$167	$167	$167	$167	$167	$167	$167	**$2**
Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$75	$75	$0	$0	**$**
Office Supplies	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	**$**
Rent	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	**$33**
Telephone	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140	**$1**
Utilities	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85	$85	**$1**
Website	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	
Other	$510	$510	$510	$510	$510	$510	$510	$510	$510	$510	$510	$510	**$6**
Loan Interest Expense	$578	$573	$569	$564	$559	$555	$550	$545	$540	$535	$530	$526	**$6**
Loan Principal Expense	$885	$890	$894	$899	$904	$908	$913	$918	$923	$928	$933	$937	**$10**
Owner Salaries	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	$4,791	**$57**
Miscellaneous	$2,520	$2,820	$2,820	$2,820	$2,820	$2,820	$2,820	$2,820	$2,820	$2,820	$2,820	$2,820	**$33**
Change in Inventory	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Cash Disbursements	**$46,524**	**$50,906**	**$50,906**	**$52,611**	**$52,611**	**$50,906**	**$53,461**	**$53,461**	**$50,981**	**$50,981**	**$52,461**	**$52,461**	**$618**
Net Cash Flow	**$9,876**	**$5,494**	**$5,494**	**$3,789**	**$3,789**	**$5,494**	**$2,939**	**$2,939**	**$5,419**	**$5,419**	**$3,939**	**$3,939**	**$58**
Cumulative Cash Flow	**$9,876**	**$15,370**	**$20,864**	**$24,653**	**$28,441**	**$33,936**	**$36,874**	**$39,813**	**$45,232**	**$50,651**	**$54,590**	**$58,529**	**$58**

Months	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Assets:												
Current Assets:												
Cash	$125,330	$124,235	$110,874	$113,307	$109,466	$105,625	$101,934	$96,159	$90,385	$86,694	$82,928	$7
Accounts Receivable	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Inventory	$7,670	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Current Assets	$133,000	$124,235	$110,874	$113,307	$109,466	$105,625	$101,934	$96,159	$90,385	$86,694	$82,928	$7
Fixed Assets:												
Accumulated Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Fixed Assets Net	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Assets	**$133,000**	**$124,235**	**$110,874**	**$113,307**	**$109,466**	**$105,625**	**$101,934**	**$96,159**	**$90,385**	**$86,694**	**$82,928**	**$7**
Liabilities and Equity												
Accounts Payable	$0	$2,512	$4,595	$10,719	$10,869	$10,719	$10,719	$12,802	$10,719	$10,719	$10,794	$1
Total Current Liabilities	$0	$2,512	$4,595	$10,719	$10,869	$10,719	$10,719	$12,802	$10,719	$10,719	$10,794	$1
Long-Term Liabilities:												
Ben Franklin Technology Partners	$130,000	$129,220	$128,435	$127,646	$126,854	$126,057	$125,256	$124,450	$123,641	$122,827	$122,009	$12
Total Long-Term Liabilities	$130,000	$129,220	$128,435	$127,646	$126,854	$126,057	$125,256	$124,450	$123,641	$122,827	$122,009	$12
Total Liabilities	**$130,000**	**$131,731**	**$133,030**	**$138,365**	**$137,722**	**$136,775**	**$135,974**	**$137,252**	**$134,359**	**$133,545**	**$132,802**	**$13**
Paid in Capital	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$3
Owner Draw	$0	$4,791	$9,582	$14,373	$19,164	$23,955	$28,746	$33,537	$38,328	$43,119	$47,910	$5
Total Equity	**$3,000**	**($7,497)**	**($22,156)**	**($25,058)**	**($28,256)**	**($31,150)**	**($34,040)**	**($41,093)**	**($43,974)**	**($46,851)**	**($49,874)**	**($52**
Total Liabilities and Equity	**$133,000**	**$124,235**	**$110,874**	**$113,307**	**$109,466**	**$105,625**	**$101,934**	**$96,159**	**$90,385**	**$86,694**	**$82,928**	**$7**

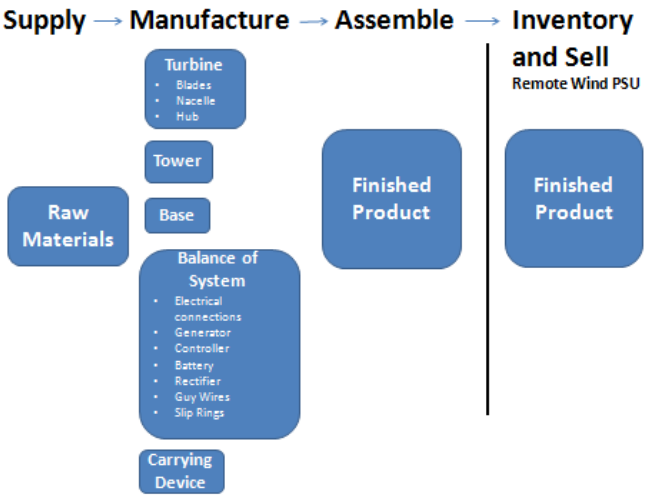
Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov
Assets:											
Current Assets:											
Cash	$104,954	$107,212	$107,635	$107,909	$110,016	$112,273	$112,697	$113,121	$115,303	$117,485	$117,
Inventory	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Current Assets	$104,954	$107,212	$107,635	$107,909	$110,016	$112,273	$112,697	$113,121	$115,303	$117,485	$117,
Fixed Assets:											
Accumulated Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Fixed Assets Net	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Assets	**$104,954**	**$107,212**	**$107,635**	**$107,909**	**$110,016**	**$112,273**	**$112,697**	**$113,121**	**$115,303**	**$117,485**	**$117,**
Liabilities and Equity											
Current Liabilities:											
Accounts Payable	$17,944	$17,944	$19,778	$18,094	$17,944	$17,944	$19,778	$17,944	$18,019	$17,944	$19,
Total Current Liabilities	$17,944	$17,944	$19,778	$18,094	$17,944	$17,944	$19,778	$17,944	$18,019	$17,944	$19,
Long-Term Liabilities:											
Ben Franklin Technology Partners	$119,529	$118,693	$117,853	$117,009	$116,161	$115,307	$114,450	$113,588	$112,721	$111,850	$110,
Total Long-Term Liabilities	$119,529	$118,693	$117,853	$117,009	$116,161	$115,307	$114,450	$113,588	$112,721	$111,850	$110,
Total Liabilities	**$137,473**	**$136,638**	**$137,631**	**$135,104**	**$134,105**	**$133,252**	**$134,228**	**$131,532**	**$130,741**	**$129,795**	**$130,**
Paid in Capital	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,
Additional Equity Injections	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,
Owner Draw	$62,283	$67,074	$71,865	$76,656	$81,447	$86,238	$91,029	$95,820	$100,611	$105,402	$110,
Total Equity	**($32,519)**	**($29,426)**	**($29,996)**	**($27,195)**	**($24,089)**	**($20,979)**	**($21,531)**	**($18,412)**	**($15,438)**	**($12,310)**	**($12,8**
Total Liabilities and Equity	**$104,954**	**$107,212**	**$107,635**	**$107,909**	**$110,016**	**$112,273**	**$112,697**	**$113,121**	**$115,303**	**$117,485**	**$117,**

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Assets:												
Current Assets:												
Cash	$128,208	$133,702	$139,196	$142,985	$146,774	$152,268	$155,207	$158,145	$163,564	$168,984	$172,922	$176,861
Accounts Receivable	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inventory	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Current Assets	$128,208	$133,702	$139,196	$142,985	$146,774	$152,268	$155,207	$158,145	$163,564	$168,984	$172,922	$176,861
Fixed Assets:												
Accumulated Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Fixed Assets Net	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Assets	**$128,208**	**$133,702**	**$139,196**	**$142,985**	**$146,774**	**$152,268**	**$155,207**	**$158,145**	**$163,564**	**$168,984**	**$172,922**	**$176,861**
Liabilities and Equity												
Current Liabilities:												
Accounts Payable	$22,326	$22,326	$22,326	$24,031	$22,326	$22,326	$24,881	$22,326	$22,401	$22,326	$23,881	$22,326
Total Current Liabilities	$22,326	$22,326	$22,326	$24,031	$22,326	$22,326	$24,881	$22,326	$22,401	$22,326	$23,881	$22,326
Long-Term Liabilities:												
Ben Franklin Technology Partners	$109,209	$108,320	$107,425	$106,526	$105,623	$104,714	$103,801	$102,883	$101,960	$101,033	$100,100	$99,163
Total Long-Term Liabilities	$109,209	$108,320	$107,425	$106,526	$105,623	$104,714	$103,801	$102,883	$101,960	$101,033	$100,100	$99,163
Total Liabilities	**$131,535**	**$130,646**	**$129,751**	**$130,558**	**$127,949**	**$127,040**	**$128,683**	**$125,209**	**$124,361**	**$123,359**	**$123,982**	**$121,489**
Paid in Capital	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000
Additional Equity Injections	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000
Owner Draw	$119,775	$124,566	$129,357	$134,148	$138,939	$143,730	$148,521	$153,312	$158,103	$162,894	$167,685	$172,476
Total Equity	**($3,327)**	**$3,057**	**$9,445**	**$12,427**	**$18,825**	**$25,228**	**$26,524**	**$32,936**	**$39,203**	**$45,625**	**$48,941**	**$55,372**
Total Liabilities and Equity	**$128,208**	**$133,702**	**$139,196**	**$142,985**	**$146,774**	**$152,268**	**$155,207**	**$158,145**	**$163,564**	**$168,984**	**$172,922**	**$176,861**

	Year 1	Year 2	Year 3
Sales			
Turbine	$240,000	$532,800	$676,800
Total Sales	$240,000	$532,800	$676,800
Material Cost	$152,140	$337,751	$429,035
Labor Cost	$0	$0	$0
Cost of Goods Sold	$152,140	$337,751	$429,035
Operating Expenses			
Accounting	$300	$300	$300
Advertising	$18,330	$26,997	$34,001
Insurance	$6,000	$6,000	$6,000
Legal Professional	$2,004	$2,004	$2,004
Licenses	$0	$0	$0
Maintenance	$150	$150	$150
Meals Entertainment	$0	$0	$0
Office Supplies	$360	$360	$360
Property Tax	$0	$0	$0
Rent	$33,000	$33,000	$33,000
Telephone	$1,680	$1,680	$1,680
Travel	$0	$0	$0
Utilities	$1,020	$1,020	$1,020
Website	$96	$96	$96
Other	$6,120	$6,120	$6,120
Salaries	$0	$0	$0
Loan Interest Expense	$7,915	$7,290	$6,624
Miscellaneous Expense	$12,000	$26,640	$33,840
Total Operating Expenses	$88,975	$111,657	$125,195
Net Profit	($1,115)	$83,393	$122,570
Income Tax	$0	$0	$0
Net Income	($1,115)	$83,393	$122,570
NPV	163,813		

Appendix 7: Supply Chain Details

Suppliers were analyzed based on prices of components and company values and methods. Figure ..shows the expected supply chain.



Appendix 8: Risk Management and Mitigation Plan

Remote Wind PSU acknowledges the risks incurred by start-up companies and has formed a mitigation plan to address the most pertinent risks. Remote Wind PSU acknowledges the risks incurred by start-up companies and has formed a mitigation plan to address the most pertinent risks: supply chain, sales, cash flow, supply chain, technology, and legal risks.

Since the supply chain is a crucial part of production, it is necessary to evaluate potential risks associated with the supply chain and develop a risk mitigation plan. According to Talluri, Kull, Yildiz, & Yoon (2013), there are three general risk categories associated with supply chains: delay, disruption, and distortion. Delay is a frequently occurring, short term risk related to schedule variations for transportation and production. Disruption is a break in the supply chain due to unavailability of materials, production, transportation, or holding space. Distortion occurs when received orders do not match expectations or estimations of needs such as size or quality of the order (Talluri et al., 2013).

Using the groupings of risks found in Talluri et al., (2013), potential risks that can occur during each phase of the supply chain will be examined and risk strategies developed to mitigate impacts. There are two main strategies for risk mitigation: redundancy and flexibility. Redundancy strategies rely on procuring backup supplies, suppliers, and finished products in the event that problems arise. Flexibility strategies involve increasing a company's ability to perform functions that will allow the finished product to reach the customer even if another link in the chain is primarily responsible for those activities (Talluri et al., 2013). Given the nature of the selected market and the infancy of the company, flexibility may not be a viable option in many cases so we focus on redundancy strategies to reduce risk exposure. Before delving into the categories of risk, allow me to note that the first phase of the supply chain is the transportation of raw materials to the manufacturers. The second phase involves the manufacturing of components and their delivery to the assembly facility. In the third stage, the components are assembled and packaged and then shipped to customers or placed in inventory.

Delays that can occur during the first phase between the raw materials supplier and the manufacturer are centered on delayed delivery of materials due to weather, accessibility of materials, or transportation issues. This initial delay can cause a delay in the remaining two legs of the chain. Obviously, late delivery to customers may lead to loss of business and a negative reputation. In a market that is based on natural disaster relief, time and reliability are crucial. Ideally, the wind turbines will be ordered in advance of natural disasters, but this may not always be the case.

The short-term nature of delay risks, meaning that the time between the realization of the problem and the time by which a solution must be found is short, indicates that it may be best solved through contracts and inventory accruement. Once a delay is realized, it may be too late to outsource the job to a secondary supplier even if the secondary supplier has already been thoroughly researched and chosen. Including additional incentives for on-time deliveries in a supplier contract could increase reliability of services. Also, increasing inventory stocks at the assembly facility can increase flexibility and reduce risks of late delivery to customers.

Disruption can occur if raw materials are unavailable or if their prices fluctuate greatly. For example, the magnet in the generator has volatile pricing. Manufacturers can take financial steps to secure materials for production such as purchasing futures at certain prices to hedge against potential increases in prices. The company assembling the parts may choose to use secondary suppliers to reduce the burden on primary suppliers if they are not able to accumulate enough of the materials. This risk can be mitigated through use of secondary suppliers to reduce burden on primary suppliers. Additionally, the manufacturers can increase inventory levels of certain goods.

Third, distortion can be caused by unforeseen changes in demand by customers. In this category, for the assembly facility stockpiling supplies and the assembled wind turbines is the best strategy. However, if demand is too low, how can this risk be mitigated? One method to address this risk is to ensure that a certain percentage of the turbines is already accounted for by customers when ordering

supplies. The manufacturers can take on the same strategy. Additionally, previous sales data and projections of sales can be utilized.

Revenue

First, initial sales may be too slow or there may not be enough growth. The sales campaign may be insufficient or ineffective. In this case, marketing activities must be increased and sales consultant must be sought out for advice. Second, contractor costs may be higher than expected or the quality of work is substandard. To address this problem, Remote Wind PSU will employ its secondary suppliers. Third, rent for a storage facility may be higher than expected. In this case, rent can be negotiated or a new facility can be found.

If cash reserves are depleted, then the company, owners can sell equity for ownership in the company, but owners will retain the majority hold in the company. Additionally, a line of credit can be established to obtain components from manufacturers.

Legal risks

In order to mitigate risks associated with legal issues we conducted research into areas of risk for selling small scale turbines including liability, safety, warranty and patents. Liability and safety risks include:

- Fire caused either by a malfunction or as a result of a lightning strike
- Physical injuries caused from turbine malfunction
- Property damages or damages caused by attempted or successful theft and burglary
- Potential for slip trip and falls associated with the turbine including the location of guy wires, etc.

Warranty policies provide coverage for product defects that lead to losses. These policies typically offer coverage for five years with a “toolbox” approach:

- product defect
- serial defect
- noise
- power curve and availability
- parts and labor “backstop”
- self-insured retention/deductible buy-down options
- warranty and loss control

When a wind turbine warranty expires, the operator can either assume responsibility for 100% of the costs and losses resulting from warranty-related incidents. In other words, paying out-of-pocket for costs to secure the effected turbine, obtain and ship replacement parts, hire and transport the repair equipment, provide the labor for repairs, and assume lost income and production tax credits. Or rely on the property insurance to cover costs, but this does not provide warranty coverage.

This resulted in developing a risk mitigation plan to combat these risks and alleviate their potential harm. This plan involves:

- Not relying on a standard property policy (fire and storm) for coverage.
- Considering fire prevention measures such as a fire-suppression system to reduce the premium.
- Secure and lock any exposed wires and adjustors to lessen risk of tripping and prevent any possible theft.
- Fit surge arrestors to electrical components to lessen risk of lightning strike damage
- Restricted access to wind turbine to lessen risk of injury.

- Regular maintenance of equipment to lessen chance of malfunctions.

We conclude that this plan will be sufficient in alleviating any legal risks we may face and providing an efficient product for consumers.

Technical Risk

Technical risk is associated with the knowledge base and its technical aspects including understanding and reproducibility. To perform a technical risk assessment, the following factors must be considered:

I. Establish the 'context of use';
II. Identify the system boundary;
III. Identify the key subsystems for each option;
IV. Evaluate the maturity of the technology;
V. Identify a set of candidate technical risks for the project;
VI. Identify possible risk mitigation strategies;

I. Establish a 'context of use'

The Remote Wind PSU is a micro-wind turbine that will provide a user with up to 500 Wh of energy per charge in a disaster situation. With its light weight and transportable design, the Remote Wind PSU is quickly dispatchable and easily stored. In an event where conventional power is not an option, the Remote Wind PSU is a reliable alternative.

II. Identify the system boundary

All material inputs of the system are contained within the system until the product has reached the end of its use (estimated 15 years). This means that there is not fuel required for the system to run and the product does not generate any type of waste. That which enters and exits the system is energy. The turbine harnesses kinetic energy in the wind, converts it into mechanical energy in the generator, which is then converted into electrical energy. The

energy is then stored within the battery and can be drawn by connecting an electronic device (e.g. laptop, light source, or cell phone) through the outlet.

III. Key Subsystems

The subsystems within the product are the turbine, the control electronics, and the battery.

a. The turbine is comprised of the turbine blades that are turned by the wind, the hub which is turned by the blades and the generator that is turned by the hub.
b. The control electronics ensure a constant voltage into the battery due to the inconsistent speed in the wind.
c. The battery stores the electricity generated by the turbine so that the turbine can generate electricity when it isn't being used.

IV. Maturity of Technology

Micro-wind energy conversion has been confidently used for long enough that it is a proven technology. Currently, micro-generation is considered an open source technology due to its scalability and simplicity.

V. Technical Risks

The risks of this product can be identified based on the subsystems referenced in Section III. An advantage of the modular design of the Remote Wind PSU is that most of the components are easily detached. This ensures that in the event of a broken component, it can be easily replaced.

VI. Risk Mitigation

The solution to this risk has three parts:

1. To reduce the risk of a component being damaged, the components are inherently designed to withstand windy conditions. Also, to reduce the risk of damage while travel, the case is designed to reduce contact between the components as well as protect the components from stressed outside of the case.

2. To reduce the likelihood of product failure, the turbines are assembled and tested in stability, durability, and electrical output before being shipped to the customer.
3. If the product was to fail from use by the customer, the customer has the opportunity to send the product back and refurbished.

Appendix 8: Economic Incentive Programs and Funding Methods

In order to supplement initial investments, Remote Wind PSU will take advantage of loan and economic incentive programs to facilitate growth. First, Remote Wind PSU plans to locate its office and storage facility in Philipsburg, Pennsylvnia so it can apply for the Keystone Innovation Network program. The Keystone Innovation Network program provides grants in the form of tax breaks as well as tax credits to small businesses. Additionally, Remote Wind PSU plans to acquire debt financing. Remote Wind PSU will apply for a $130,000 loan from Ben Franklin Technology Partners during the first year of production. During the beginning of the second year of production Remote Wind PSU will look for equity financing from angel investors.

Appendix 9: Triple Bottom Line Evaluation

Remote Wind PSU keeps the three points of the triple bottom line in mind while conducting business: economic, social, and environmental. First, we are a business and as such we aim to generate cash for survival and growth through keeping costs low and holding a small price margin. Second, we aim to please our customers by helping them aid those in need during power outages and by promoting the use of renewable energy. Third, during the design process we kept the environment in mind and have used recyclable materials so customers can easily. Remote Wind PSU also evaluated our manufacturing and assembly partners to be sure that they socially and environmentally responsible. Our methods of evaluation follow.

Before entering a contract with a supplier, thorough research must be conducting on the supplier and their practices. While low prices are important for start-up companies, reliability is necessary. Limiting potential suppliers to those who meet International Standard of Organization (ISO) 9001: 2008 standards is a first step to ensuring suppliers offer reliable services and quality products. ISO 9001: 2008 offers quality management standards that follow eight basic principles: customer focus, leadership, involvement of people, process approach, system approach to management, continual improvement, factual approach to decision making, and mutually beneficial supplier relationships. Another standard that can be utilized is the Global Reporting Initiative (GRI) rating system which focuses on triple bottom line rating. The GRI helps governments understand what companies within their jurisdictions are doing with regard to their environmental and social impacts. Reporting guidelines are generated through input of various sectors such as business, labor, accounting, investors, governments, and sustainability reporting practicitioners. Through the use of GRI, company contributions to sustainability are obvious. This creates a sense of transparency and accountability for analyzed companies.

Companies evaluate their sustainability according to guidelines that inspect economic, social, and environmental impacts of business actions. There are many aspects which an organization must be

judged based mainly on material aspects, specifically considering the economic, environmental, and social impacts of the organization. When it comes to economic aspects, one must consider economic performance, market presence, indirect economic impacts, and procurement practices. Environmental impacts take into account materials used, energy, water, biodiversity, emissions, effluents and waste, products and services, compliance, transport, overall, supplier environmental assessment, and environmental grievance mechanisms. There are a few subcategories for social aspects, including labor practices and decent work (employment, labor relations, occupational health and safety, training, education, diversity); human rights (investment, non-discrimination, freedom of association and collective bargaining, child labor, security practices, assessment); society (local communities, anti-corruption, public policy, anti-competitive behavior, compliance); and product responsibility (customer health and safety, product and service labeling, marketing, customer privacy, compliance). By using these guidelines and rating system, Remote Wind PSU can ensure that contracts are entered with reliable suppliers.

Appendix 10: “How to” Documents (How to assemble, expectations of use pamphlet)

Turbine Assembly Instructions

Part 1. Attaching the Blades to the Nacelle

Step 1. Remove the nacelle and blades from the container

Step 2. Remove the hub cover from the nacelle

Step 3. Attach blades to the hub by inserting the blade root into the hub port

Step 4. Tighten the center faceplate bolt using an allen wrench

Step 5. Set the assembled piece aside

Part 2. Attaching the turbine tower to the nacelle & raising the tower

Step 1. Remove guy wires, collar, and safety pins from container

Step 2. Grab the top turbine tower section. Pull up and raise the top section until

it cannot extend anymore. Insert the safety pin into the slot.

Step 3. Slide the collar over the top section of the tower. It will rest just above the

joint of the first and second section. Insert the collar screw and tighten.

Step 4. Attach guy wire carabineers to the collar hooks

Step 5. Let the guy wires hang outside of the container.

Step 6. Unravel the power cord from the nacelle

Step 7. Attach the nacelle to the top tower section by inserting the base of the

nacelle onto the top tower segment. Insert supplied screws into screw holes and

tighten.

Step 8. Leave power cord hanging inside the container.

Step 9. Repeat Step 2 for the remaining sections of the tower.

**Once the tower is fully raised, two people will be needed to complete the installation

Part 3. Stabilizing the tower

Step 1. Attach the remaining three carabineers to the stake hooks

Step 2. Attach the ground ends of the guy wires to the carabineers on each of the stakes.

Step 3. With at least two people assisting with this task, insert the stakes into the ground so the guy wires make a 45 degree angle (measure ~10 feet from the edge of the container) with the ground. If possible, all three stakes should be inserted at the same time.

Step 4. Insert the power cord plug to the port inside the container.

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