Eco-Entrepreneurship Project by: Danial Hannigan, Prajwal Manohar Kumar, Christopher Uraine

Portable, whole-home solar solutions for the energy impoverished

**Customer Problem**

Providing access to electricity for the world’s 1.3 billion people living without it represents one of the greatest modern challenges of sustainable development. Energy impoverished people living at the bottom of socioeconomic pyramid (BoP) experience extreme hardship and lower quality of life. There is an underserved market of people who are demanding energy in the form of electricity. Industry experts, organizations, and customers have revealed the following as their core problems:

- They currently use fossil fuels to satiate their energy needs. These fossil fuels are dangerous and produce toxic emissions.
- Their current fuels cannot provide energy for cell phone charging or other appliances.
- Their current fuels are very expensive. They cannot afford clean energy alternatives.

**Environmental Problem**

Individuals living in energy poverty have few alternatives when it comes to energy sources, and they usually end up consuming crude, emission intensive fuels, such as kerosene. Households using liquid fuels and kerosene as their primary energy source contribute 190 million metric tons of Carbon dioxide to the atmosphere each year. Additionally, kerosene's combustion produces many hazardous air pollutants that are strongly linked to respiratory, and heart diseases.

Kerosene lamps emit:

- **Black Carbon**, a pollutant with 700 times more global warming potential than CO₂.
- **Particulate matter (PM)**, and other hazardous air pollutants that impact human health.

**Solo Energy Solution**

Solo Energy provides a portable solution to home power for individuals who rely on expensive, and emission intensive energy sources. The Solo Pack is the company’s first product offering, and is designed to replace the customer’s need for kerosene lighting while providing power for mobile phones or other personal electronics. Solo Energy uses its network of development partners and innovative financing to align the product’s price with the customer’s current expenditures on kerosene fuel.

1. **Solo Energy** provides **Solo Packs**, solar power kits containing PV modules, batteries, controllers, and balance of systems.

2. The **Solo Pack** eliminates the customer’s need to consume expensive, and hazardous liquid fuels to provide light in their homes.

3. **Solo Energy** uses its network of partners to provide Solo Packs at an affordable price.

**Opportunity Analysis**

The energy access market is growing due to the declining cost of PV solar power equipment, and the increased demand for electric lighting and mobile phone charging in less developed nations. These factors increase the viability of new ventures in the market because solutions to the electricity access problem can now be delivered at a price that BoP customers are willing to pay.

**Target Market and Competitive Landscape**

Solo Energy will target its operations towards the 1.5 million Colombians without household access to electricity. Colombia’s physical proximity to the U.S., ease of doing business, and presence of development organizations represents a considerable market opportunity.

Our competitors are primarily focused on offering the most affordable solution possible, often at the expense of performance or quality. The Solo Pack differentiates itself from alternatives by providing a low-cost, powerful solution that meets a customer’s need to light their home and charge personal electronics.

**Solo Energy’s Impact**

Projections of Solo Energy’s sales were made using information gained through interviews with our customers, partners, and market analysis. The direct cost and margin of selling one Solo Pack was determined through a prototype project and contribution margin analysis. Solo Energy’s financial model predicts profitability in year 1, and growth in its gross margin.

**Environmental benefits from projected sales:**

- Reduced CO₂ equivalent emissions: 402 metric tons
- Reduced PM emissions: 333 kg
- Avoided sick time: 314 days

**Pilot Project**

Solo Energy is collaborating with two organizations in Colombia interested in forming development partnerships. These organizations see the value in the Solo Pack and want to conduct feasibility studies and demand assessments. This project will help refine Solo Energy’s business model and product to deliver the greatest value to its customers.

**Environmental Problem**

Citations:

2. 1. Partnership
4. Equivalent
5. International Finance Corporation, the World Bank, 2014

Acknowledgements:

We would like to thank these individuals for their continued support:

- Faculty Advisors: Emily Cotter, Jeff Dozier; Eco-E Project Mentors: Jeff Bruner, Robert Delves; Eco-E Teams: Foodlynx, Slightly Nutty; Eco-E Advisory Council; Student Contributors: Daniel Gold, Spencer Middleton; Friends, family, and wired links.