New Venture Creation Project

Deliverable 1: Problem Validation & Value Proposition

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| **Project Name:** | **Radiant Power** |
| **Code (EMINE23\_XY):** | EMINE23\_03 |
| **Tutor:** | Carol Daunert |

Project Team

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Project Description

(Please provide a clear and concise description of the new venture idea, key aspects of its business model, and an assessment of why it is a good opportunity)

The "Radiant Power" project is a new venture that aims to provide uninterrupted electricity to cellphone towers by harvesting decay heat from decaying nuclear waste, specifically Pu-239, and applying it to a Stirling engine to generate electricity. The Stirling engine is one of the most efficient ways of converting heat energy into mechanical energy, making it ideal for the environment. It is also a simple, reliable, and proven platform, which makes it suitable for remote power generation. The project's business model is based on the safe and efficient management of nuclear waste while providing a reliable and sustainable energy source for critical infrastructure. By repurposing nuclear waste, the project has the potential to reduce environmental impact and increase the lifespan of existing nuclear waste storage facilities. Further development could expand the project’s energy source to include solar energy in addition to heat from nuclear waste, making it even more viable in providing clean energy to many other potential ventures.

Problem/Need and Customer Description (Try to be as specific as possible)

(Describe the problem and the customer that has the problem/need. What is the problem or need? Who has the problem? When does the customer have it? In which circumstances? Why? How painful is not having it solved?)

The problem that the project aims to solve is the need for a reliable and cost-effective power source for cellphone towers in places that often lack access to reliable grid electricity.

In many developing countries, uninterrupted electric power is not available even in major cities. In rural areas, the situation is even worse. But mobile phones are widely used even in the most remote corners of the planet. So, cell phone towers must be operated in these locations regardless of the power availability.

Hence, the project's target customers are the cellphone tower operators who operate towers in these remote places that experience frequent power outages, or even in urban areas that experience power outages during severe weather events or due to lack of available power from the grid.

The implications of such power outages can be significant, resulting in a loss of communication and productivity and even endangerment of lives. The financial implications for the cell phone tower operators can be huge because nowadays, it is very easy to switch a cell phone plan. Whichever provider has the best network coverage will naturally get the most customers, while the other providers with weaker networks will lose customers. And even with an existing customer base, experiencing downtime means foregoing revenue.

Problem Validation (Try to be as specific as possible)

(Which data supports the existence of the problem? How do you know this is a real problem?)

The current energy sources that power cell towers rely heavily on the electric grid. These can be vulnerable to natural disasters, cyber-attacks, and other disruptions, especially in developing countries where the energy sources are not sustainable and renewable. Additionally, in remote locations where the electric grid has yet to be extended, a hybrid solution of diesel generators and solar power with backup batteries is mostly used, which is an expensive drawback because it has to be replaced every 5 years. Do you have specific data from publications or studies about how often a power outage happens in a certain country? Or how many hours/days did the experiment lack connection due to electricity failure? You say that they are using PV panels+battery, do you have data about how many of those installations exist nowadays in the country where you want to develop your business? We need “official” info.

Customer Segment Validation (Try to be as specific as possible)

(Who has the problem? Why do they have the problem? When do they have the problem? How are they (Customer Segment) trying to solve/alleviate the problem now?) You are expected to “observe” your customer experiencing the problem and complete **5 to 10 in-person or Skype interviews/observations.**

Companies that put up the cell towers in developing countries such as AT&T, Erricson, MTN have the problem of unreliable and unsustainable power. A survey conducted has shown that:

1. The diesel generators only provide backup power for 8 hours. They come with a lot of maintenance cost.
2. The problem arises when there are natural disasters or extremely bad weather conditions.
3. The power consumption by the equipments with higher bandwidth is higher. That is the reason why in developing countries the transition is much more difficult.
4. Cell tower companies are planning to put up small modular reactors (SMRs) or other renewable energy sources of energy to power them.

Give us details about this survey. Who answered the questions (gender, age, profession,….)? How many peope answered it? Include the questionnaire.

Solution (Value Proposition) Description (Try to be as specific as possible)

(What is the solution you propose to address the problem? Describe how and why it solves the problem. Why is it better than the competitor’s?)

Our solution, Radiant Power, involves the use of nuclear waste to design a power source that works by harvesting decay heat and converting it to electricity by utilizing Stirling engines and a generator. The primary heat energy source, nuclear waste, is an alpha emitter with a high heat density, which makes it easy to shield and safe to handle. It is also nuclear proliferation proof as it cannot cause fission. The heat source has a lifespan of 80 years and is capable of delivering constant power, eliminating the need for frequent maintenance and replacements, thus improving efficiency and reducing costs. Is it radiation save? Does it need to be treated with special protocols? Are you treating it in a plant that gives electricity to several towers? Is it cost efficient?

Justification (Try to be as specific as possible)

(Justify why your solution addresses the problem correctly and responds to the findings obtained during the problem and customer segment validation.)

Cell towers consume power constantly and it requires uninterrupted electricity. Each tower consumes up to 8kWh of power, although it might not sound that much, there are enough cell towers for the companies to consider building solar farms to cut down the cost of electricity.

Therefore, we suggest using our nuclear power source to power the cell towers in remote locations where power cannot be obtained from the electric grid. Since our technology will be able to provide uninterrupted power for a long time without the need to be refueled, it is ideal for such remote locations.