

re-voΩM+



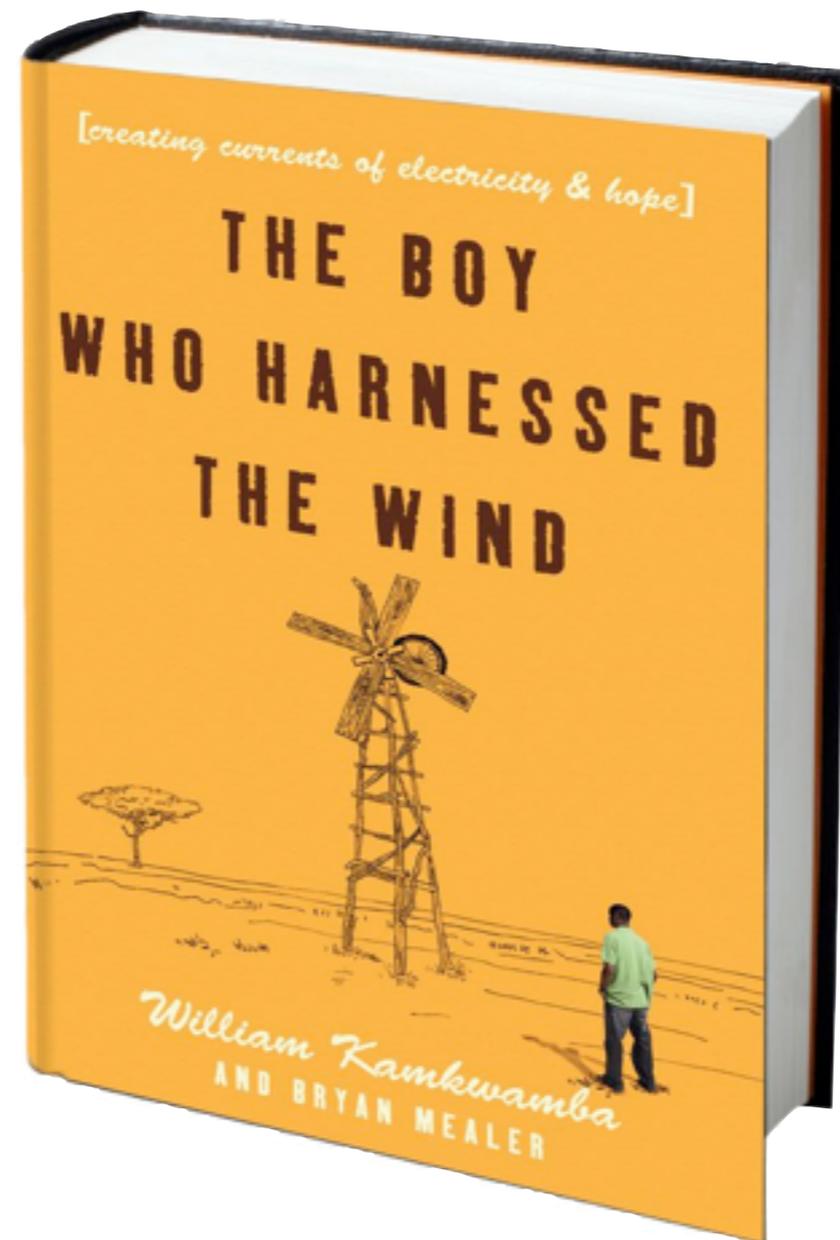
DESIGN. TRANSFORM. SUSTAIN.

# Field Work

- Robot Competition - Yai
- Voltage Wars! - Abdul
- Wired Exhibit - Jerzy
- UMaine Advanced Structures and Composite Center - Nick

# The Boy Who Harnessed the Wind

Samira



# REAL Device

Morton

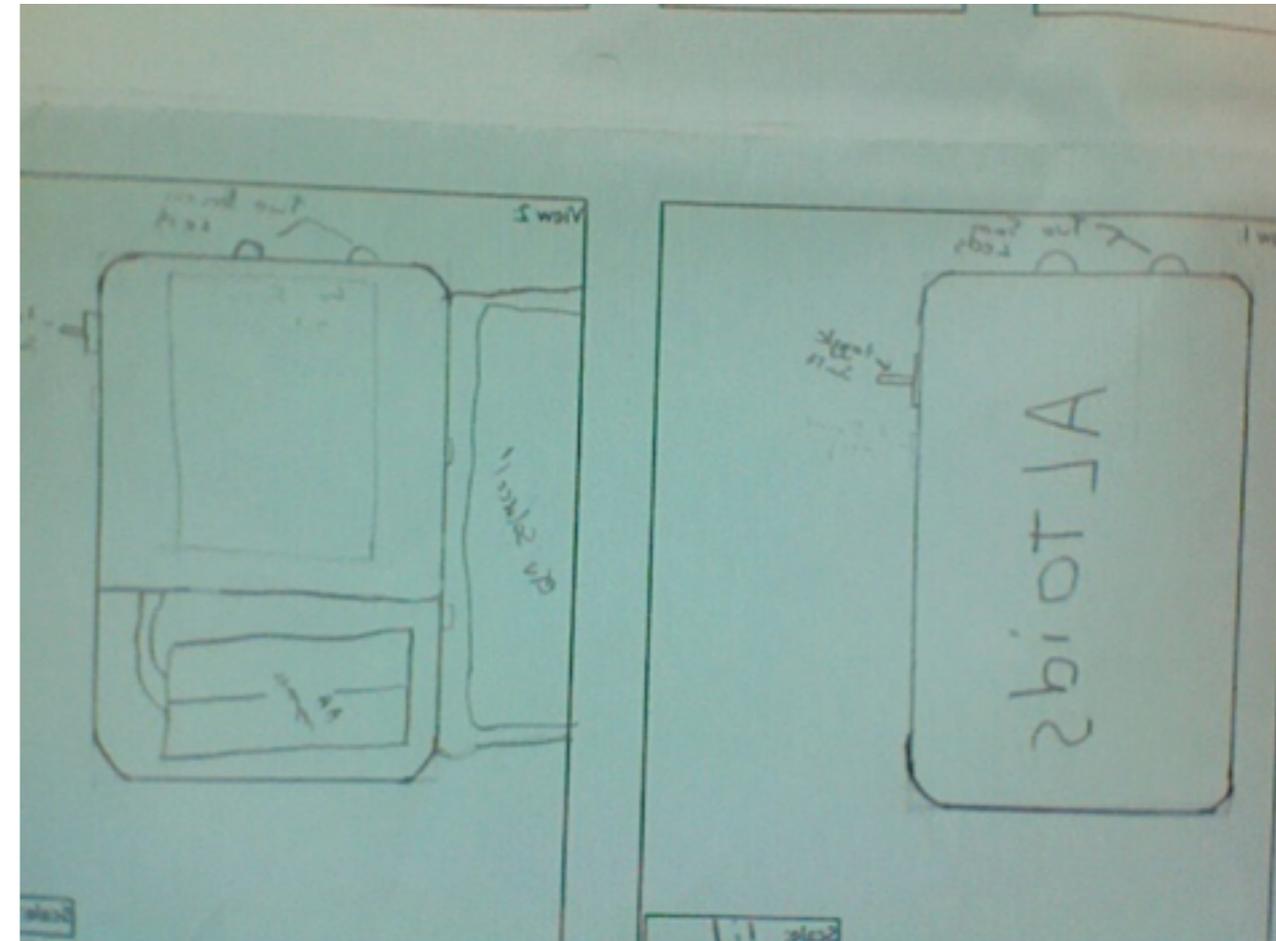
-In science we learned about the energy present in the universe and how energy can be transformed.

-We look at case studies depicting other inventions and the problems they solved.

-We identified a problem we wanted to solve.

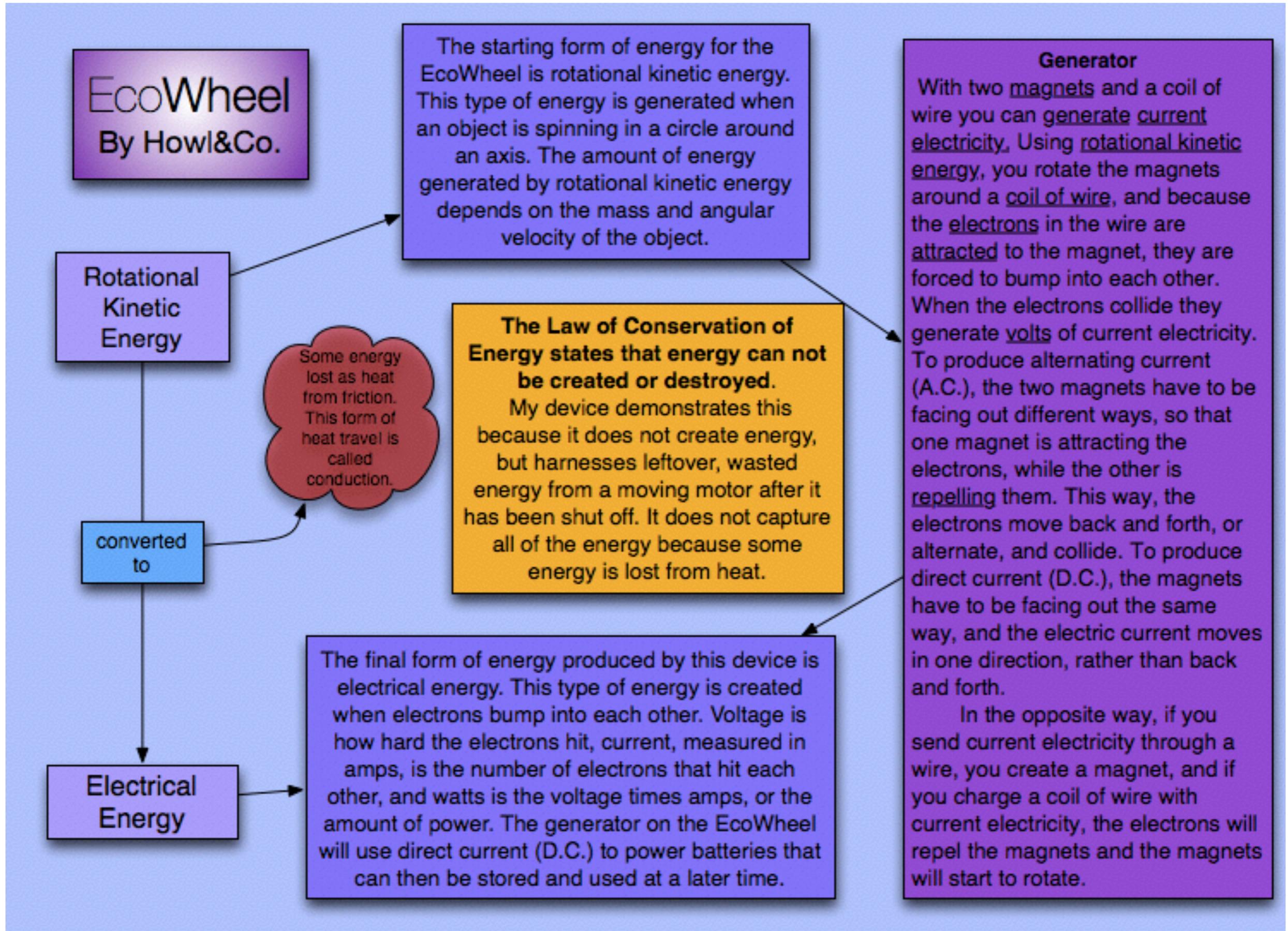
- We then made a rough sketch of our design that would solve our chosen problem.

-In Tech Ed we turned the sketch into a scientific drawing using the computer program SketchUp.





# Flowchart Esme



# Geographic Considerations

Franci

Country- Malawi

Continent- Africa

Problem- Malawi uses 78 cubic meters of water per year, because it is so scarce. In America, we use 1,600 cubic meters of water per year.

In Malawi, there are many waterborne diseases, such as bacterial and protozoal diarrhea, hepatitis A, and typhoid fever.

Malawi only consumes 1/3 as much electricity as America does, and this is because very few people have electricity.

My device would help these issues because no one would have to drink the infected water, and although it does not give people electricity in their homes, it will allow them to have a light.

# Creating Our Shocking Statistics Maggie

1) Write out a proportion comparing the total number of affected people (or items) to the total population (or total number of items.)

$$\text{Ex. } \frac{800,000,000}{7,000,000,000}$$

This represents 800 million people in the world don't have access to clean drinking water.

2) Change your proportion to a percentage. You find this by dividing the numerator by the denominator.

$$\text{Ex. } 800,000,000/7,000,000,000=.1142 \text{ or } 11.4\%$$

3) Take your proportion and create a simplified fraction. You do this by setting up another proportion and cross multiplying.

$$\text{Ex. } \frac{11.4}{100} = \frac{1}{X} \quad \frac{11.4x}{11.4} = \frac{100}{11.4} \quad X = 8.77 \text{ rounded to } 9$$

cross multiply                      divide by both sides by 11.4

1 out of 9 people don't have access to clean drinking water

# kedTALKS

King Engineering and Design

Emma : Rub-A-Dub Scrub!

Luca : **THE SURVIVOR CAN**

Gracie : LightKite

Abass : The Electromagneto

Lilly : Watercycle

*Look familiar?*



It's the. . . .

# Rub-a-Dub Scrub!



Electricity One Scrub at A Time

Generated by Scrubbing Inc. <sup>TM</sup>  
Emma

# The Problem

- Over **3 billion** people, that's **1** in every **2** people, survive with only **\$2.50** for a daily income
- About **2.5 billion** people rely on wood and charcoal for electricity
- 63%** of sub-Saharan Africa is illiterate, which is partially due to lack of light to learn after dark

**How can we change this???**



**Using the wasted rotational kinetic energy from washing dishes, the Rub-a-Dub Scrub is a renewable way to generate electricity to power a light at night.**

# What Are We Doing Wrong?

## Methods:

-For light at night, those 3 billion people without electricity have to burn **kerosene lamps** for light



-**25%** of your electricity bill is spent on light



## Problems:

-Kerosene lamps uses oil, a form on fossil fuel, which means they are non-renewable and also harmful to the environment

- The smoke and chemicals the lamp gives off as it burns are harmful to humans

-Most Americans today receive their electricity from the burning of fossil fuels which is harming the planet

# The Solution

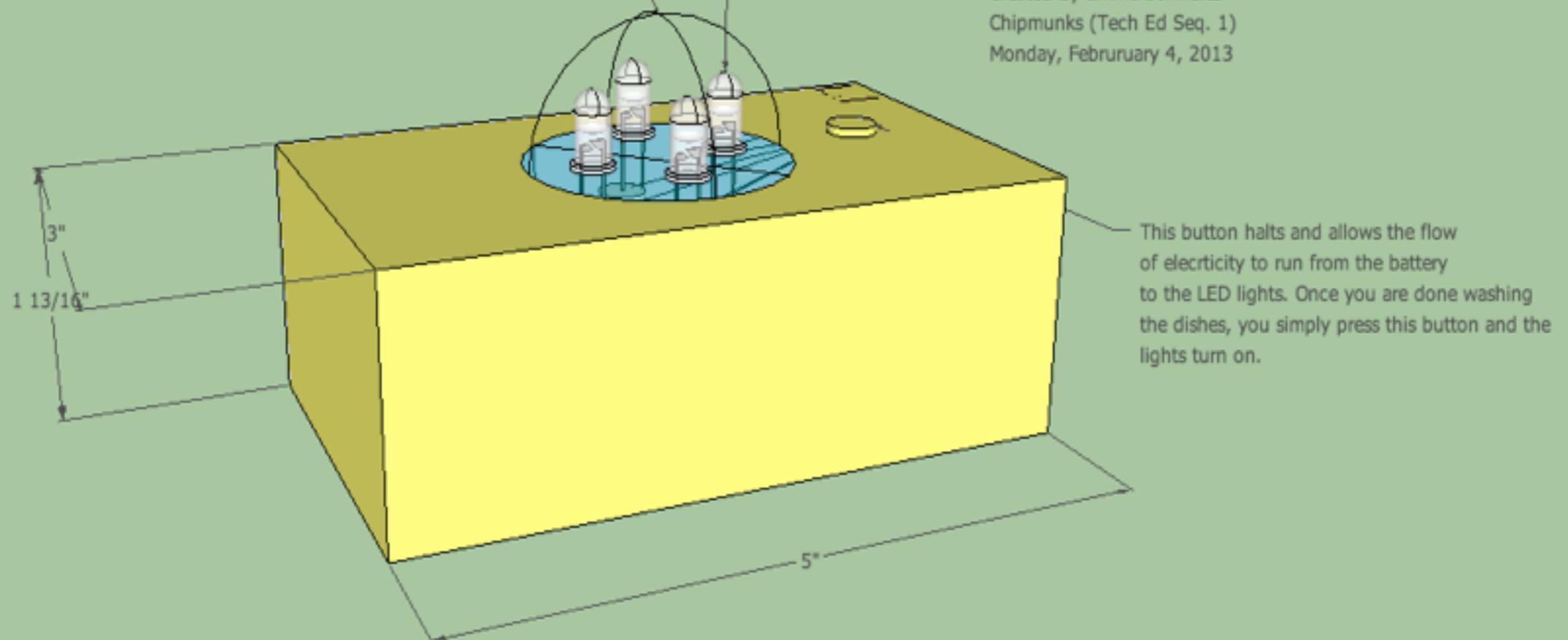
The Dome is 1" tall.

Under is 4 LED lights connected by small rotators to magnets. These magnets are connected by wire to scrubbers on the bottom. When the scrubbers rotate, the magnets rotate. This generates power to light the 4 LED lights under the transparent dome

The LED Light Bulbs are powered by a charged battery inside the sponge. The battery is charged by the generators who get their energy from the rotational kinetic energy of the scrubbers

The Rub-a-Dub Scrub is a sponge that harnesses the usually wasted rotational kinetic energy of washing dishes and uses it to generate electricity to power a light at night.

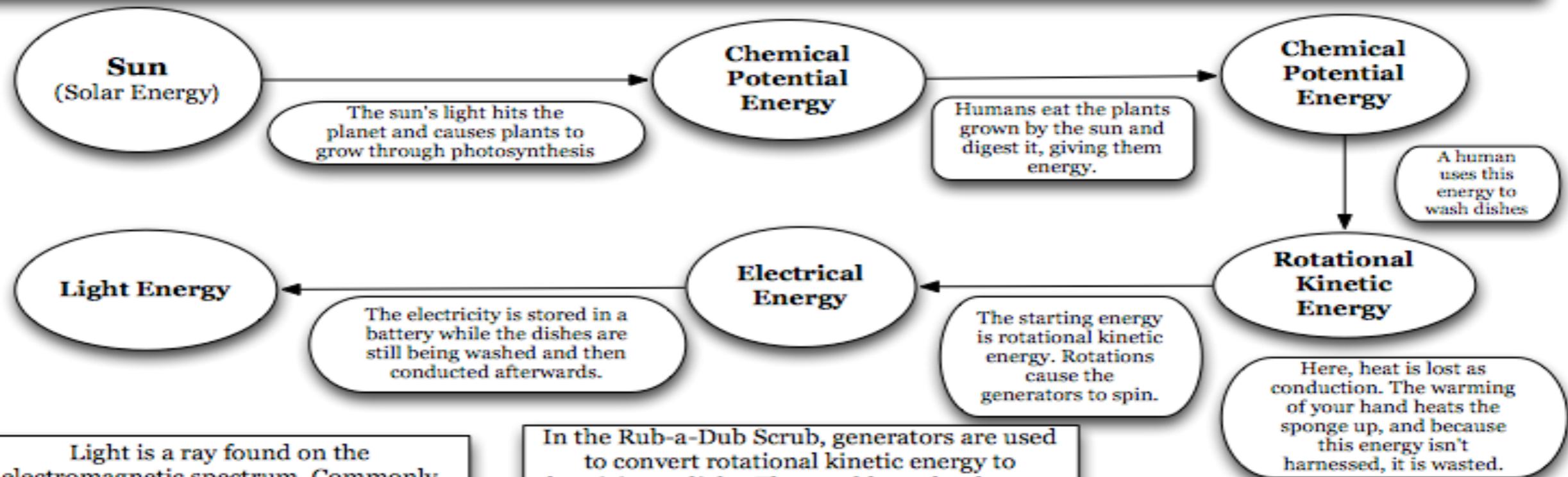
Created by Emma Schwartz  
Chipmunks (Tech Ed Seq. 1)  
Monday, February 4, 2013



This button halts and allows the flow of electricity to run from the battery to the LED lights. Once you are done washing the dishes, you simply press this button and the lights turn on.

# How it Works

**Law of Conservation of Energy:** It is impossible for energy to be created; all energy is converted from one energy form to another.  
By Emma ! (Seq. 3) When an object moves, energy is converted. This is evident in the Rub-a-Dub Scrub.



Light is a ray found on the electromagnetic spectrum. Commonly found rays on this spectrum are: radio waves, infrared light, visible light, ultra-violet light, x-rays, and gamma rays. Our eyes can only detect visible light, which are waves of light with a wavelength of 380-700 nm. This light is what we see as colors. Infrared light is heat, which have wavelengths of 1 million to 760 nm. Ultra-violet light is light that hits Earth from the sun. This light is able to kill bacteria, but also is the radiation that causes skin cancer. The waves for ultra-violet light are 400-10 nm. The Rub-a-Dub Scrub generates visible light.

In the Rub-a-Dub Scrub, generators are used to convert rotational kinetic energy to electricity, to light. The scrubbers that harness rotational kinetic energy are attached to magnets. These magnets then spin around large coils of wire, which generates electricity. Since a magnet is a material such as steel or iron in which all the atoms are pointing in the same direction, when a magnets spins around wires, the electrons in the atom want to move away from each other, and they latch on to the wire. As the electrons move, they bump into each other, creating a chain reaction that is called electricity. Once can conclude that this process is an equation: magnets + wire + motion = electrical energy. This is how the Rub-a-Dub Scrub uses a generator to induce electrical energy.

The Rub-a-Dub Scrub is powered by rotational kinetic energy. Kinetic energy is energy in motion, and depends on the mass and the weight of the object; therefore, rotational kinetic energy is energy that is in motion and moving in a circular pattern. On the bottom of the sponge, the scrubbers attached to wire rotate due to the rotational motion of a person's hand.

# Geographic Considerations

In Ethiopia, one of the poorest countries in Africa, most citizens have absolutely no access to electricity. To put these facts into perspective, let's compare Ethiopia's electricity statistics to America's:

## **Ethiopia:**

- produces 4 billion kWh (82.1% is hydroelectric)
- consumes 3 billion kWh
- imports and exports 0 kWh

This means that all of the little electricity consumed in Ethiopia comes from Ethiopia, which is not enough electricity for everyone there. If all of the population owned a Rub-a-Dub Scrub, they could have light

## **United States:**

- produces 4.12 **trillion** kWh
- 75.5% of this electricity comes from fossil fuels

This means that the Rub-a-Dub Scrub could have an impact in America to lower our rate of energy consumption that is generated by environmentally harmful power plants

# The Future

**The Rub-a-Dub Scrub** is a unique and creative way to power a light at night. By taking the rotational kinetic energy that is usually wasted when you wash dishes, it powers 4 LED lights that have the potential to change lives.

**As it is with any invention**, there are modifications that could be made:

- Many people may not like the idea of having electricity around water
- In underdeveloped countries, there may not be clean water to wash dishes

We can improve the Rub-a-Dub Scrub so it will be able to educate people on the advantages of renewable energy, and so it can benefit those without an education.

**So next time** you wash the dishes, think of the potential for energy and education. Think of how the world would change if everyone owned a Rub-a-Dub Scrub.

*Just think, if washing dishes could be fun. . . .*



# **The Survivor Can™**

Solar power to clean water  
Clean, Simple, Efficient

Luca  
CEO of Serio and Sons

# The Problem

Every living thing needs potable, drinkable water.

- Clean water is needed by everything to survive
- 800 million people don't have access to potable water
- That's about 11% of the world population

We need to find a way to get water to these people!

# The Common Solution

- Most people try to boil water to clean it
- People have to burn finite items to create enough heat to boil water

## Fossil Fuels

- To create heat to boil water, people need expensive fossil fuels
- Fossil Fuels are rare and are often shipped to wealthier countries so the places that need them for boiling water, the more impoverished nations, don't have access to them

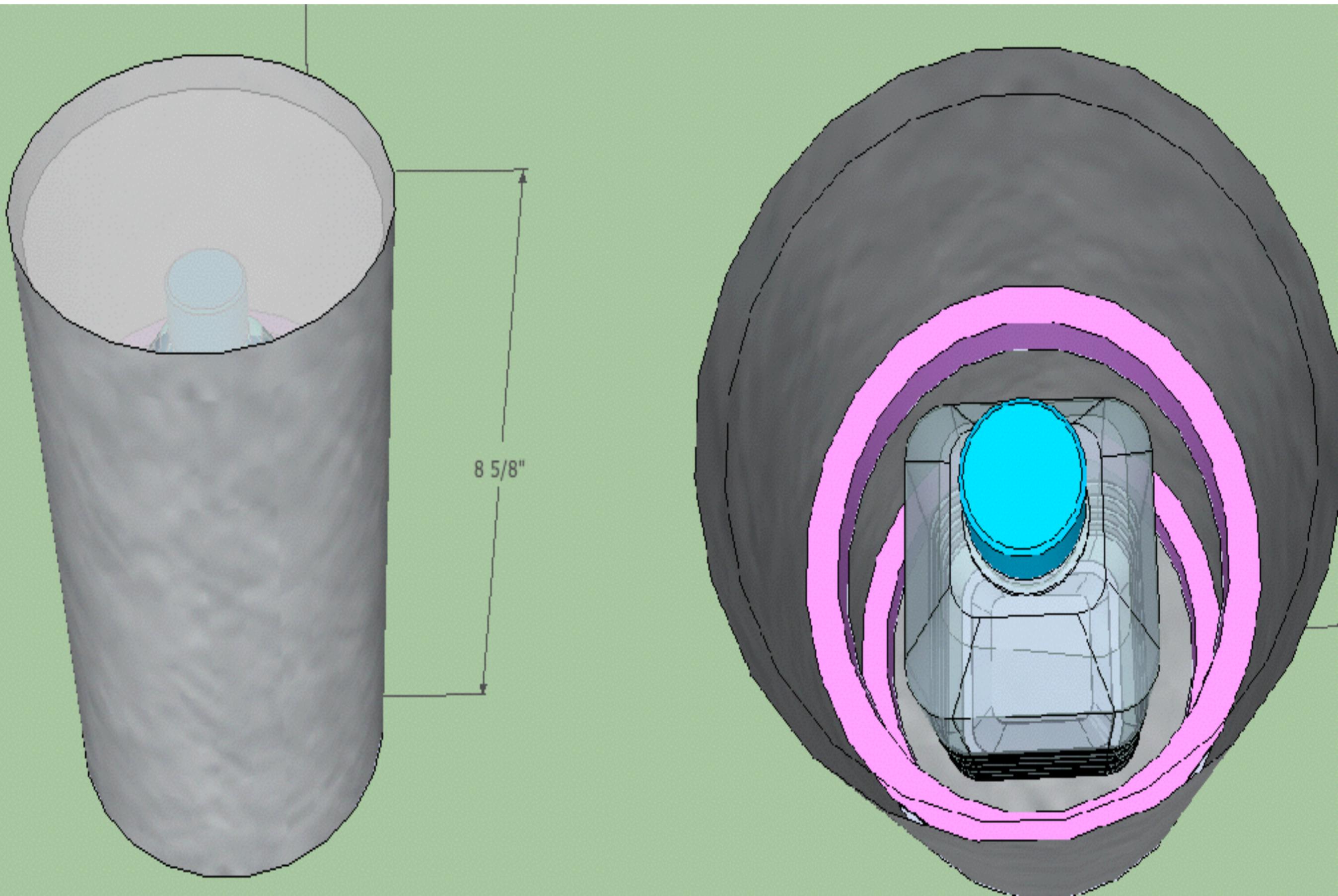
## Wood

- Some people burn wood to create heat for water boiling
- People have to waste time looking for wood when they could use that time to do something productive
- People have to travel insane distances, sometimes over 5 kilometers for maybe just a handful of firewood
- Wood is as expensive as various fuels in some parts of the world

# The Problem With The Common

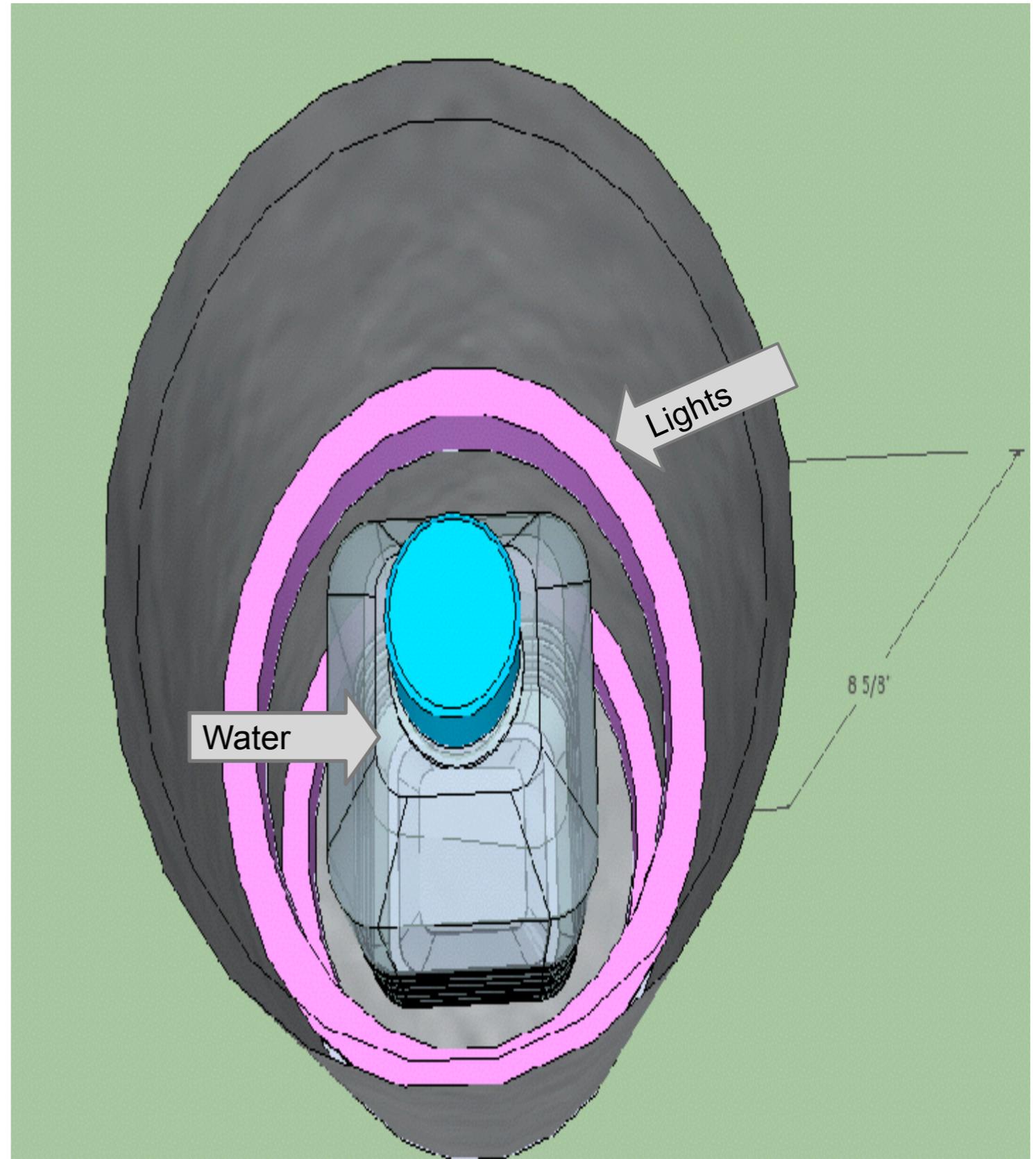
- When water is boiled by burning fossil fuels 84% of the heat generated is wasted
- That means if someone was to pay \$100 dollars for a gallon of fuel to burn, \$84 of those dollars would be thrown out the window
- If that 84% was somehow harnessed you would be able to use it OVER FIVE TIMES to boil the same amount of water
- This is almost exactly the same percent of your money wasted when you're playing slots at a casino <http://casinogambling.about.com/od/moneymanagement/tp/costlymistakes.htm>

# My Solution



# How The Survivor Can Works

- The sun's energy is captured by a solar panel
- The solar panel converts this energy to electrical energy
- The electrical energy is used to power UVB lights
- These lights can kill harmful bacteria in seemingly clean water



# How It Works

The Law of Conservation of Energy  
Energy in my device changes from solar, from the sun, to electrical, that powers the lights. This is how my device works.

Solar Energy

This device captures solar energy from the environment. This energy travels in waves from the constantly combusting sun's surface. Some of this energy is lost in the atmosphere. The rest can be captured by a solar panel.

Converted to

My energy converter is a solar panel. It has two layers with even levels of electrons. When the sun hits the top level it changes the charge in some of the electrons making them unbalanced, when the top layer is unbalanced the electrons want to flow to the bottom layer of the panel. This flow of electrons is what starts the current flow.

Electrical Energy

When energy flows through the wires in the solar panel to the light, the electrons bump into each other. This creates heat, heat is lost energy.

Heat lost Through Radiation

Converted to

The device helps people by producing UV-B radiation light. This is a very strong wave of light that can purify water with strong concentration and lots of time exposed. This light can be produced with both LED and fluorescent bulbs. I will use LED's because they are more efficient.

Light Energy

# Where in the world?

## Targeted Area or Region

-Northern Sahara

- There are about 4 Million that live in this desert
- There are 800 Million people in the world that don't have clean water
- That's almost 3 TIMES the entire United States population!
- This is one of the poorest regions on the planet

## Reason

-Some polluted water is able to be found in the area, it's a desert, but there are rains in the bordering area.

## Solution

- The Survivor Can would work well here because deserts have a lot of sunlight, which is needed to power it

- 360 days of 365 days a year in the Sahara are sunny! <http://>

[wiki.answers.com/Q/How\\_many\\_days\\_are\\_sunny\\_in\\_the\\_sahara\\_desert](http://wiki.answers.com/Q/How_many_days_are_sunny_in_the_sahara_desert)

# Conclusion

For the majority of the world clean drinking water is a massive problem. From drinking unclean water you can contract many diseases such as bacteria that cause Diarrhea, Cholera, and Intestinal Worms.<http://www.unicef.org/wash/>

[index\\_wes\\_related.html](#) One simple, cheap way to kill harmful bacteria in water is **The Survivor Can!**

**Never Again Will There Be...**

- Harmful fumes from burning wood and fossil fuels
- People having to drink dirty water
- Money spent on expensive items to burn
- Deaths from water based bacteria

# Next Steps

- I would like to change the size of solar panel so The Survivor Can could have more UVB LED's
- I would like to use more commonly found items so my device is cheaper to make
- I would like to let people use my device so I could get feed back for future upgrades and modifications



# Light Kite

One flight, and you have light.

# The Problem

**Many people all over the world, do not have the money or access to a light at night.**

**One out of five people in the world live without any electricity.**

**Over three billion people live with less than \$2.50 a day.**

# Problems with the Current Methods

People without electricity are using kerosene lamps to light their homes at night.

- Kerosene is a highly flammable liquid.
- Use of these lights, creates toxic fumes that kill humans.

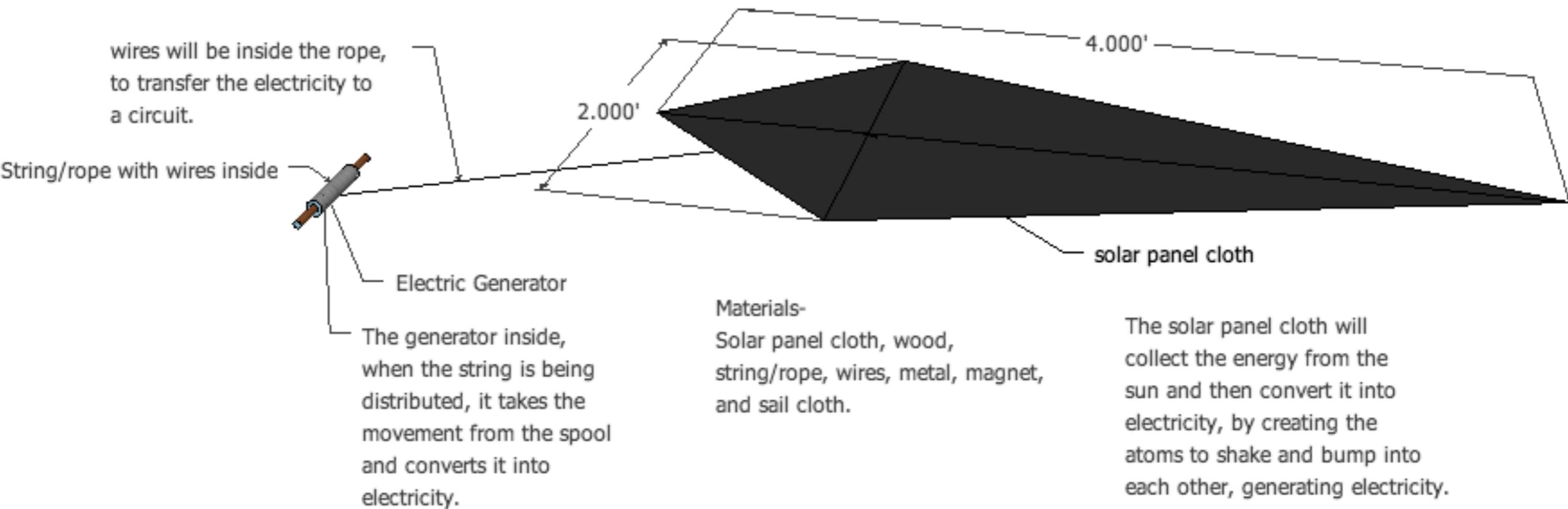
Many people all over the world burn fossil fuels to create electricity.

- We will eventually run out of fossil fuels.
- Fossil fuels affect our environment and cause climate change.

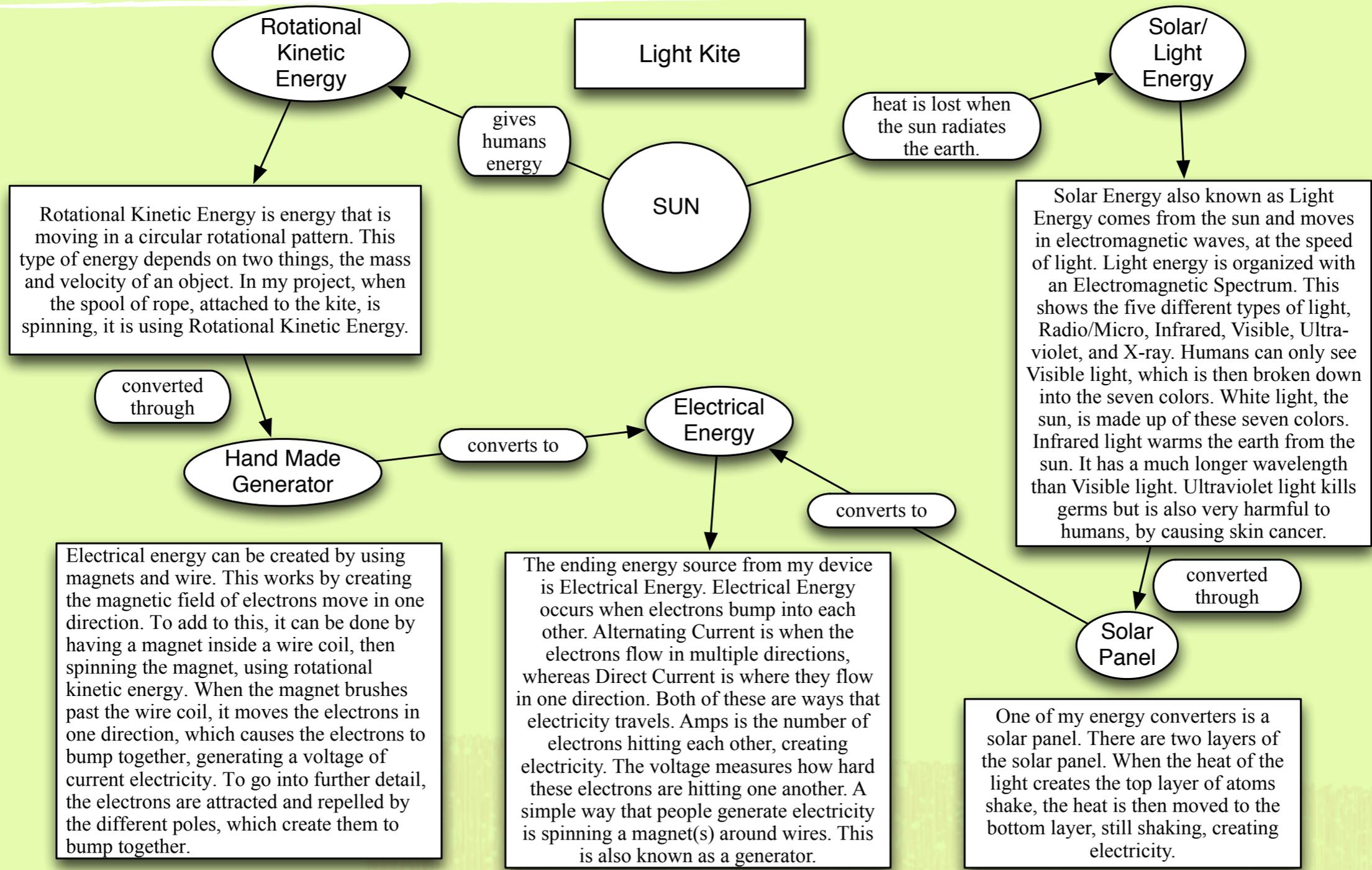
Nuclear power is a newer source of electricity.

- It is a very long process to generate nuclear power.
- Nuclear power creates climate change.
- This energy source generate radioactive waste.

# My Solution



# How It Works



Rotational Kinetic Energy is energy that is moving in a circular rotational pattern. This type of energy depends on two things, the mass and velocity of an object. In my project, when the spool of rope, attached to the kite, is spinning, it is using Rotational Kinetic Energy.

converted through

Hand Made Generator

Electrical energy can be created by using magnets and wire. This works by creating the magnetic field of electrons move in one direction. To add to this, it can be done by having a magnet inside a wire coil, then spinning the magnet, using rotational kinetic energy. When the magnet brushes past the wire coil, it moves the electrons in one direction, which causes the electrons to bump together, generating a voltage of current electricity. To go into further detail, the electrons are attracted and repelled by the different poles, which create them to bump together.

converts to

Electrical Energy

The ending energy source from my device is Electrical Energy. Electrical Energy occurs when electrons bump into each other. Alternating Current is when the electrons flow in multiple directions, whereas Direct Current is where they flow in one direction. Both of these are ways that electricity travels. Amps is the number of electrons hitting each other, creating electricity. The voltage measures how hard these electrons are hitting one another. A simple way that people generate electricity is spinning a magnet(s) around wires. This is also known as a generator.

converts to

Solar Panel

One of my energy converters is a solar panel. There are two layers of the solar panel. When the heat of the light creates the top layer of atoms shake, the heat is then moved to the bottom layer, still shaking, creating electricity.

Solar Energy also known as Light Energy comes from the sun and moves in electromagnetic waves, at the speed of light. Light energy is organized with an Electromagnetic Spectrum. This shows the five different types of light, Radio/Micro, Infrared, Visible, Ultra-violet, and X-ray. Humans can only see Visible light, which is then broken down into the seven colors. White light, the sun, is made up of these seven colors. Infrared light warms the earth from the sun. It has a much longer wavelength than Visible light. Ultraviolet light kills germs but is also very harmful to humans, by causing skin cancer.

converted through

The Law of Conservation of Energy states that you can not create energy and you can not destroy it. There is always the same amount of energy around the earth.

# GEOGRAPHIC CONSIDERATIONS

**Country-** Haiti

**Continent-** North America

**Weakness-** Haiti produces 650 million kWh per year. While America produces 4.12 trillion kWh. Because Haiti is one of the most poverty stricken countries in the world, many families do not have the money to buy or have access to electricity. However, this can change.

**Solution-** My device will provide more electricity to Haiti, paving a path for an advancing future. If more electricity is introduced to Haiti, this will create jobs, which will then strengthen their economy.

# Conclusions and Next Steps

**Potential Problem-**There is one problem that may occur in my kite. When the energy from the solar panel is being transferred down to the battery, there may be some loss of energy due to heat, potentially causing less electricity to be generated.

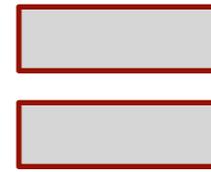
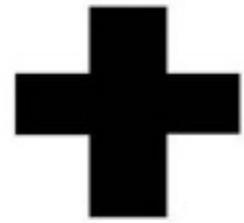
My device will be an affordable, environment friendly source to electricity. Because its energy comes from the sun, everyone on earth will have the potential to have the results of my solution, electricity. Also, by having to go outside and fly the kite, this will encourage physical fitness while generating electricity to power a light at night. This new solution will help children get an education, for a brighter and healthier future.

Do you want  
this?



Or this?





# The Electromagneto

Lighting the world at night

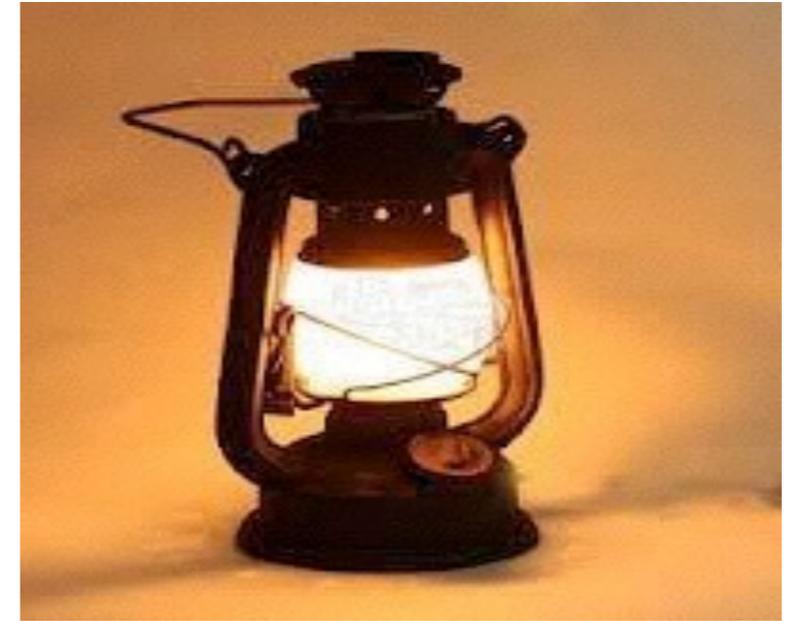
# The Problem



- People around the world have no access to lights at night.
- A quarter of humanity around the world live without electricity
- Nearly 7 million children in primary school are not able to get a better secondary school because of the lack electricity.

## Kerosene Lamp:

- Dangerous
- produces smoke which can harm your body
- powered by fossil fuel



## Electricity:

- expensive
- causes pollution
- powered by fossil fuel



## Materials

Rod  
Magnets  
Coils  
Wood  
Battery  
wires  
shaft  
drum barrel

# THE ELECTROMAGNETO

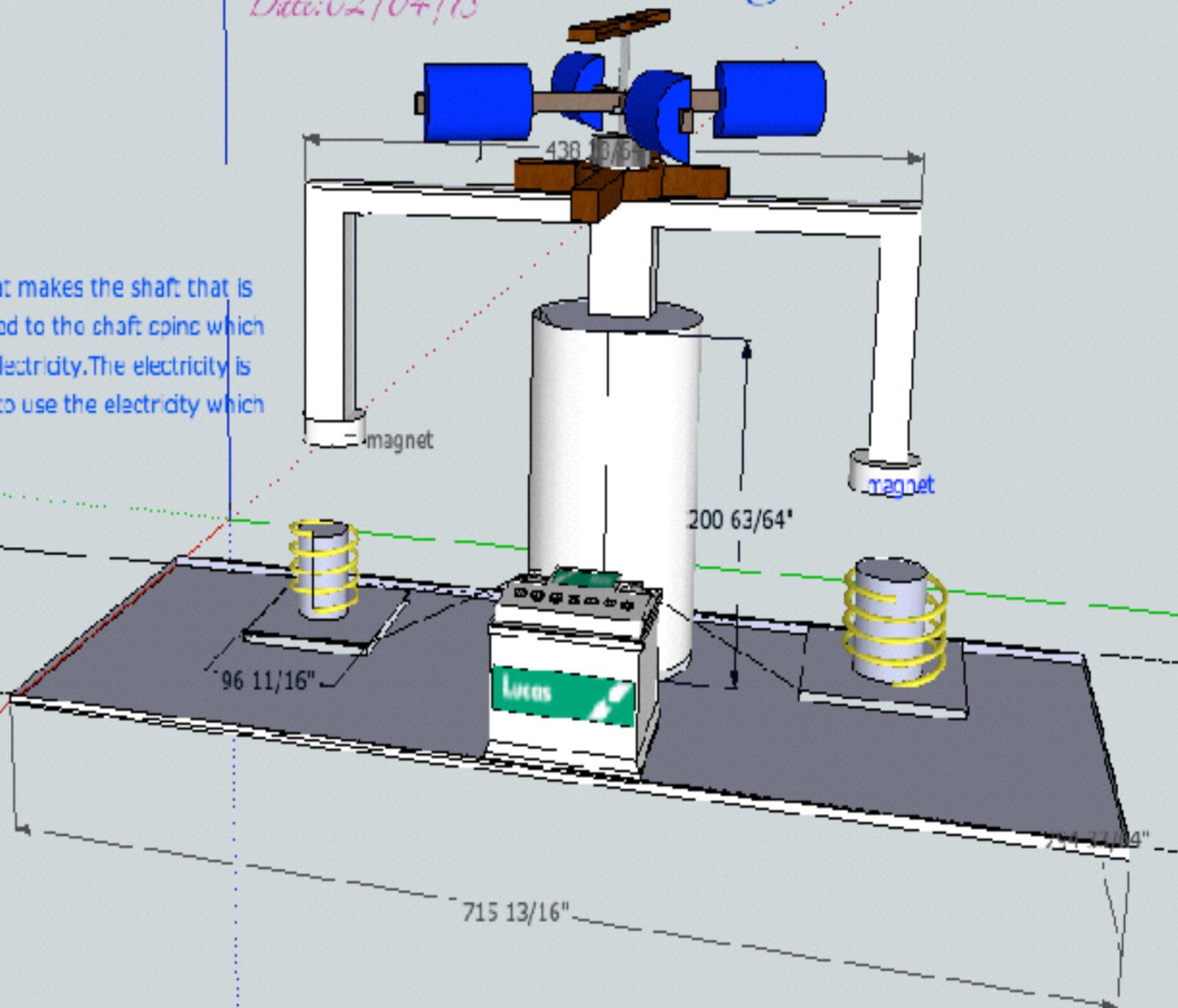
*Mt. Lions*

*Real Device*

*Date: 02/04/13*

*Designed By: Abrass*

The vertical axis wind turbine is going to be spinning, that makes the shaft that is connected to the rod spin. The magnet that is connected to the shaft spins which allows the coils which are at the bottom to generate electricity. The electricity is going to be stored in a battery. The person will be able to use the electricity which is stored in the battery to light up their house.



# The Electromagneto

This device follows the Law of Conservation of Energy, because the device is not creating new energy.

Wind Energy

Wind energy is a type of energy that this device starts with. This is a type of Linear Kinetic Energy. It is caused by the sun heating the Earth. Then hot air rises to the Earth's surface. Then the air cools down and sinks. This is called convection and it is what causes wind. The more wind the device receives, the more electricity is generated.

Heat Energy

some energy lost as conduction

converted to

Rotational Kinetic Energy

Rotational Kinetic Energy is another type of energy that is present in the Electromagneto uses. This energy type depends on how heavy the and how fast the object is. The heavier the object is the more rotational kinetic energy it has. The faster the object is the more rotational kinetic energy it has.

converted to

Electrical Energy

Wires and magnets work together to affect current electricity. Electricity is generated when electrons bump into each other. As you move a magnet along a coil, the electrons are attracted so the electrons move with the magnet. The electricity is generated. The electromagneto works like this: the threaded rod is being pulled by heavy trash back which then the rotates magnets. The electrons in the coil below the threaded rod starts to generate electricity.

Heat energy

Some heat lost as conduction

converted to

Light Energy

Light energy is a form of energy that travels in waves. Visible light is part of the electromagnetic spectrum. This device however relies on the rotational kinetic that is being produced by the heavy bag. The electricity that is being produced is electric energy and people can use it to do their daily duties.

# Geographic Consideration



Targeted Country:South Africa

Continent:Africa

Weakness:

- South Africa has low electricity production compared to the U.S per capita,also the country imports about 13 billion kWts.

Solution:

- My device is the best solution to the problem, because of the lack of electricity.It will enhance peoples lives forever

# Conclusions and Next Step

## Potential Problems and Improvements:

- I have to test the device to see how many volts will be produce.
- I need to have a cover so that people won't get shocked.

## A call to action:

- Affordable, simple and easy to use lights are essential for advancing life.



# The Watercycle

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By:





# The problem

- Dirty water kills 5,000 children a day which means 1.8 million a year
- 3.4 million people die each year from a water related disease, almost the population of Los Angeles
- Lack of access to clean water and sanitation kills children at a rate equivalent to a jumbo jet crashing every four hours
- Nearly 5 billion people lack access to clean water

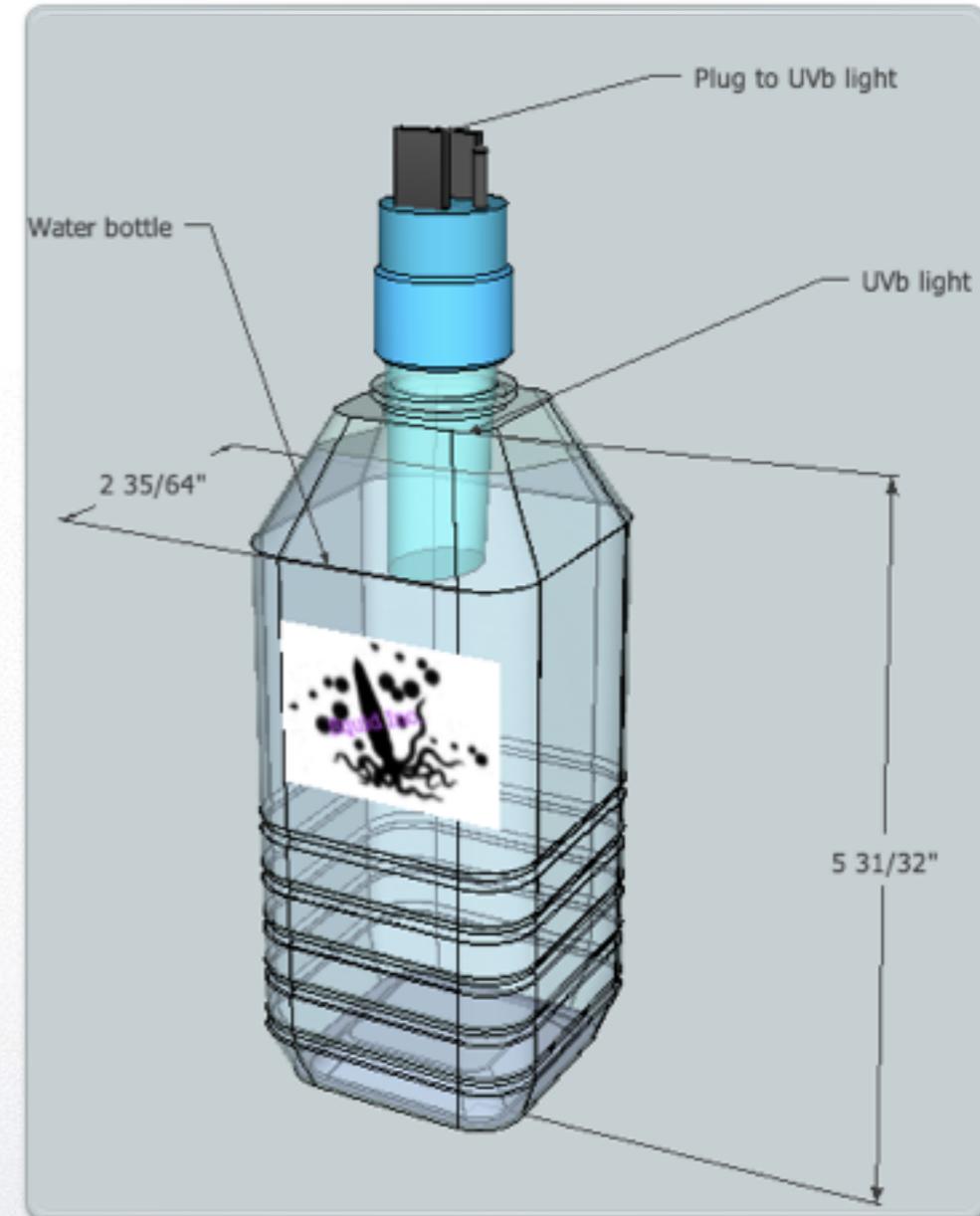
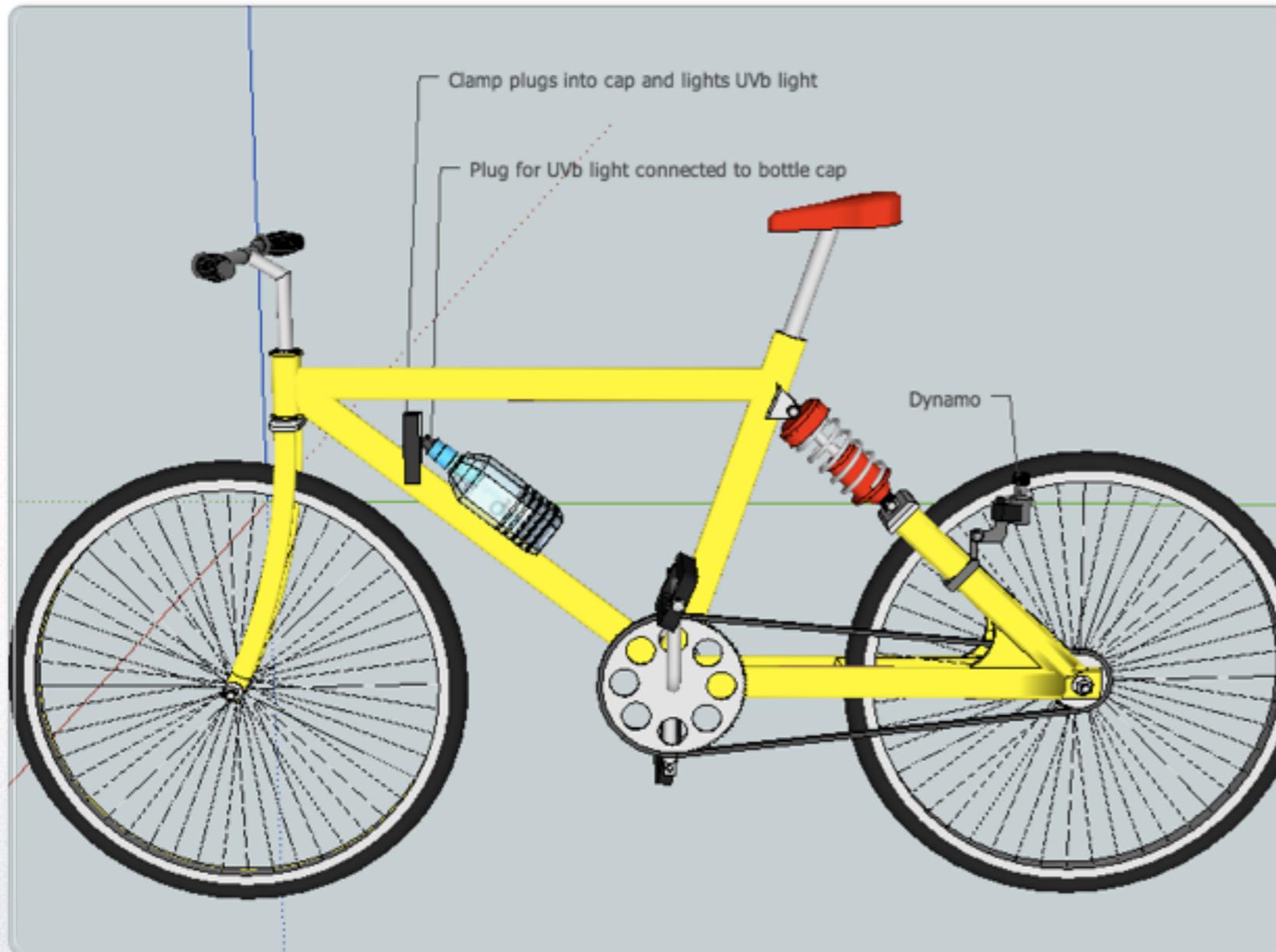


# Problems with the current solutions

- Life straw- Takes a long time to get the water to purify within the straw. (almost 10 minutes)
- Carry water from closest lake, river ect. - There is only a certain amount of water you can carry back and that depends on the container you have to carry it in and how long you have to walk.
- Chlorine and iodine tablets- Takes a long 30 minutes until the water is safe to drink and also leaves the water tasting terrible.
- Solar ball- although it does effectively purify water, the materials are just hard plastic which is not very durable, it would last much longer if it was metal.
- Carbon filters- Although it is great against pesticides and chlorine, it does nothing against bacteria and having entirely clean water is very important in developing countries.

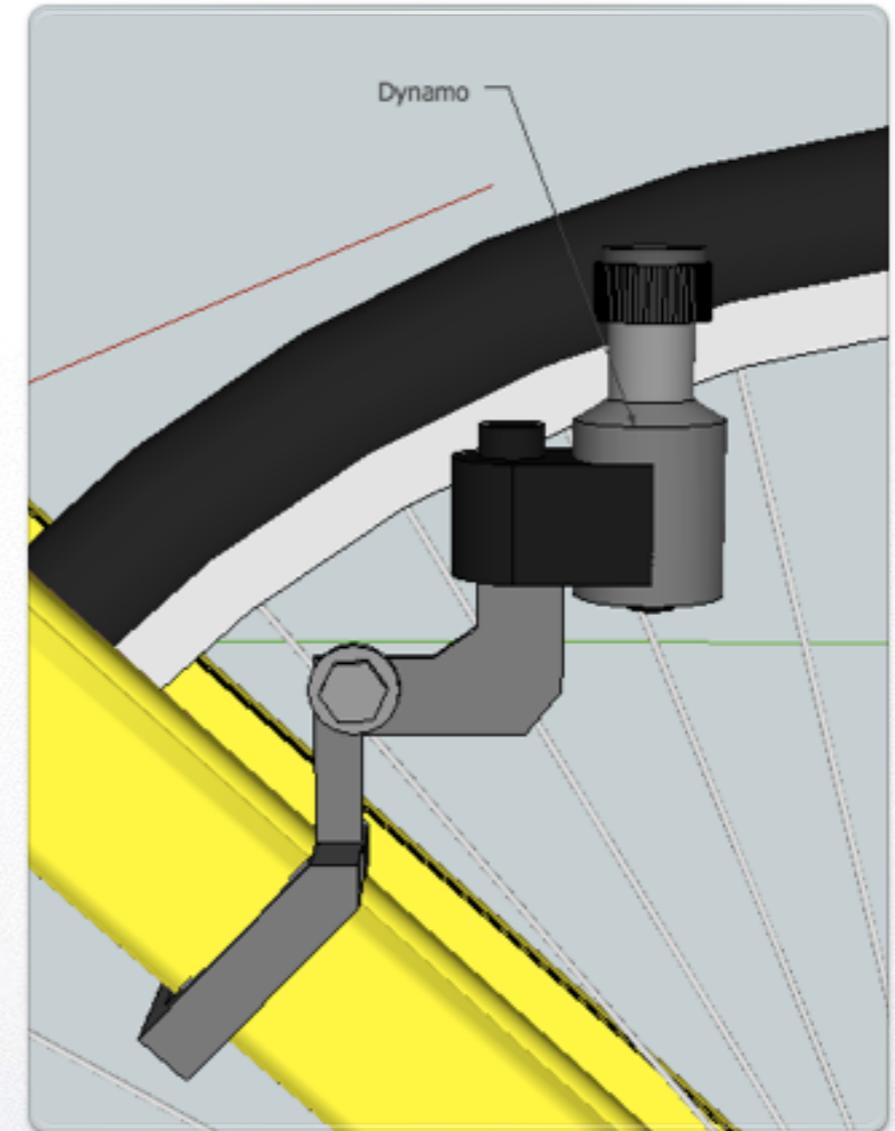
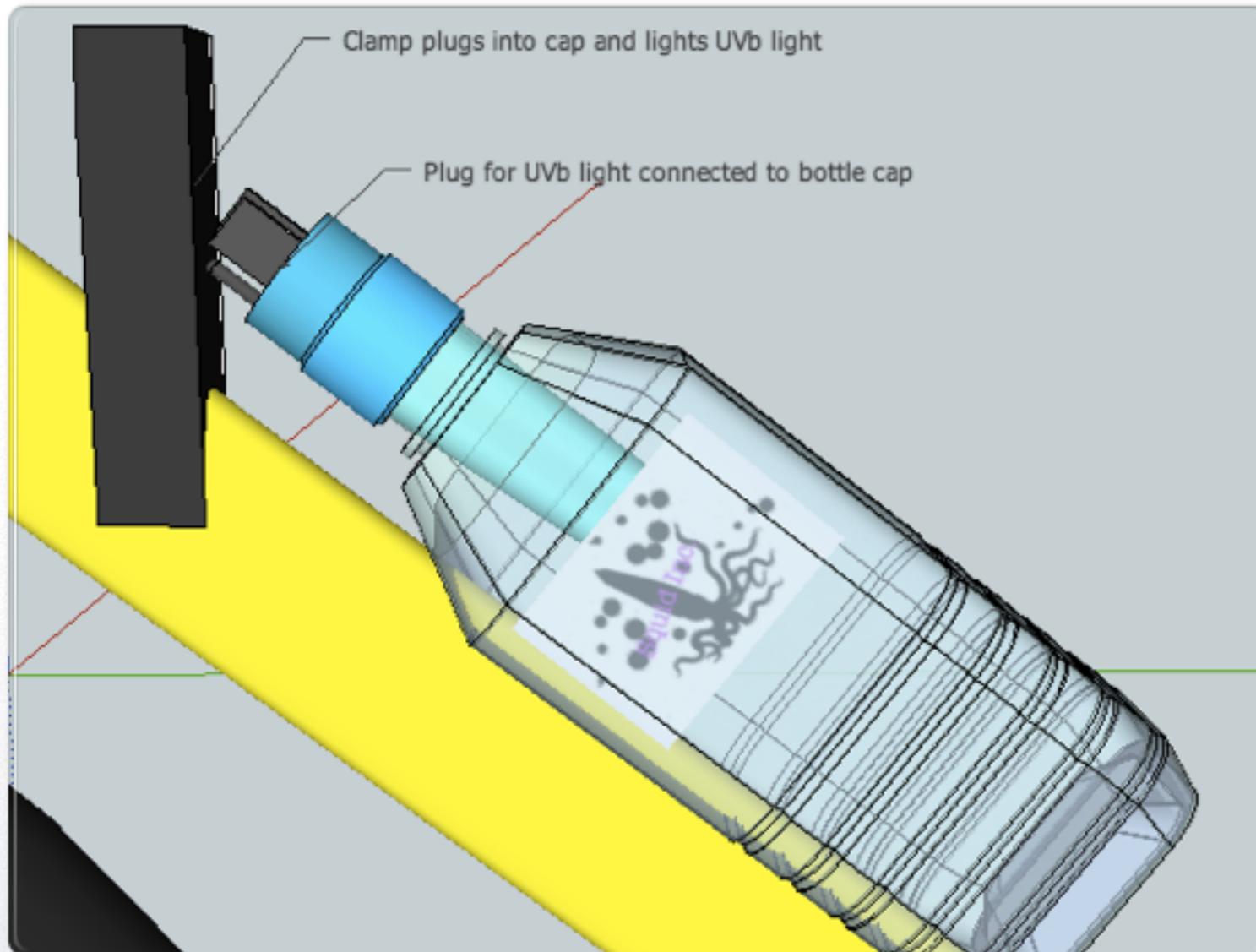


# My solution





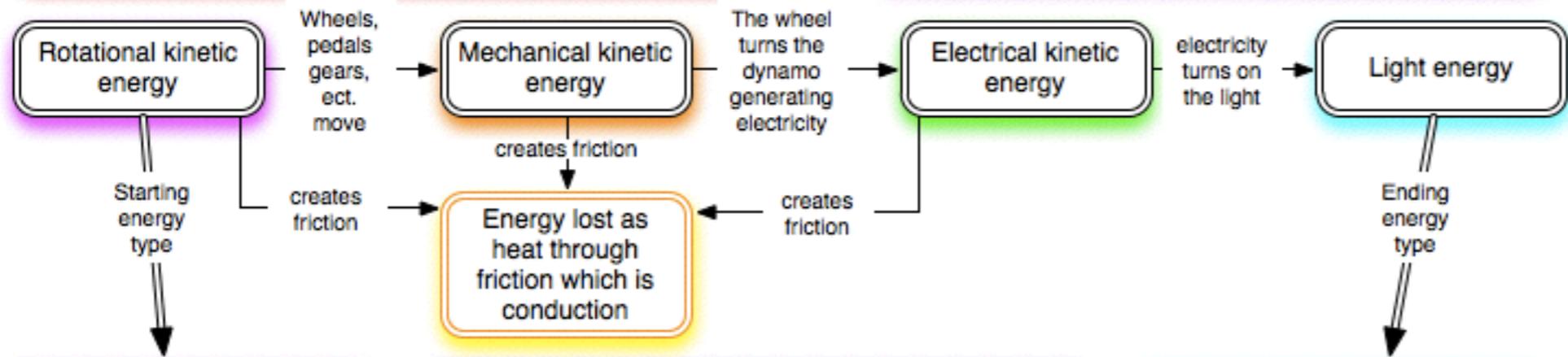
# My solution *continued...*





# The WaterCycle

By: Squid inc.



This device starts by using Rotational Kinetic energy from the wheels of the bike turning. Rotational Kinetic energy is anything rolling, spinning or turning in any way. Rotational Kinetic energy depends on the weight and the height of the object. It also depends on the angular velocity which is how many degrees something is rolling per second.

The production of electricity may seem difficult to understand but it's actually very simple and easy to produce. Current electricity is generated when magnets, wires and motion are combined. In class we learned that when two magnets facing two different ways spun around the inside of a coiled wire and electricity was generated the voltage was low but it was electricity nonetheless. The reason for this was because when one side of the magnet comes near the electrons, the electrons are attracted to it but then the other side comes around, and the electrons repel. This simple movement forces the electrons to move and bump into each other generating electricity. Here is a way to remember it , rotational kinetic energy (anything that rotates)+magnets +wires=electricity.

The ending source of energy in this device is light energy from the UVb lights. Light energy travels in waves and travels at 186,000 miles/second. There are only certain waves we can see. The light in the light spectrum start with infrared which is heat then the colors in the visible light spectrum go in this order: red which is the weakest, orange, yellow, green, blue, violet and then ultraviolet which is what my invention uses to purify the water.

The Law of Conservation of energy is that no energy is created or destroyed and is instead converted and generated into another type of energy. This is present in my invention because the rotational kinetic energy is converted into mechanical kinetic energy, the mechanical energy is converted to electrical kinetic energy which is then converted to light energy.

# How it works



# Haiti

Located in the Atlantic Ocean and Caribbean Sea

- Uses 116 cu m/yr. of freshwater which is 1 tenth of what the U.S uses
- Sewage treatment plants are virtually non-existing in cities and towns in Haiti. 76% of cities and 90% of small villages do not have sewage treatment.
- The most harmful diseases in Haiti are waterborne diseases such as bacterial and protozoal diarrhea, hepatitis A and E, and typhoid fever
- Infant mortality: 52.44 deaths/ 1,000 births

My invention could be a solution to these problems, because my invention purifies water. It can start to diminish many harmful waterborne diseases. by doing this it will lower the infant deaths in Haiti.



# Conclusion and next steps

My next step is to figure out what materials work best with my invention so it will last as long as possible. I would also like to figure out a way to get Watercycles to places in need of clean water.



Thank you for  
your time!