

# **FANTASTIC IDEAS FOR ENERGY GENERATION**

## **SIMPLE HANDBOOK FOR COMMUNITY PRACTITIONERS**

Energy is everywhere around us! Energy is in all the natural elements and is a source, and product of LIFE!

We just need to open our eyes for the wonders of nature around us and to start using her richness with gratitude and appreciation, and for the benefit of all.

This booklet is a collection of innovative approaches to energy generation with simple technological solutions using available materials around you. Using these technologies at the community level will provide them with the freedom from using fossil fuels and will inspire them to generate more solutions on their own. Empowering local communities will bring prosperity and wellbeing to their members and the awareness that Mother Nature supports them.

The technological solutions provided in this Handbook are developed by me following years of observations of the natural elements (Soil, Water, Wind, Fire, and Life Movements) and the opportunities for energy generation these provide on daily basis. The simplicity and replicability of these solutions provide a fantastic opportunity for upscaling.

Each technological solution is supported by a theoretical explanation, description of the concept idea, design blueprints and guidance, and a story which can inspire your creative mind to make a wonderful creative innovation for changing the way of making and using energy at the household and the community level.

This Handbook was developed with support from the United Nations Regional Commissions – Economic Commission for West Asia (Headquarters in Beirut, Lebanon) and Economic and Social Commission for Asia and the Pacific (Headquarters in Bangkok, Thailand) and would be provided to community leaders through the services United Nations provides to the people of the world.

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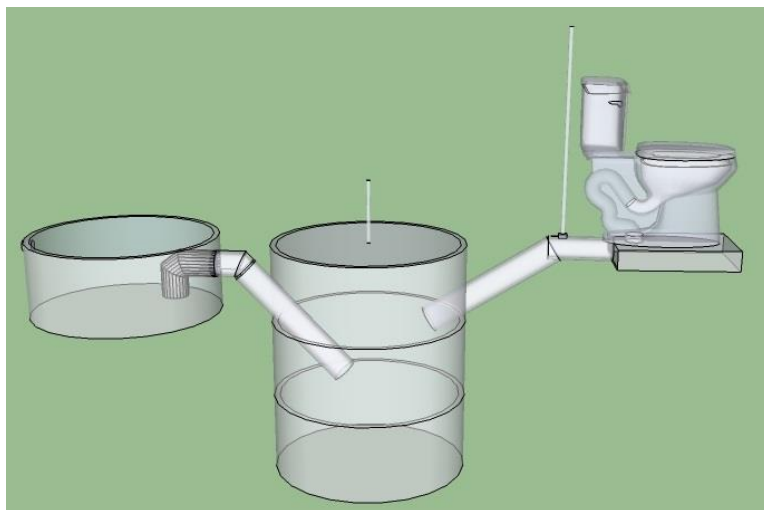
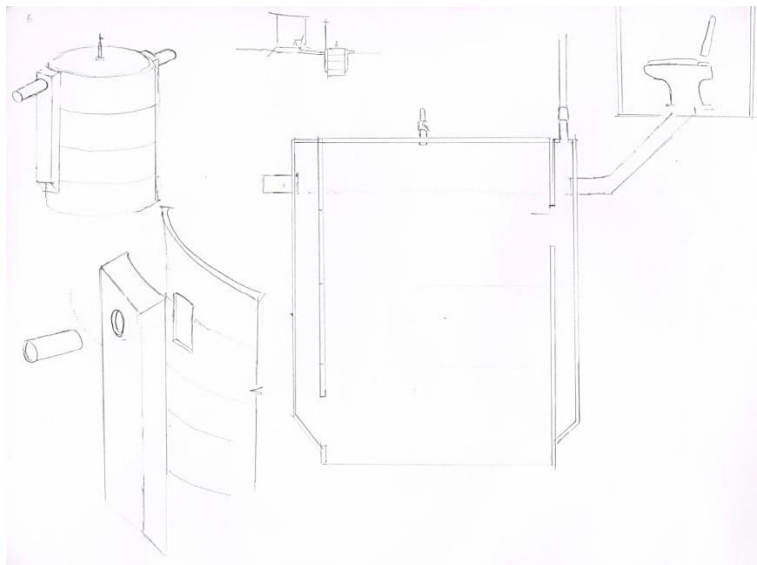
# **Waste to Energy**

## From home toilet to biogas

Actually, every house which has a toilet can produce biogas. This idea, you doesn't have to invest a lot of money just applied some of equipment from your house and you will have a free biogas for your own.

The process is easy, because a waste tank from the toilet is already a digester tank for biogas system by natural. It has a microorganism which makes a methane gas. So all you need is apply some part of waste tank to flow the system.

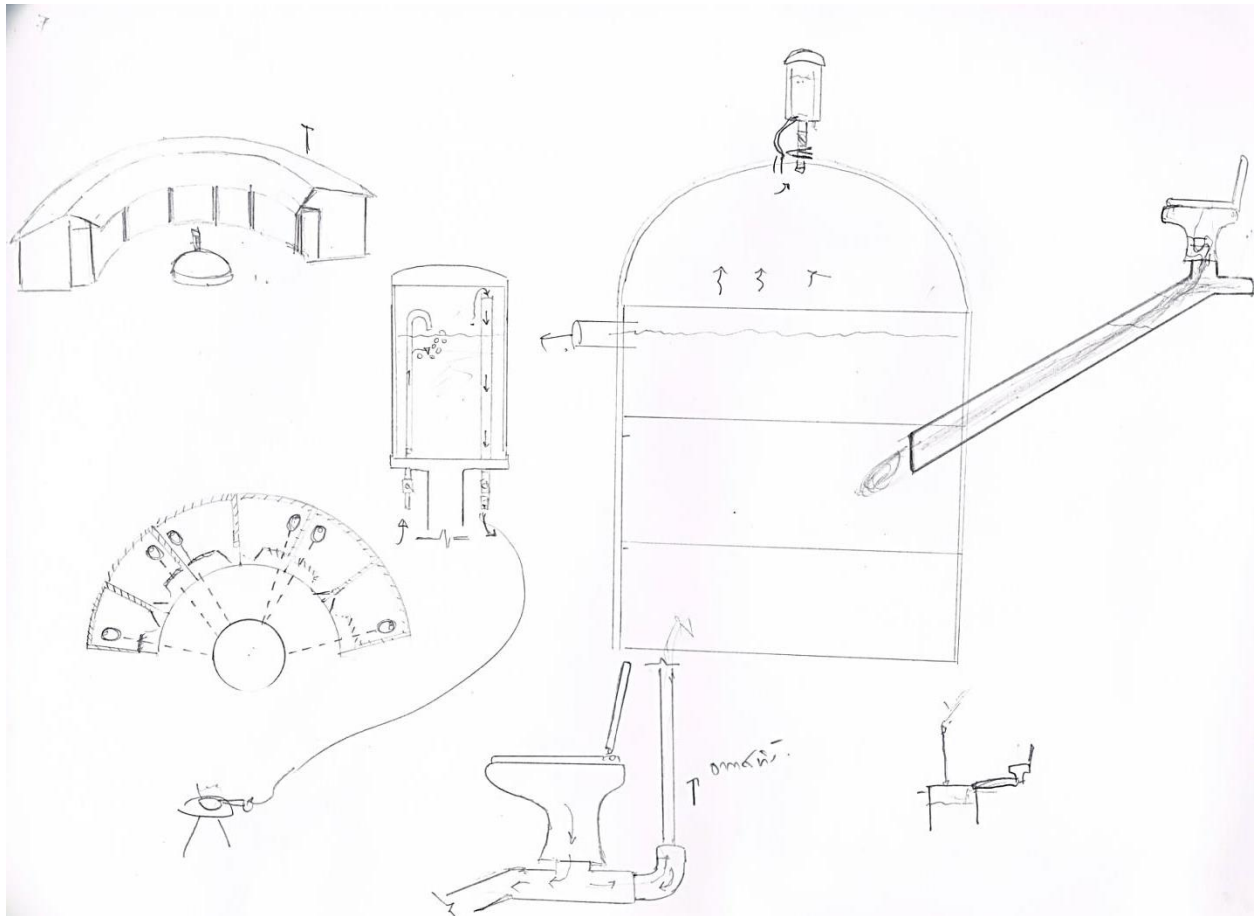
Be careful, normally we always use a chemical cleaner for clean the toilet but the chemical can eliminate a useful microorganism that make a biogas for us. If you want to use this system, you will have to change a chemical cleaner to a natural cleaner for protect a microorganism.



## From public toilet to biogas

Many public place has amount of waste and don't know what to do with it. But we can make a waste to be a worth thing like a biogas by a simple method.

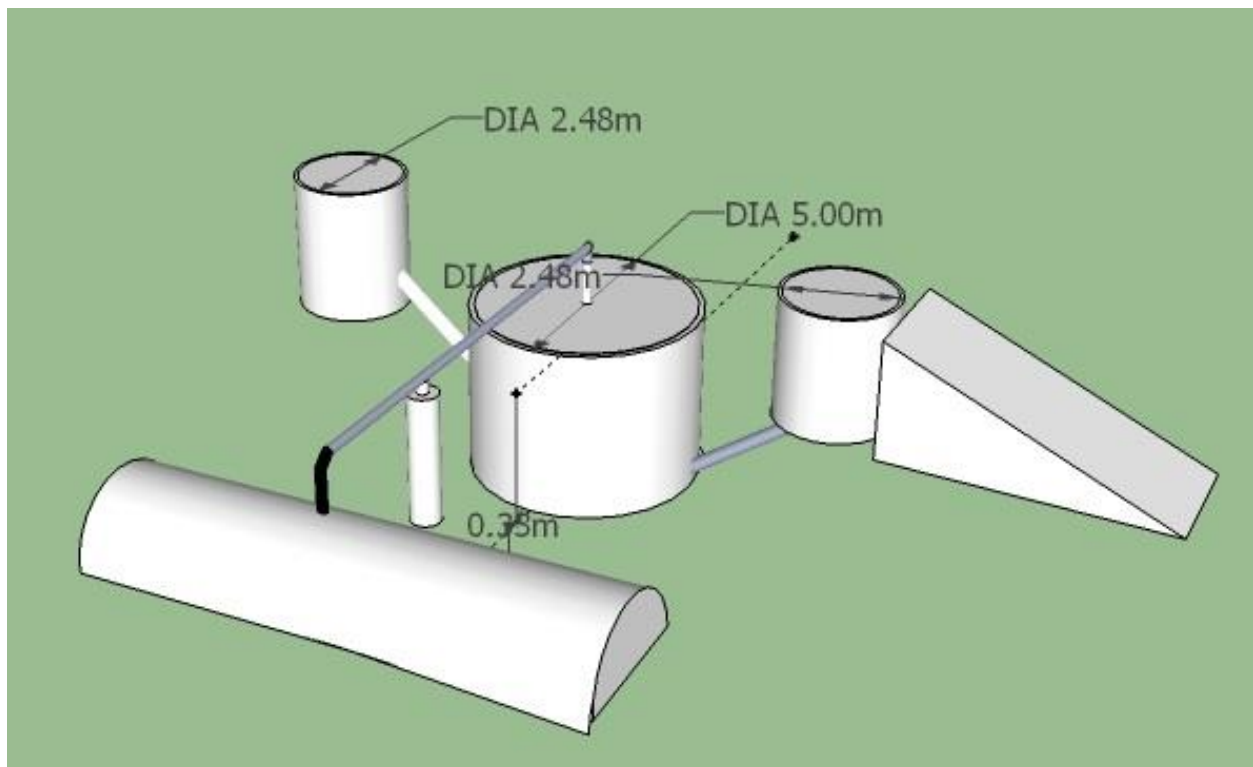
This idea is similar to a home toilet. But we change from a small scale to a bigger one. This biogas system you have to place every pipe from every toilet room to a big one digester tank.



## Biogas from Cassava Waste

In agriculture area, we always have amount of waste from the field. But for energy area, many agriculture's waste can change to a useful energy which depends on what you have.

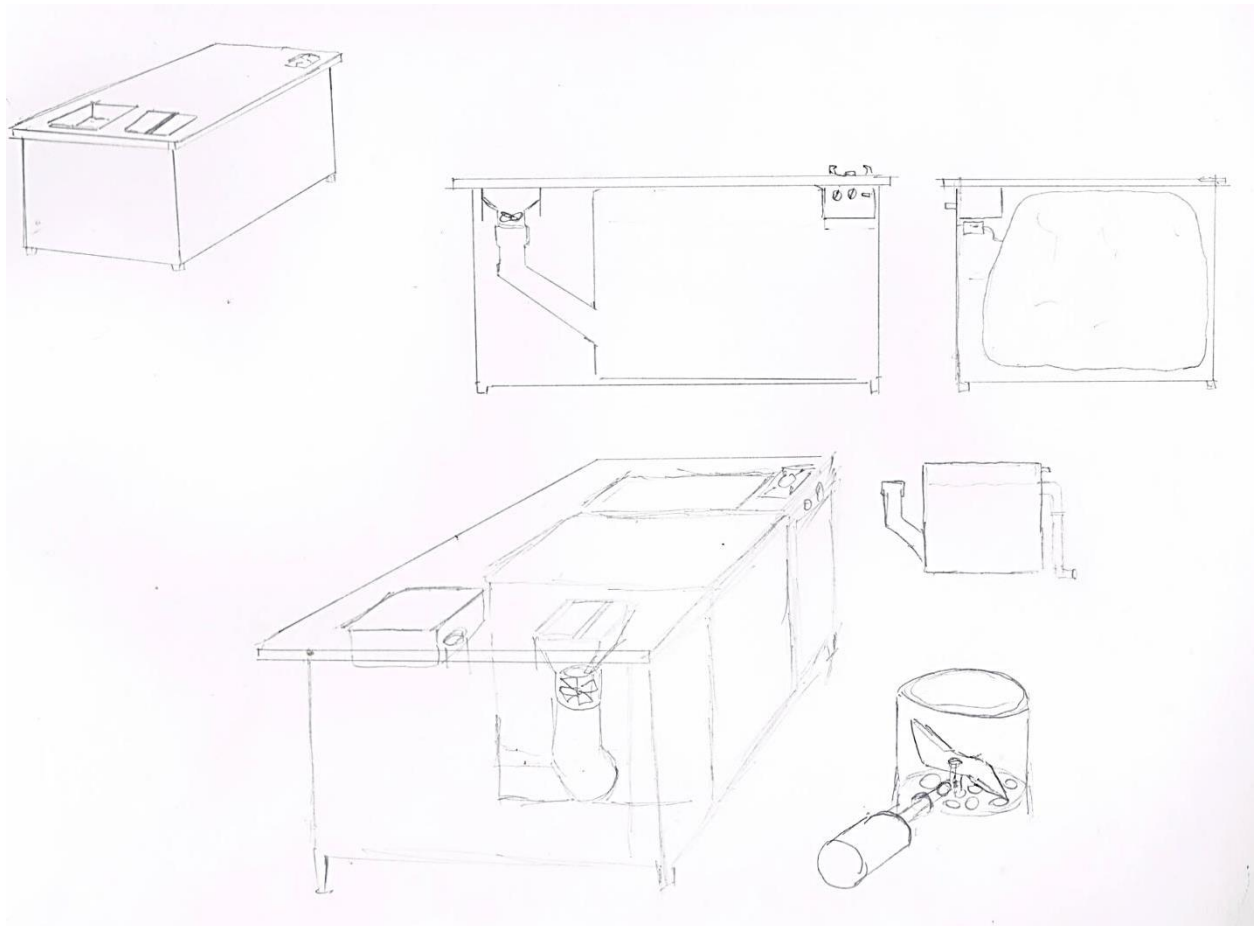
For a cassava, it has many carbohydrates that can turn to monomolecular of glucose. It's cause a lot of benefit to put glucose to a biogas system because glucose is a food of microorganism. So if microorganism alive, it means that you are going to have a free biogas 24 hours.



## Biogas from the kitchen

When you prepare a food for cooking, you always have a lot of garbage from the preparing table. Like a vegetable, a small piece of meat or a juice from a raw material.

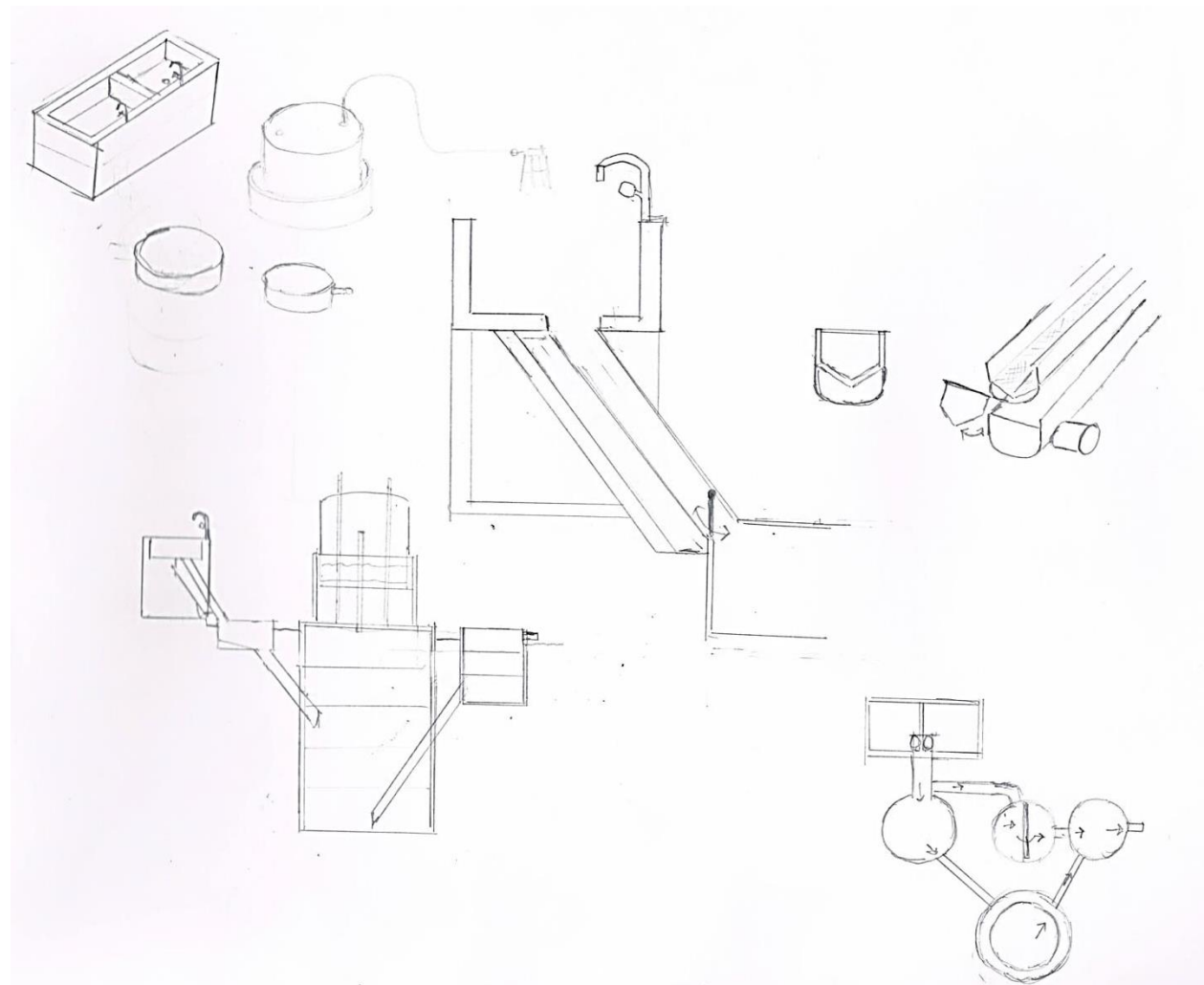
This idea, we will adapt a little part of the preparing table to put all of a garbage in a tank. And we also add a chopper to reduce a garbage to a small scale before go to the tank.



## Sink separate Food and Waste Water

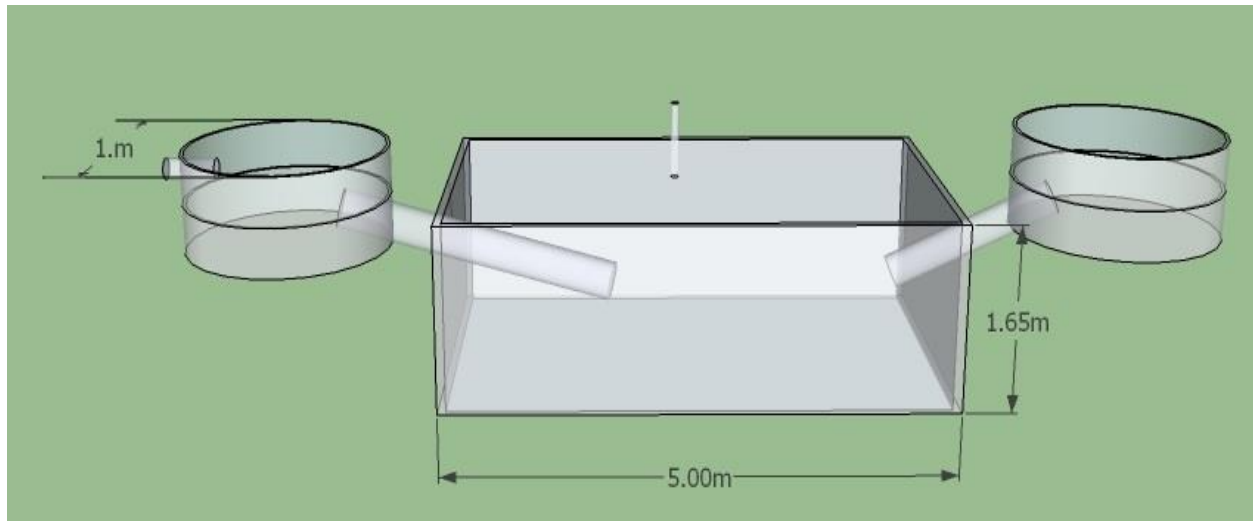
In dishwashing process, you always have a problem about a waste food and grease. If you leave it to natural, it may cause a problem later, like a smell, infection or waste water.

This sink, when you put a waste food in, it is going to separate food and waste water. For the food will go to a digester tank for produce a biogas, for the waste water which has grease mixing together, we can use a drying system to purify water and collect lipid to make biodiesel.

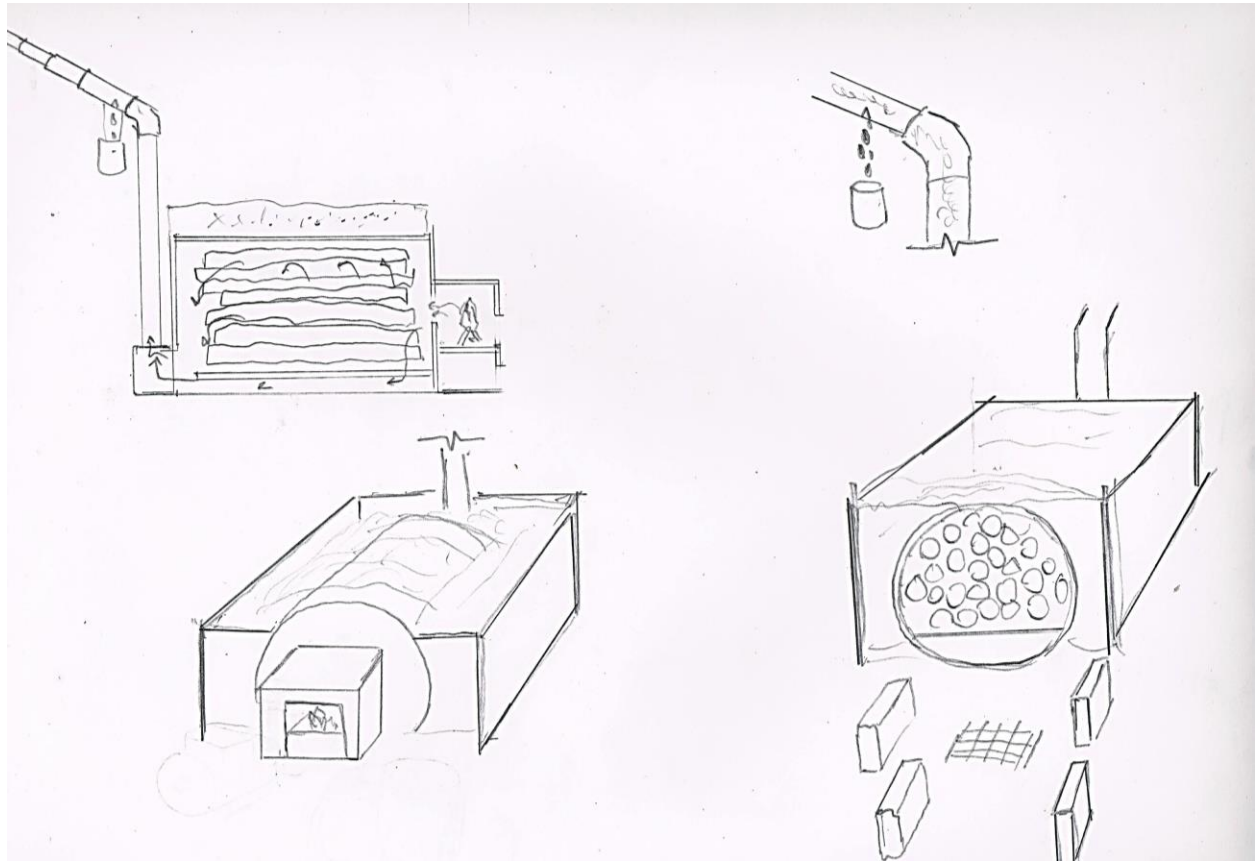




## Rectangular Biogas



## Charcoal Production in 200 liter drum kiln



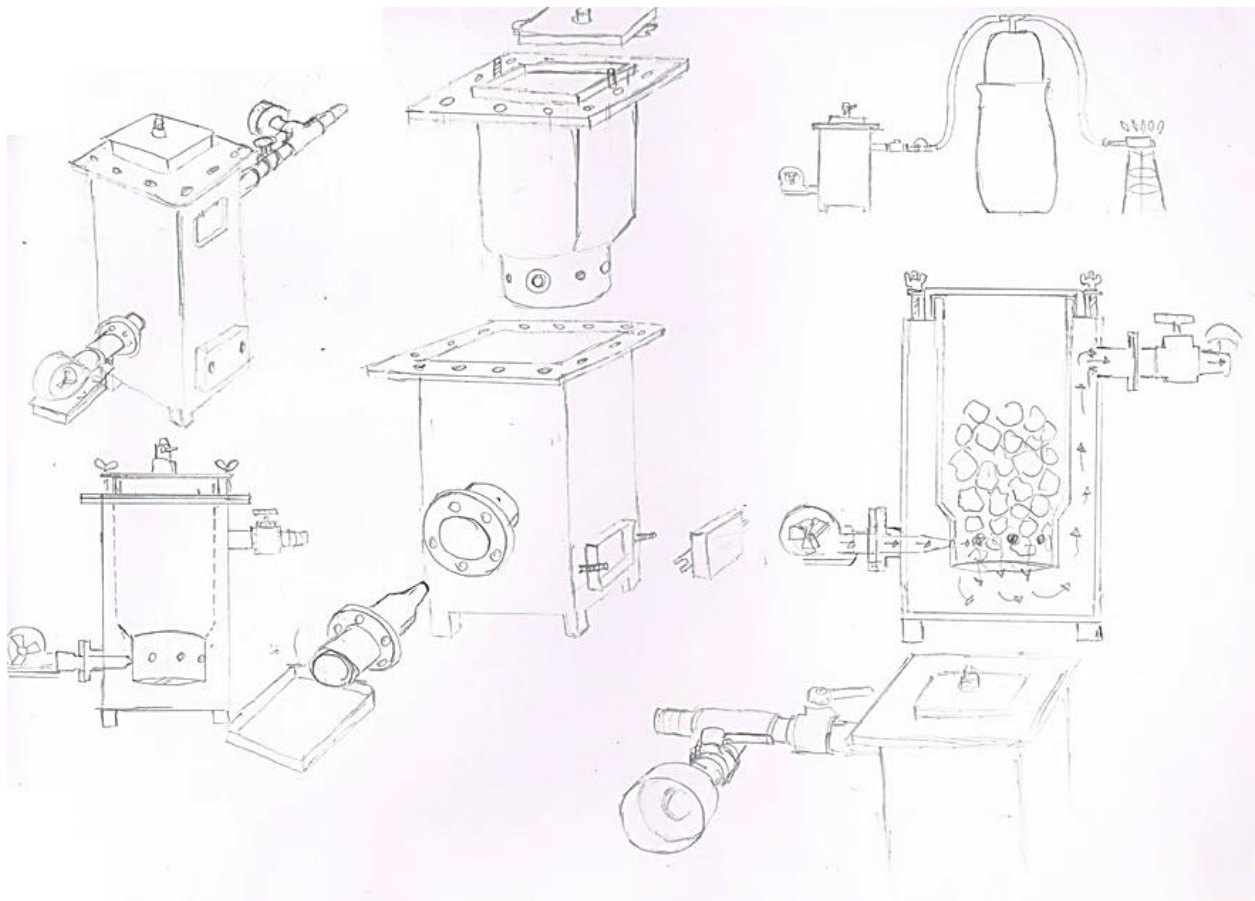
## Downdraft Gasification from steel pole 6 inch

Gasification is a process to convert biomass into carbon monoxide, hydrogen and carbon dioxide. This process use high temperature (more than 700 C) and control amount of oxygen without combustion.

The resulting gases can use as a fuel. We can use for cooking gas and reducing oil for running generator, water pump and engine.

Downdraft gasification is a process when gasification agent gas flowing down in the system. Normally we use this system with a piece of wood or biomass.

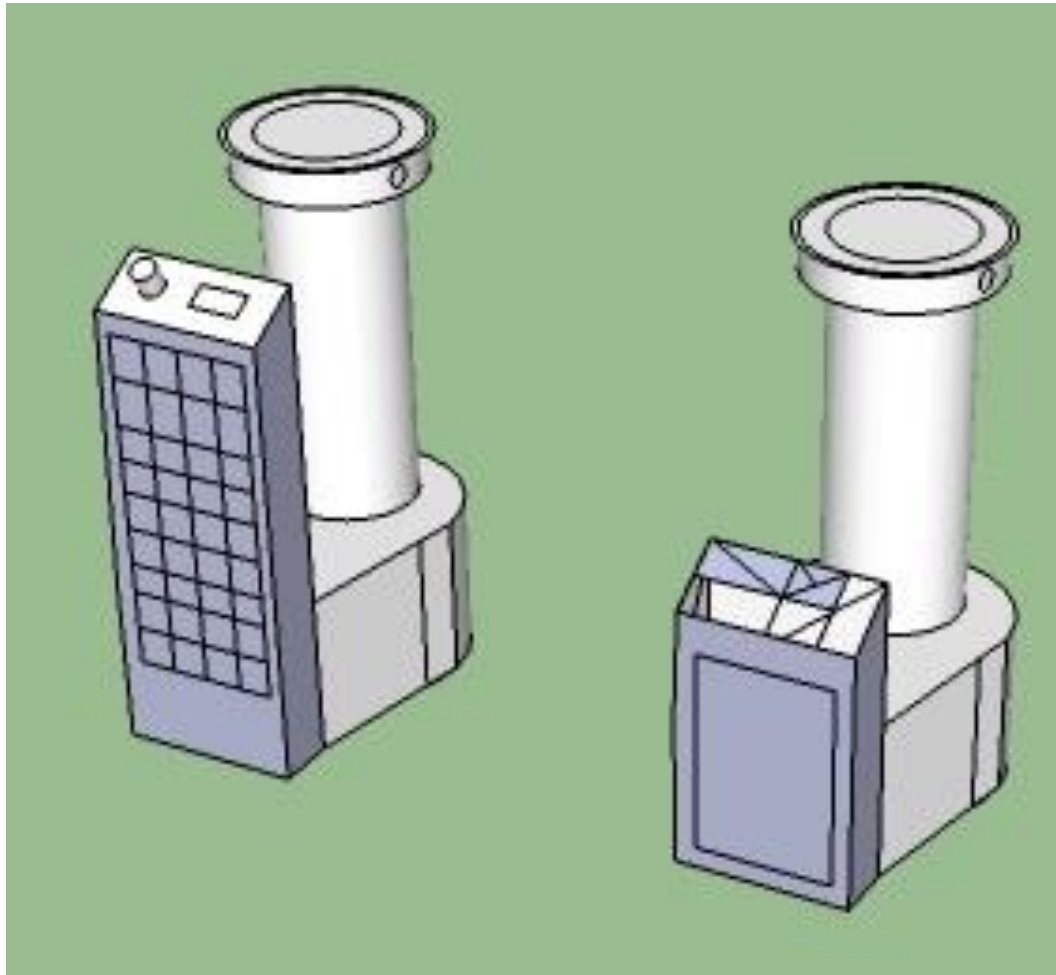
For this idea, we can recycle a steel pole 6 inch to be a chamber.



## Updraft Gasification

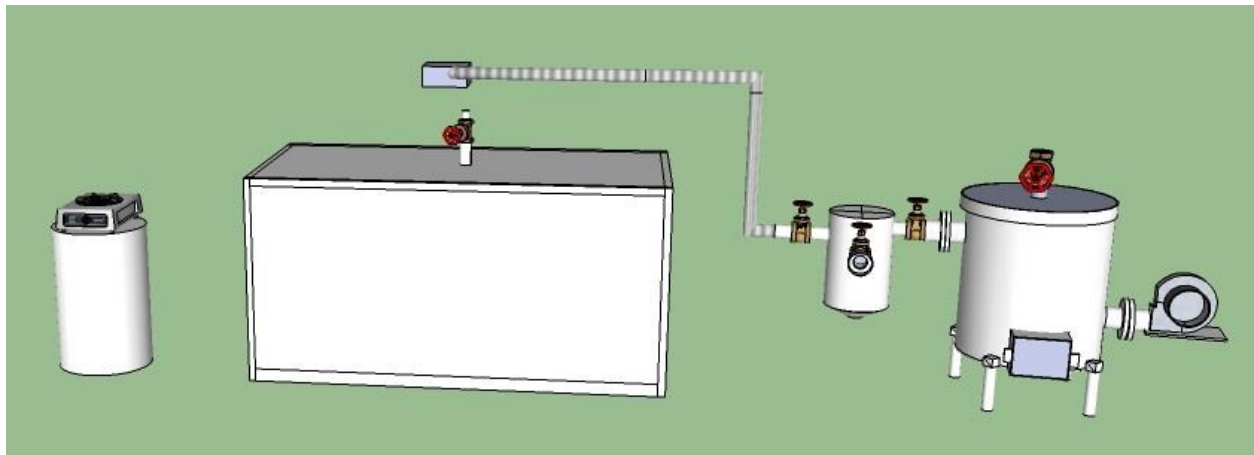
Updraft gasification is a process when gasification agent gas flowing up in the system. We use this process for a small scale biomass like rice husks or crushed leaves.

This model can use a fuel gas as a cooking gas for 20 – 45 minutes.



## Gasification System

This gasification system is an idea for small scale enterprise that use amount of gas. This model will have a downdraft gasification, a storage system and gas pressure controller.



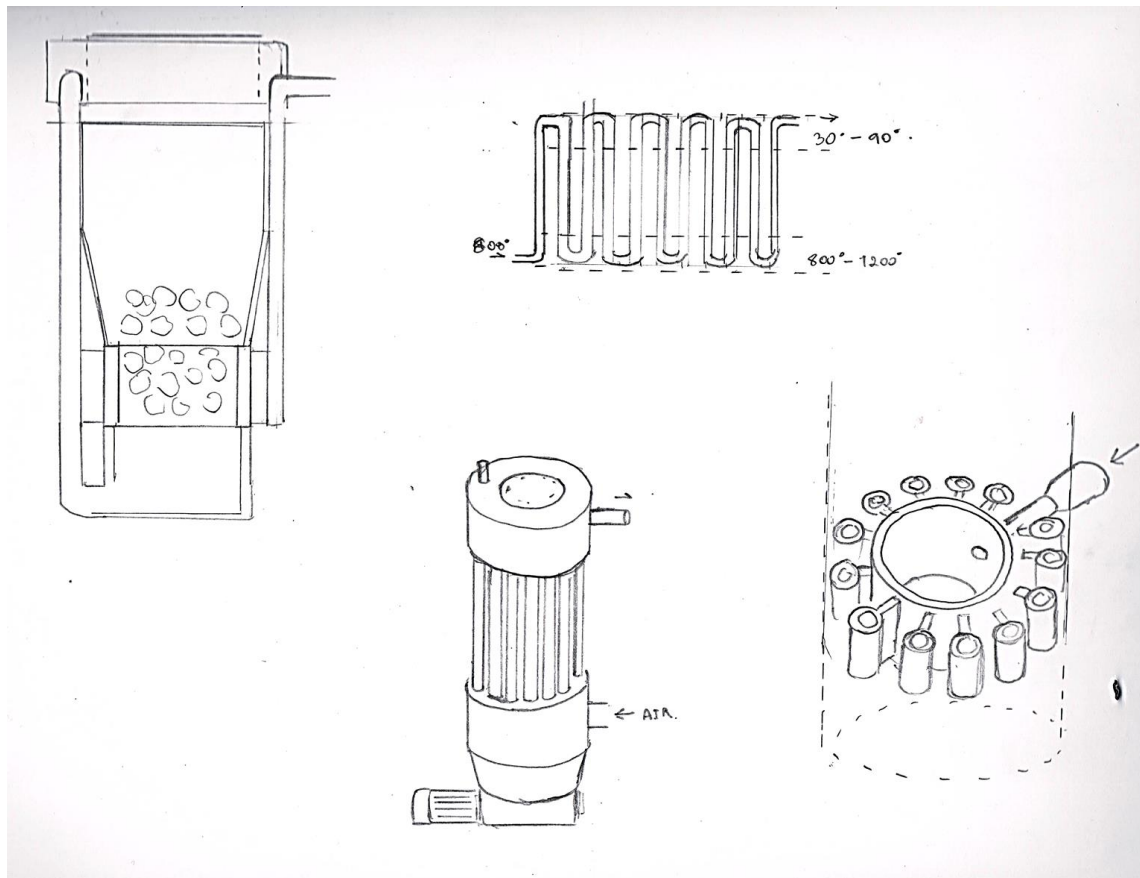
## Gasification Tar Removal Machine model

Gasification technology can solve the problem of tar build-up during the gasification process via chemical separation.

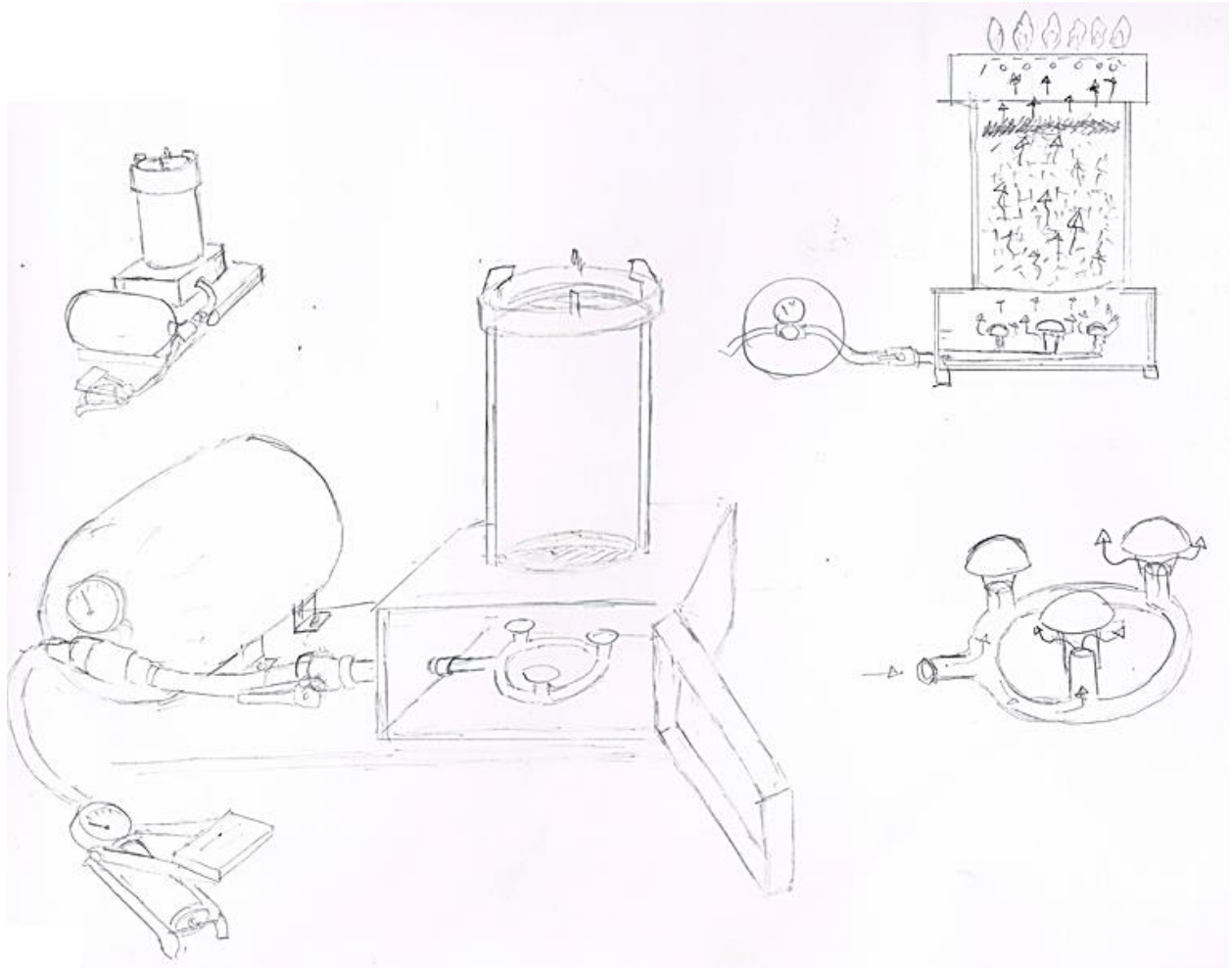
Tar is a term used to describe a complex mixture of condensable hydrocarbons and is undesirable due to its condensation causing blockage in the process equipment.

By using excess heat during combustion (approximately 700-1100 degrees C.), and redesigning the pipe alignment to retain the high-temperature process, tar blockage and corrosive ash elements such as chloride and potassium can be eliminated and thus can keep the machinery clean allowing clean gas production from otherwise problematic fuels.

This concept integrates tar, gas and vapor, thus reducing tar build-up.



## Gasifier with Air Pump

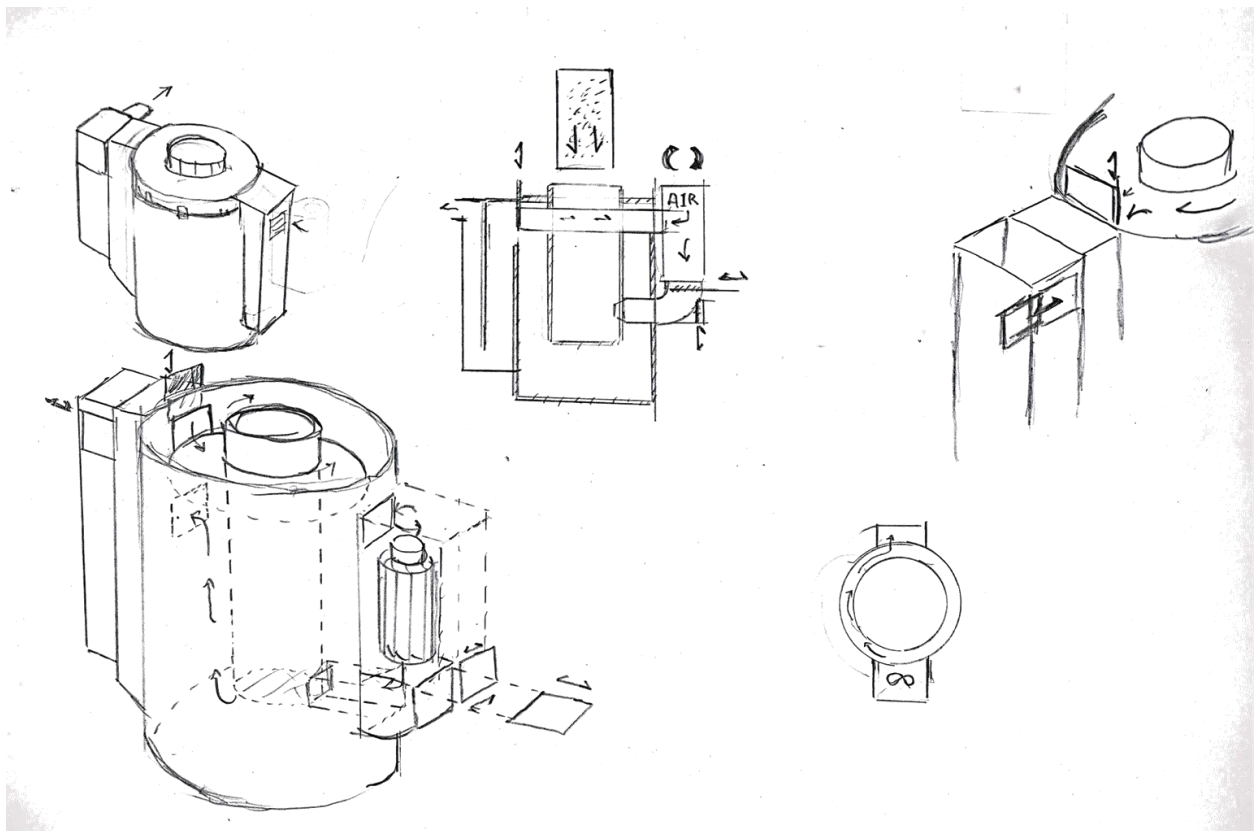


## Alternating air biomass gas production system

With energy demands increasing, and fossil fuel prices remaining high, Biomass gas (Gasification Technology) to convert biomass to renewable energy can provide low-cost energy to rural communities.

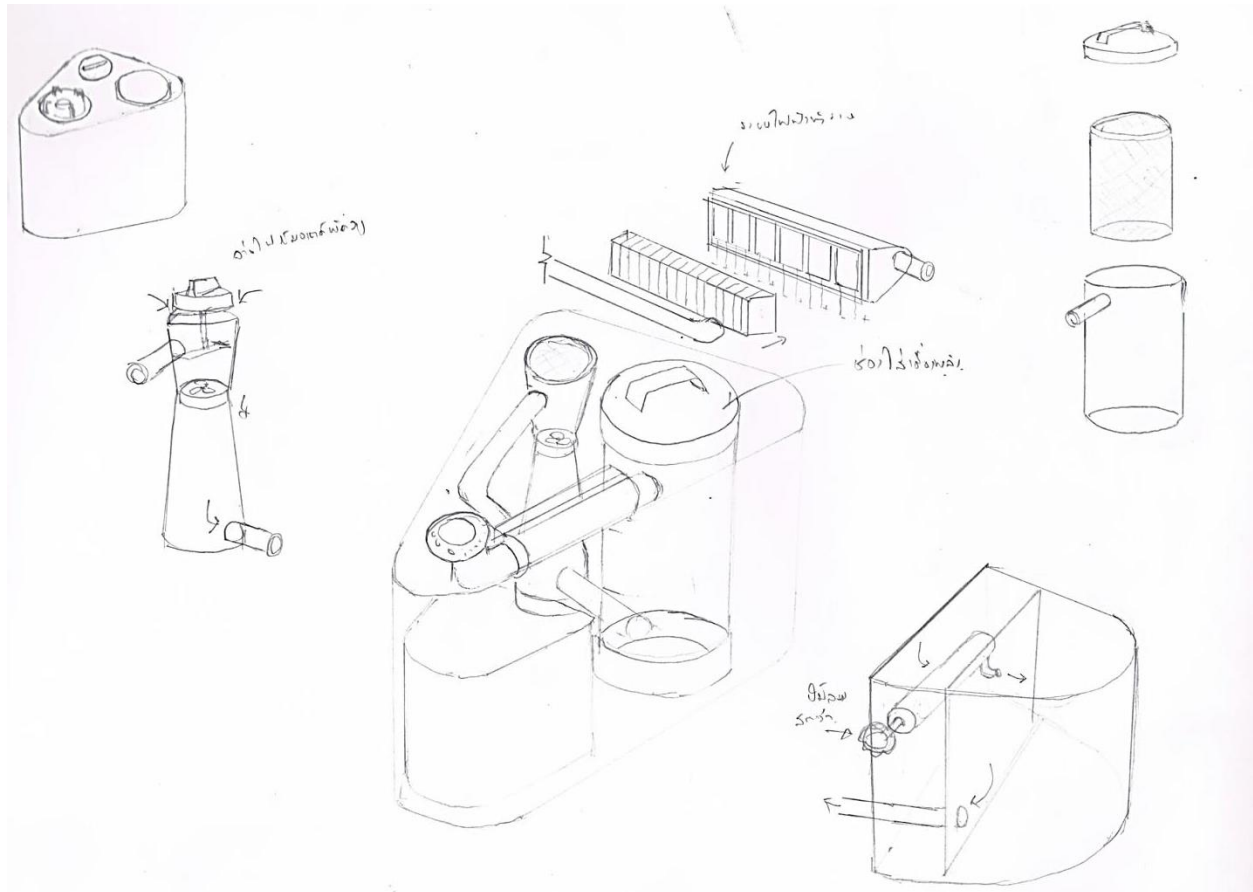
This model alternates blowing air into the reactor which creates a very high gasification temperature thus increasing the energy conversion efficiency.

With energy conversion efficiency increased, the system can meet household energy needs using less biomass, thus saving time and resources

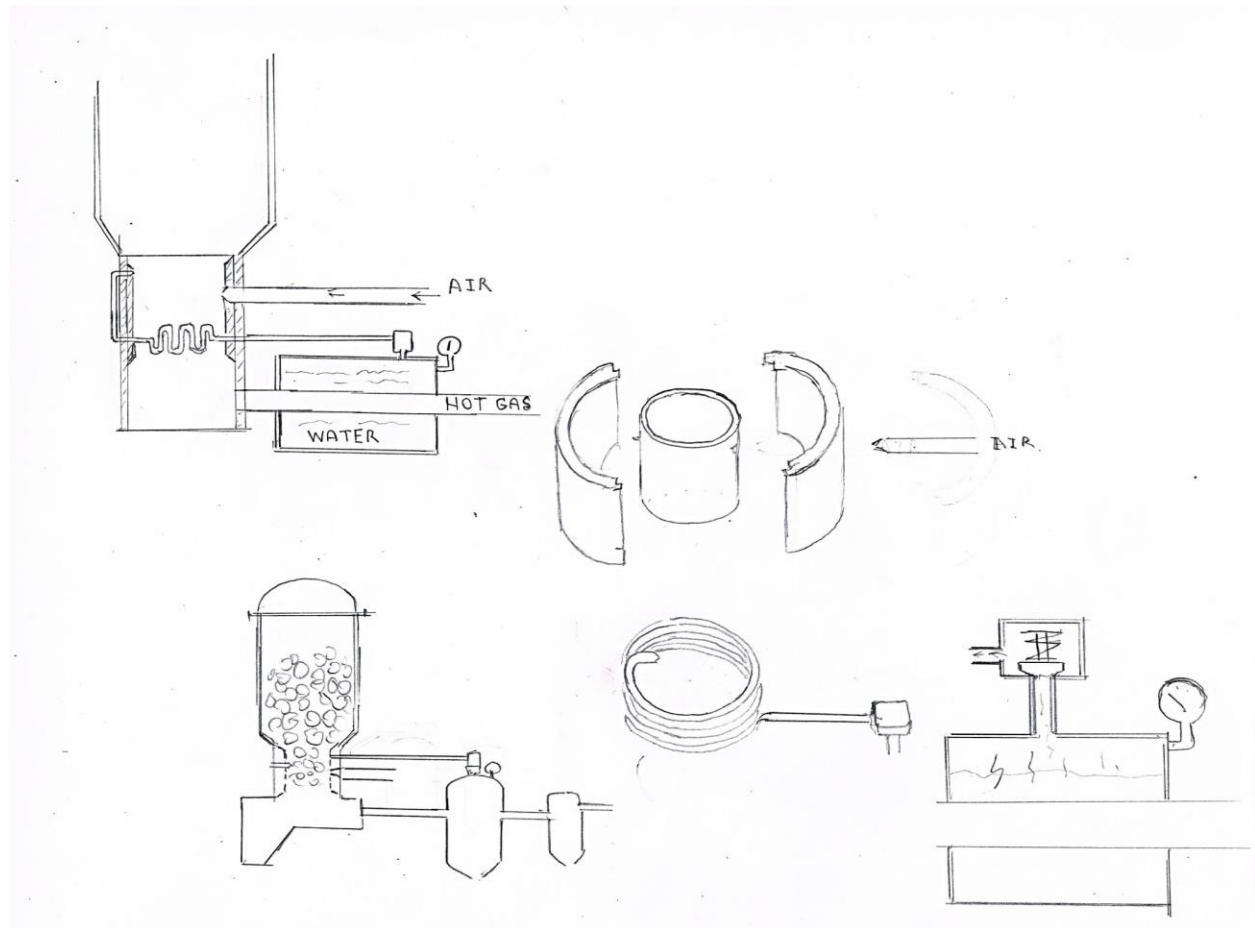




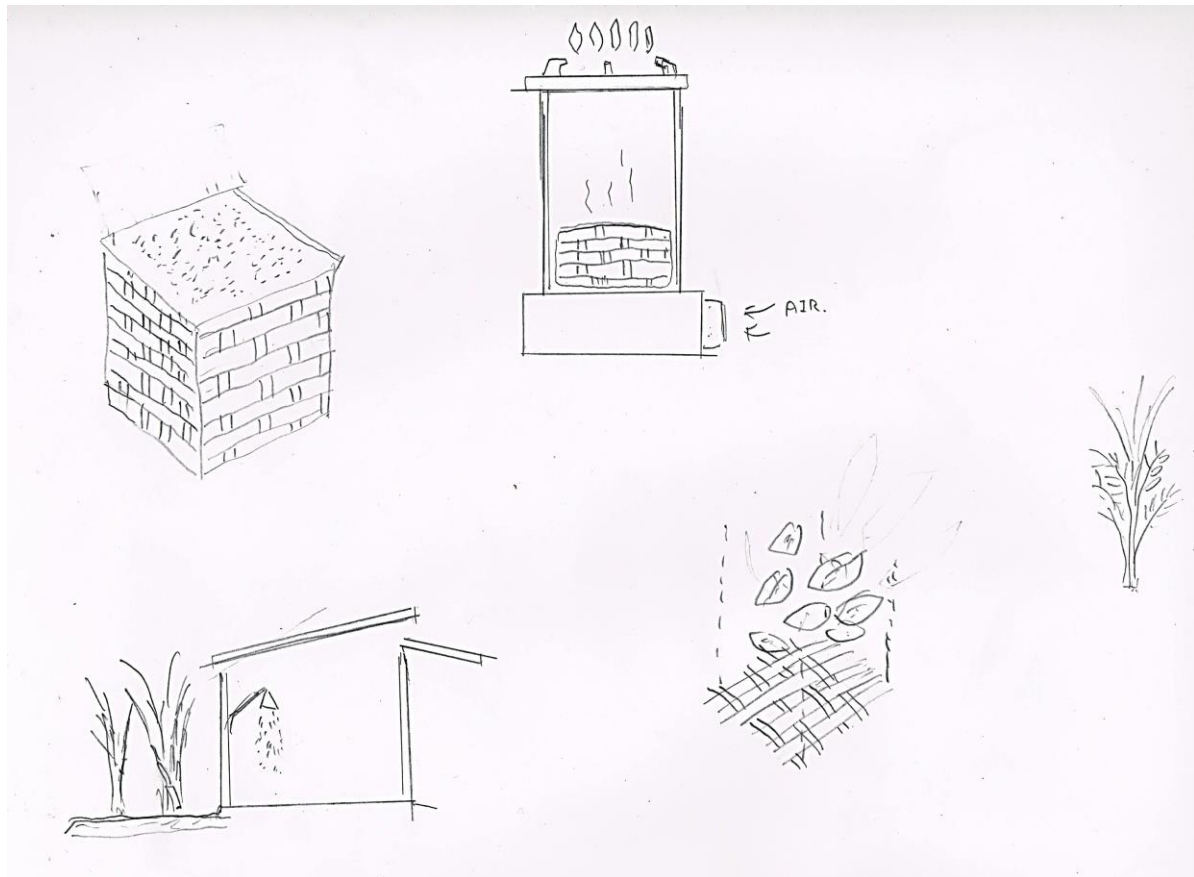
# Gasification Generator



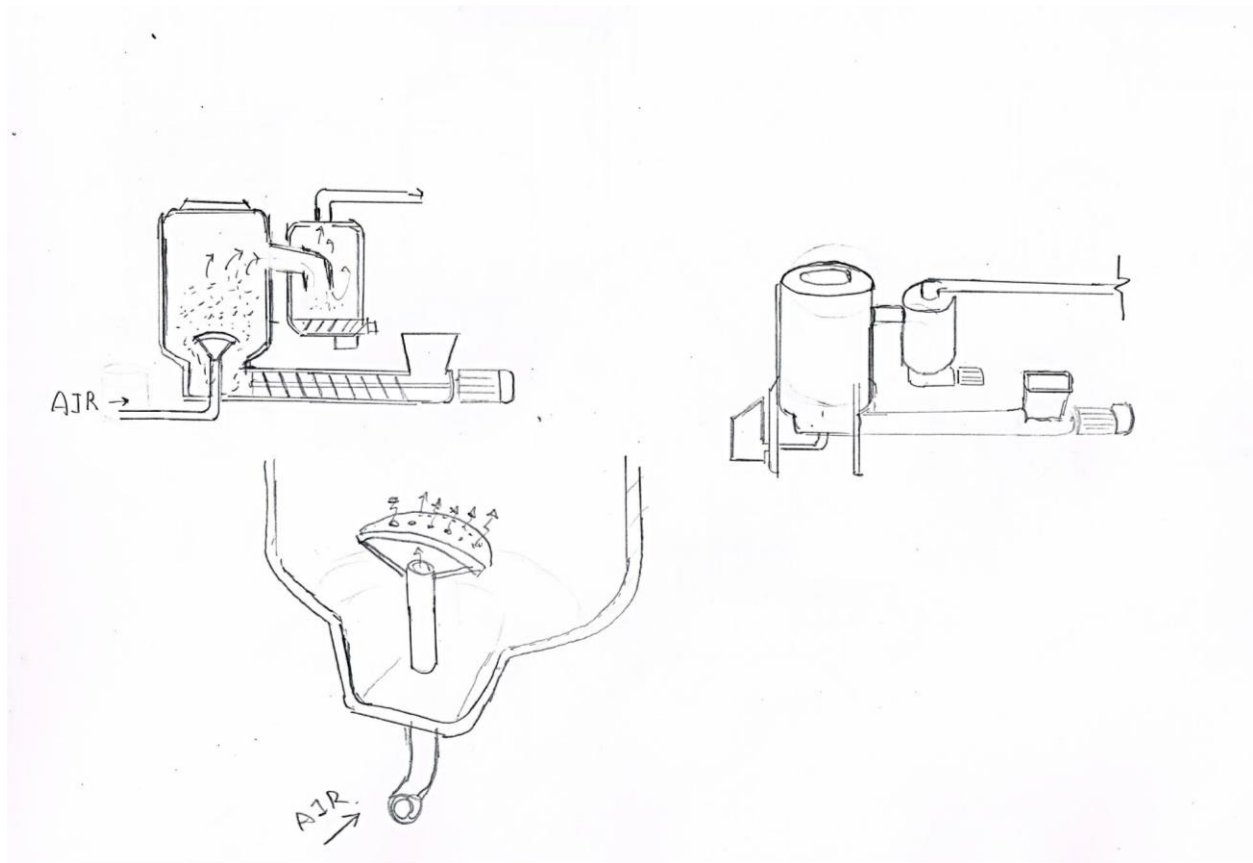
## Gasifier and Hydrogen Energy



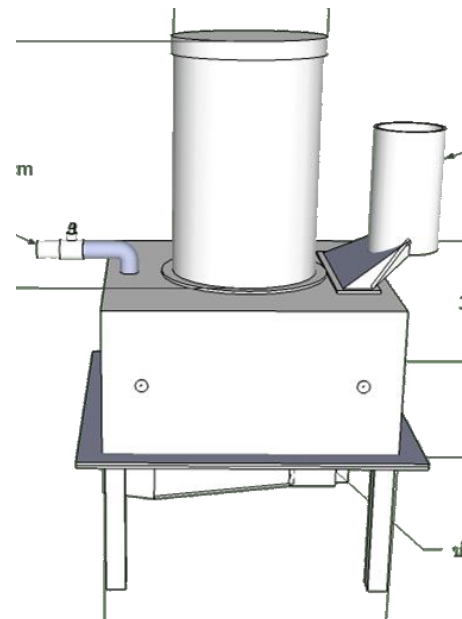
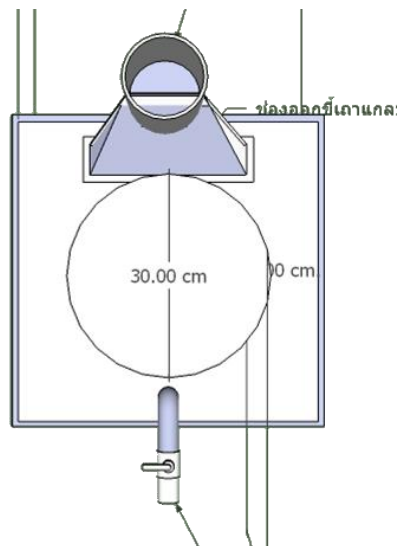
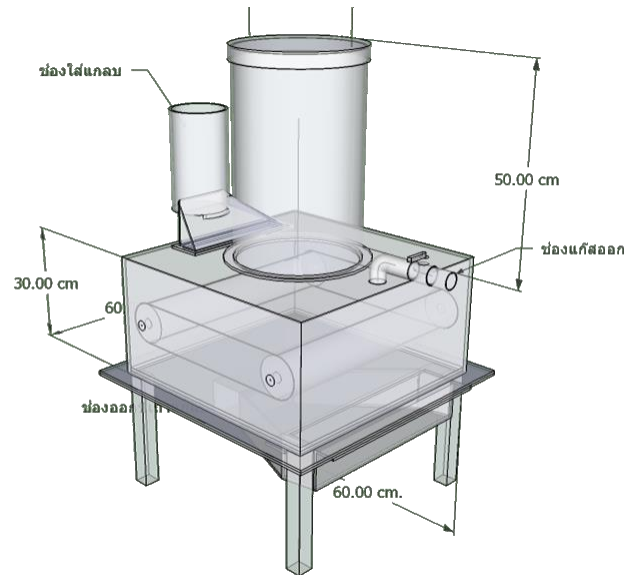
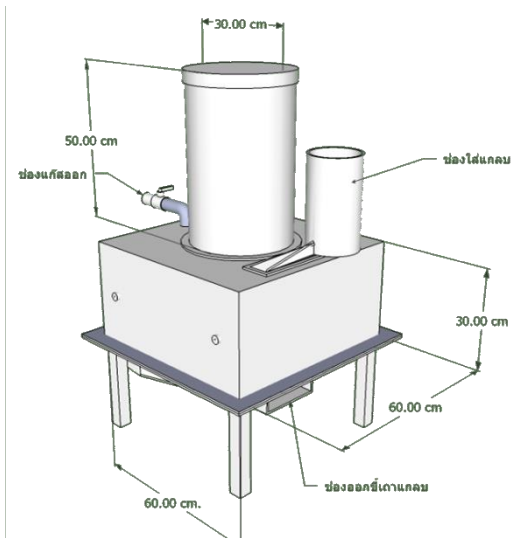
## Loosen Wood Briquette for Updraft Gasification



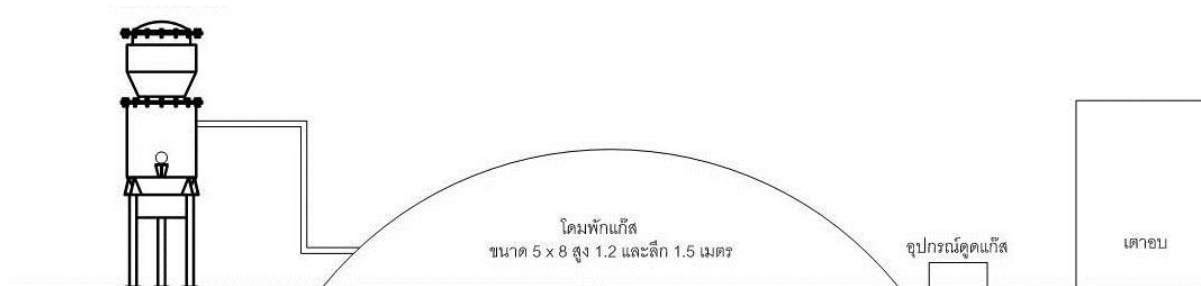
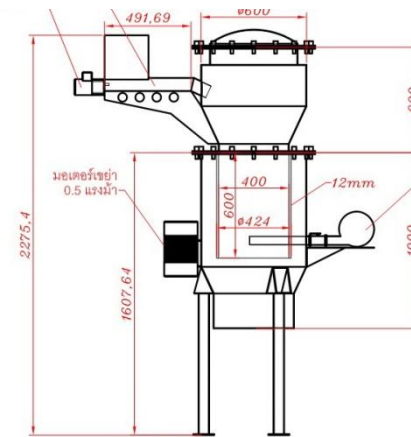
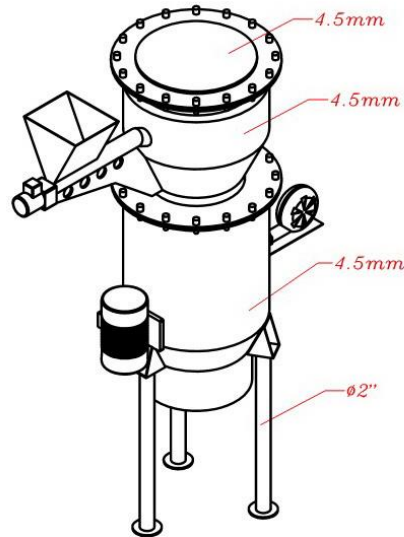
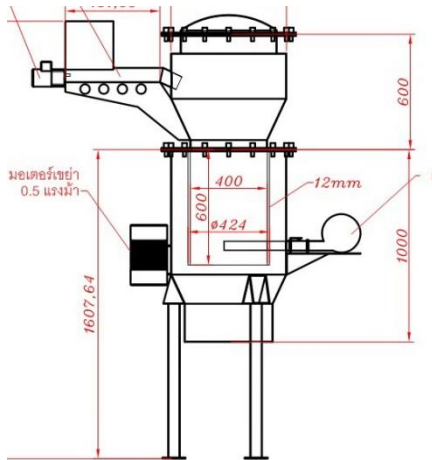
## Screw conveyor Continuous Updraft Gasification



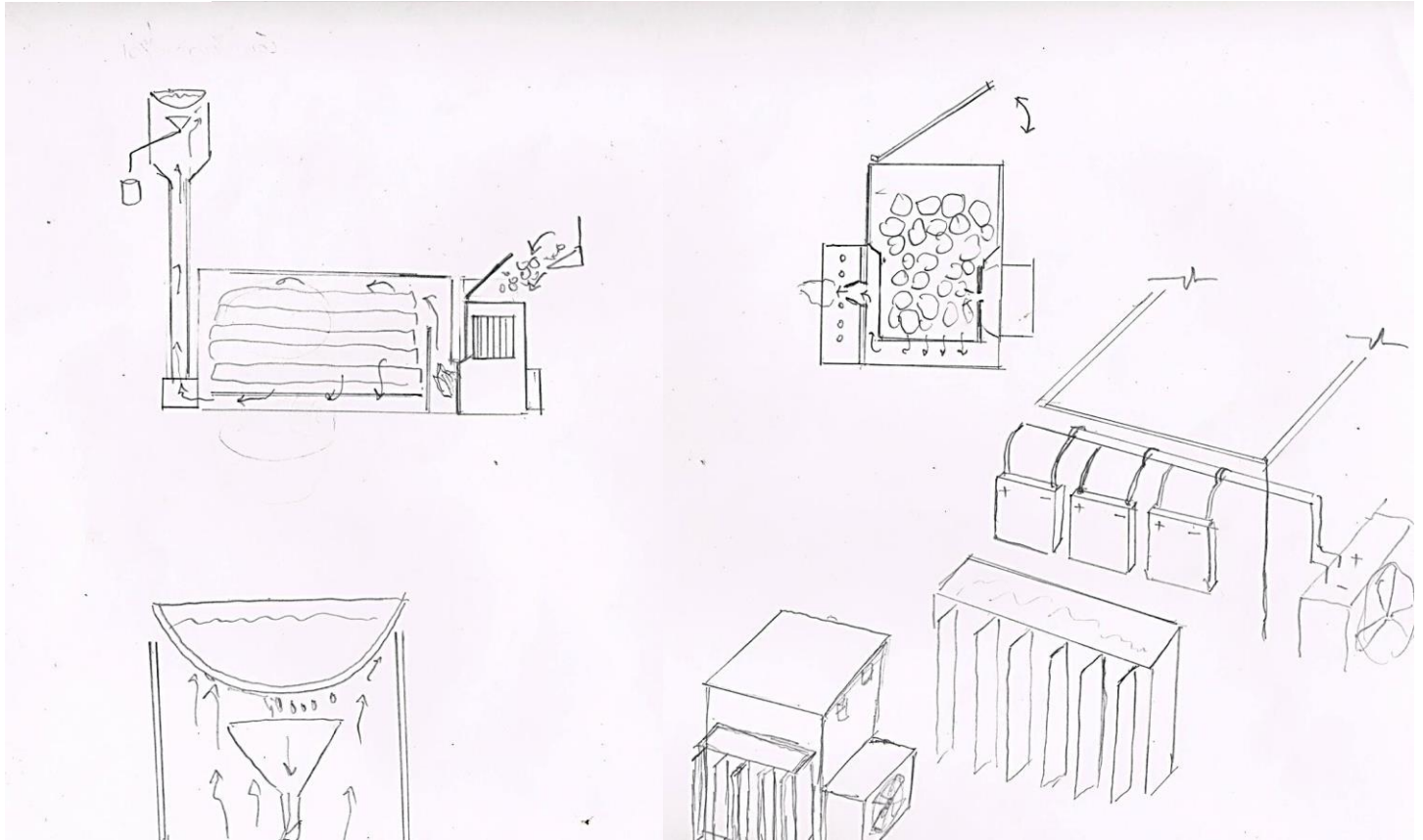
## Belt conveyor Continuous Updraft Gasification



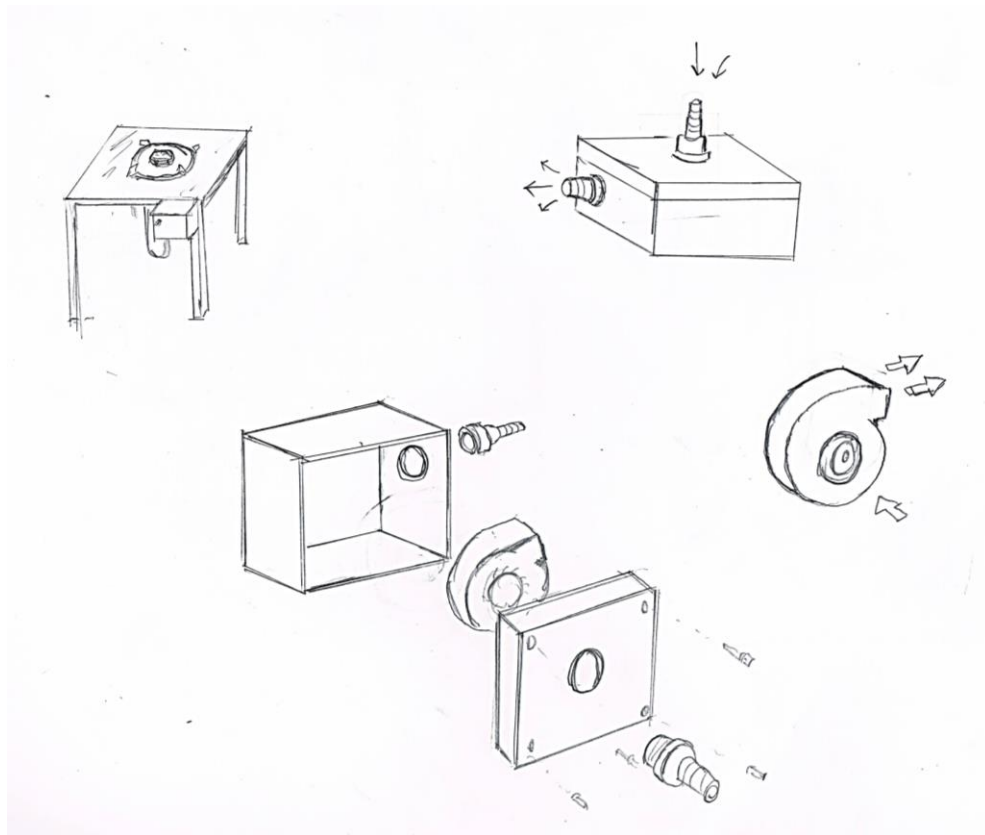
## Continuous Downdraft Gasification with Vibration system



## Charcoal kiln using heat from gasification



## Increasing Pressure for biogas and gasification



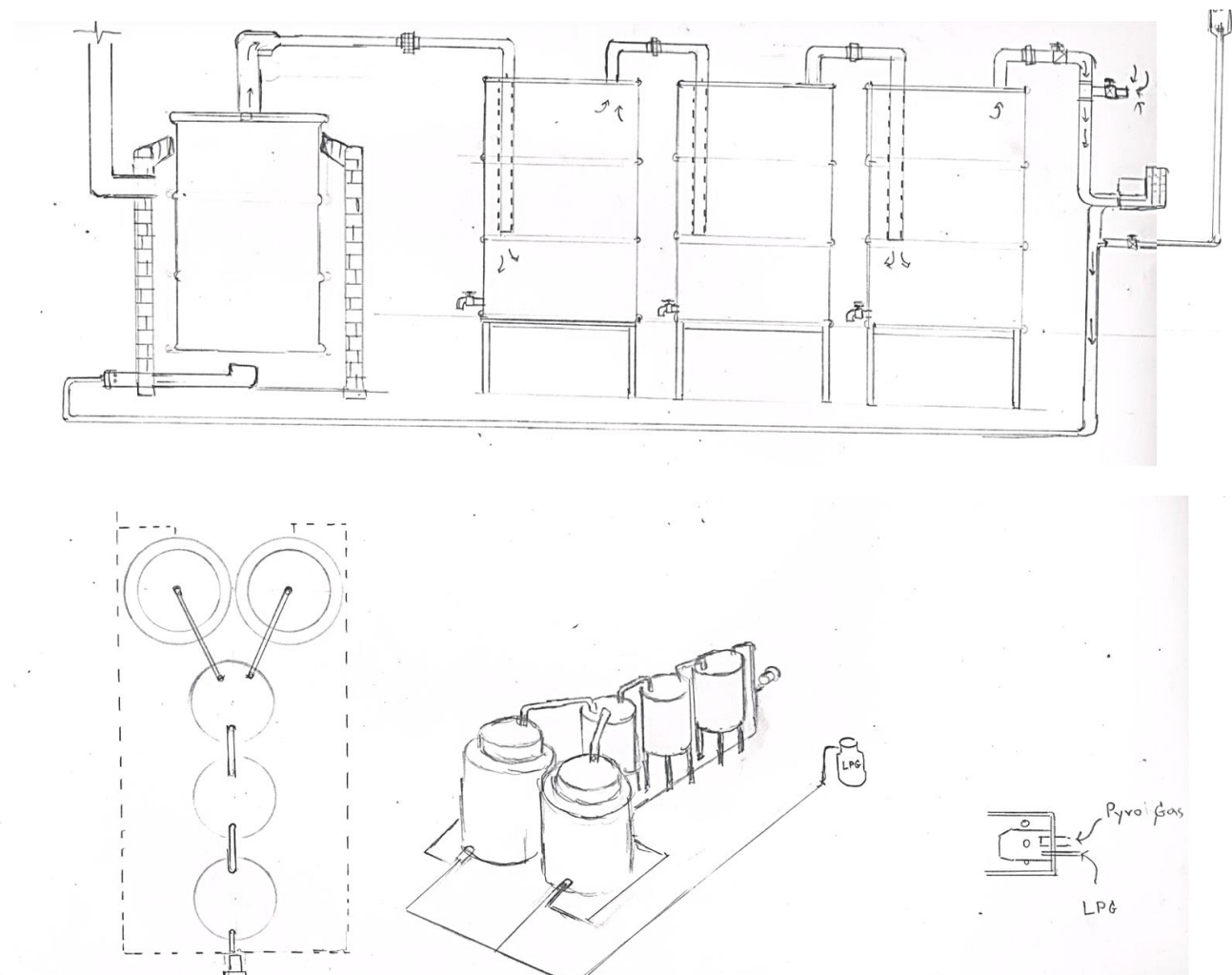


## Pyrolysis: system to convert waste to energy

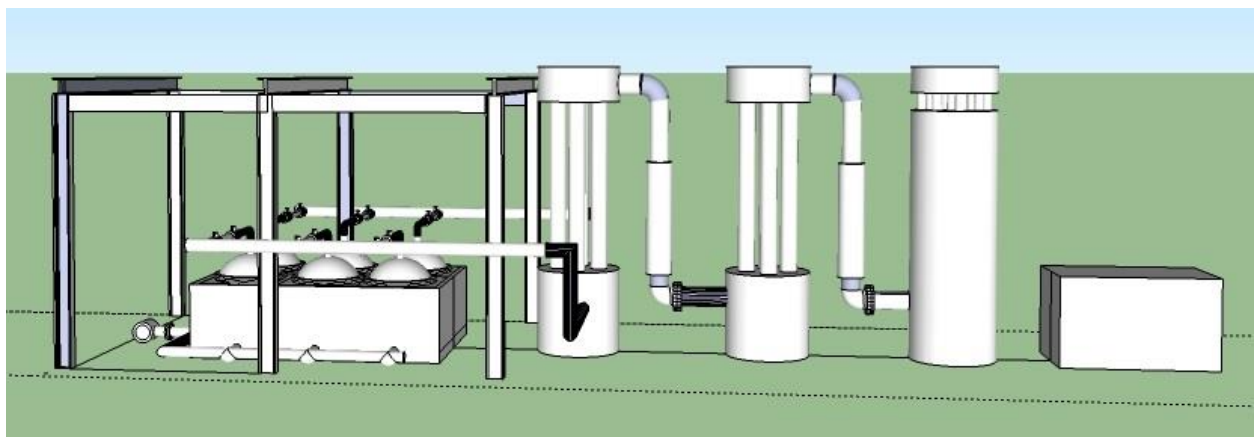
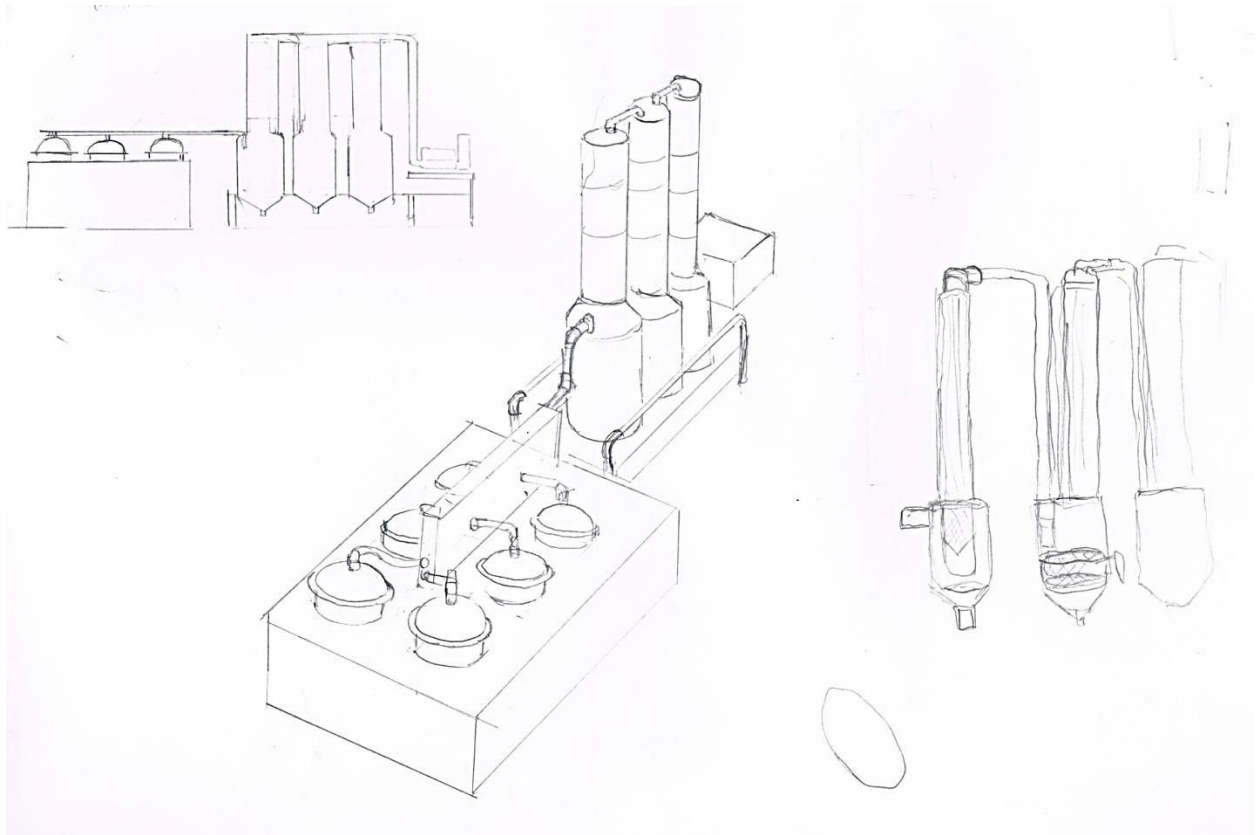
Pyrolysis is a thermochemical decomposition of mainly organic material at elevated temperatures in the absence of oxygen (or any halogen). It involves the simultaneous change of chemical composition and physical phase, and is irreversible. Its application here is to decompose plastics widely available in the form of trash and recover the fuel from the process.

The machinery used for this waste to fuel energy process is a 200-liter fuel tank, two tank heater to maintain sufficient temperature, three or more exhaust fans, and light burner LPG gas stove which can be applied for cooking at home to use the fuel converted from the waste plastic.

The system is able to convert up to 50-60 per cent fuel oil of the amount of recycled scrap.



## Continuous Pyrolysis system

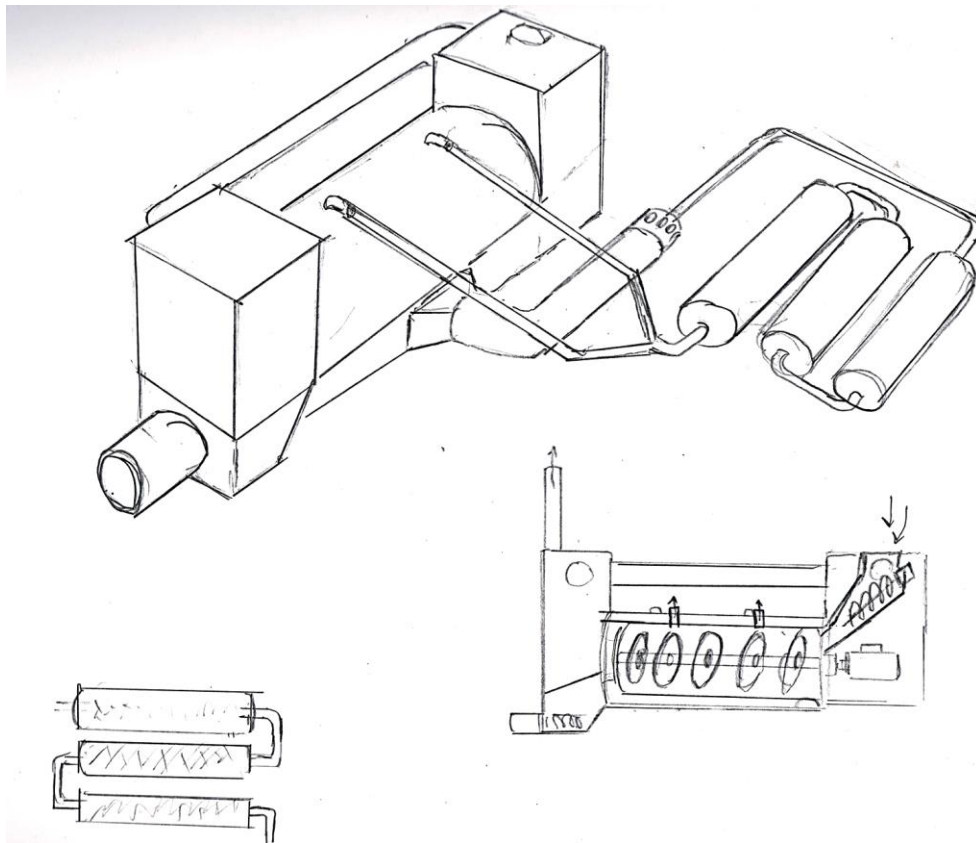


## System for continuous conversion of plastics to fuel

Plastic waste is a big problem that can now be addressed via applying a system that continuously converts plastic to fuel oil.

The machine is designed to handle large quantities of plastic waste and allows feeding plastic into the machine with out air flowing back into the apparatus. This allows smooth functioning and avoids damage to the machine itself.

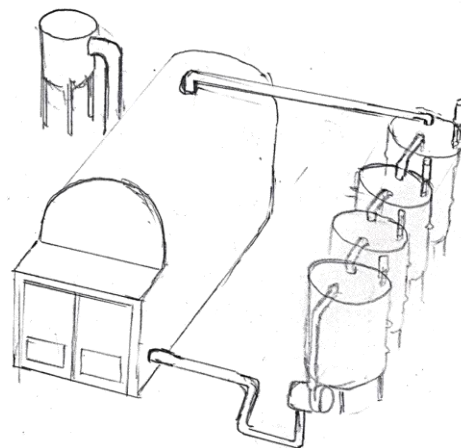
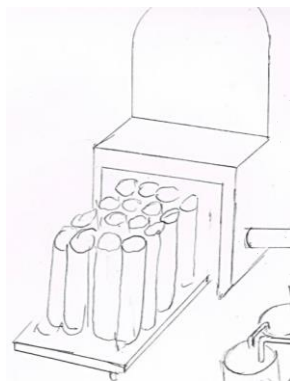
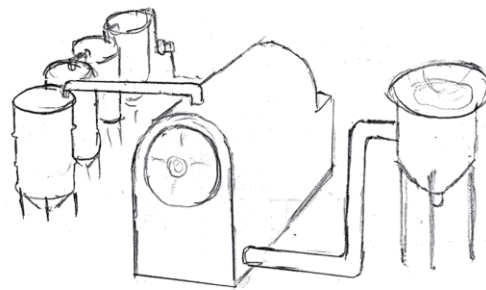
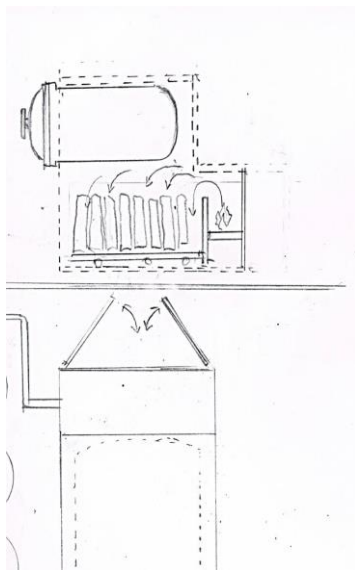
The system also allows for the efficient storage of fuel.



## Extracting oil via burning charcoal

In many rural and remote areas, burning charcoal is still a popular method to produce heat. The method calls upon using a small fire and adjusting the air flow until wood becomes charcoal. **And to be able to collect wood vinegar with insecticide .**

Implications of this method can thus be applied to extract oil from plastic, yet another path for oil production. This application could reduce the large amounts of plastic waste linked to agricultural use, which is an on-going problem in many rural areas in the Asia-Pacific region.

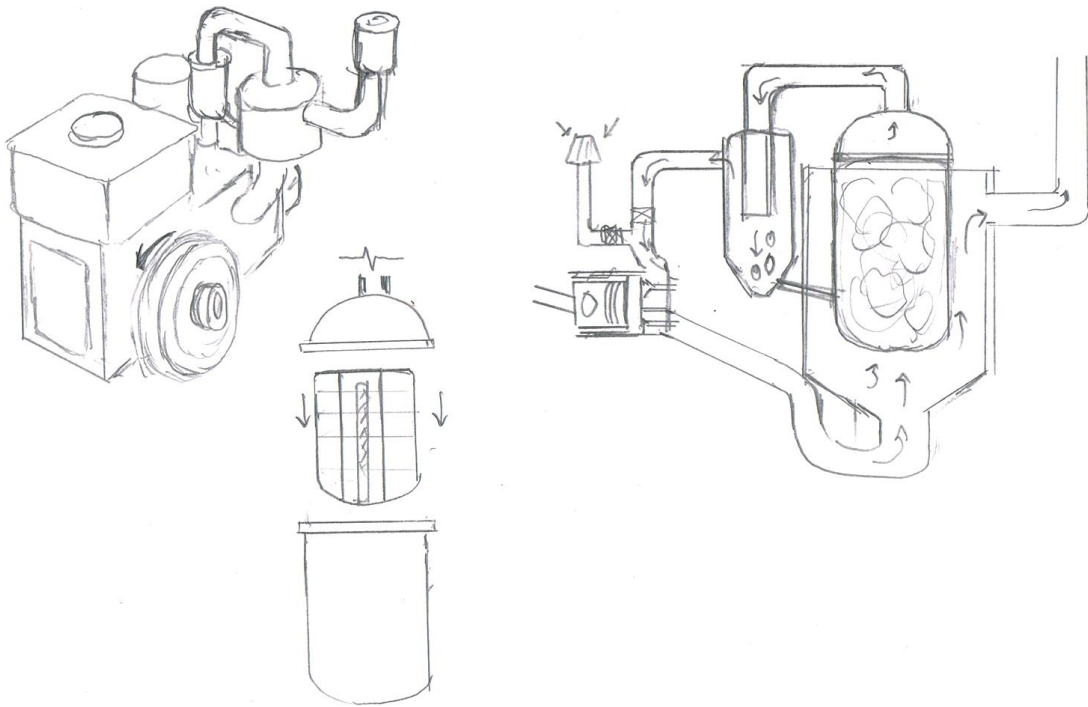


## Converting plastic to diesel

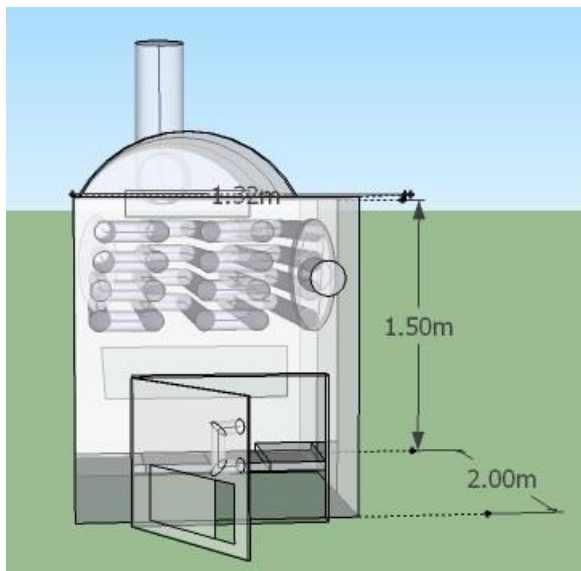
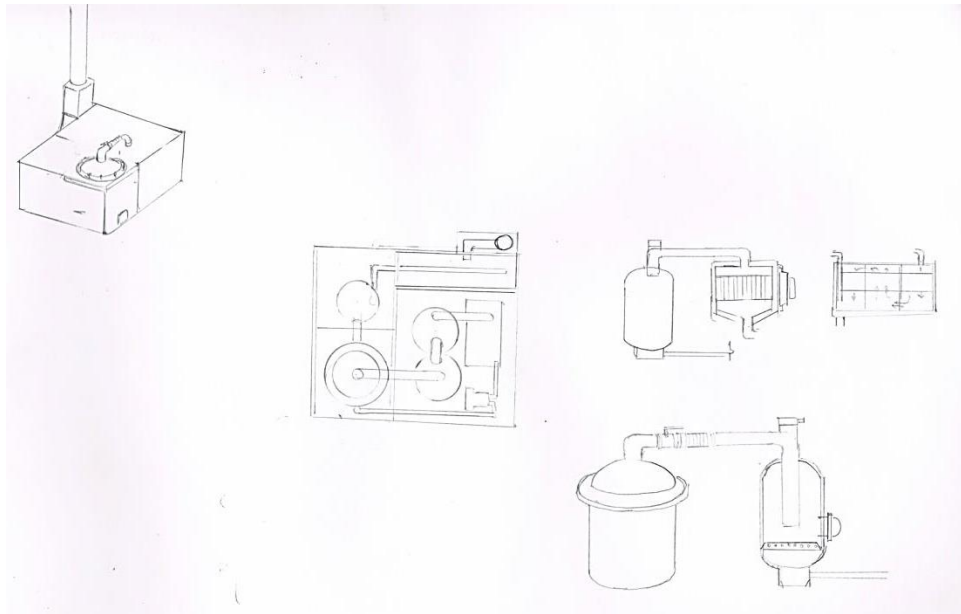
Converting plastic to diesel fuel can add a savings by more than 50 -60 per cent each time ones fills the tank;

This technology combines Pyrolysis and gasification technology to produce fuel gas to mix in the intake system of a engine.

The system also reduces the amount of waste headed to landfills



## Pyrolysis Incinerator Infectious waste

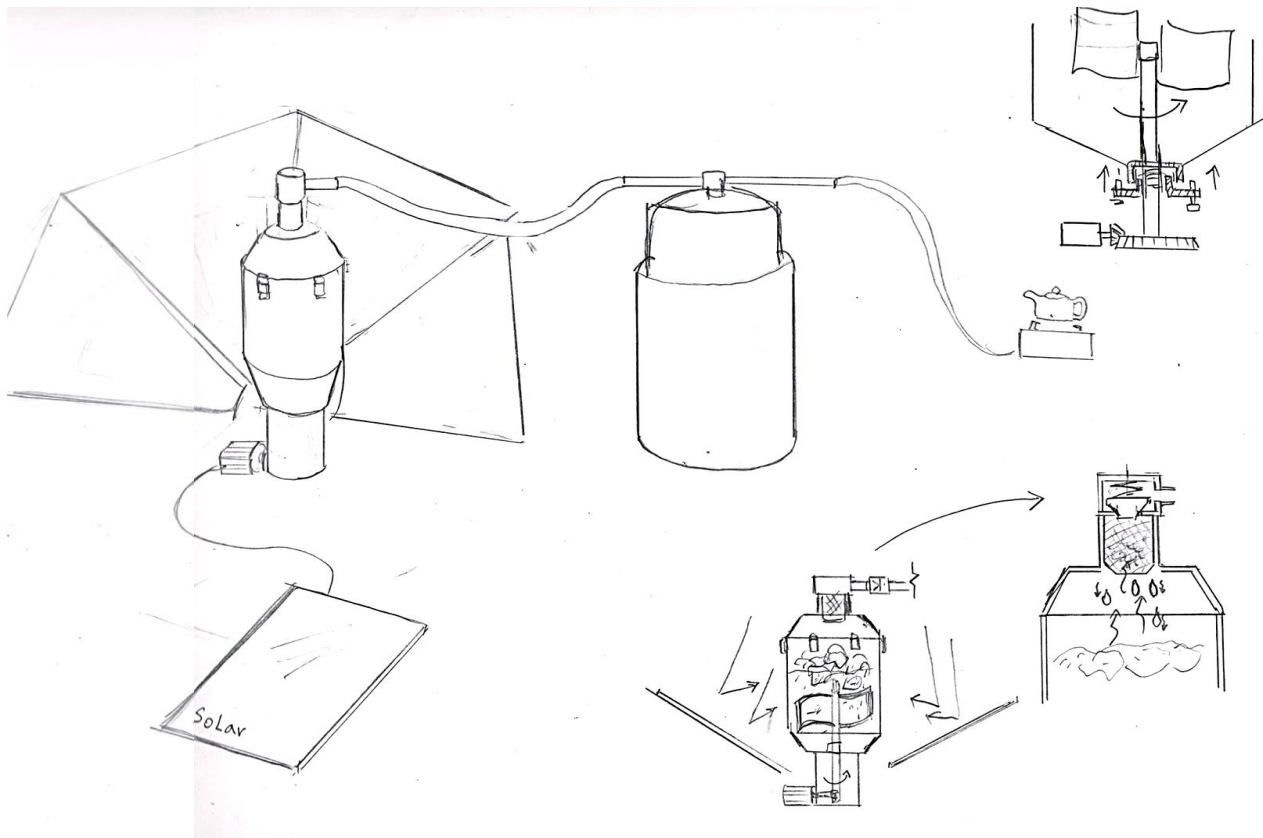


## Gas from plastic

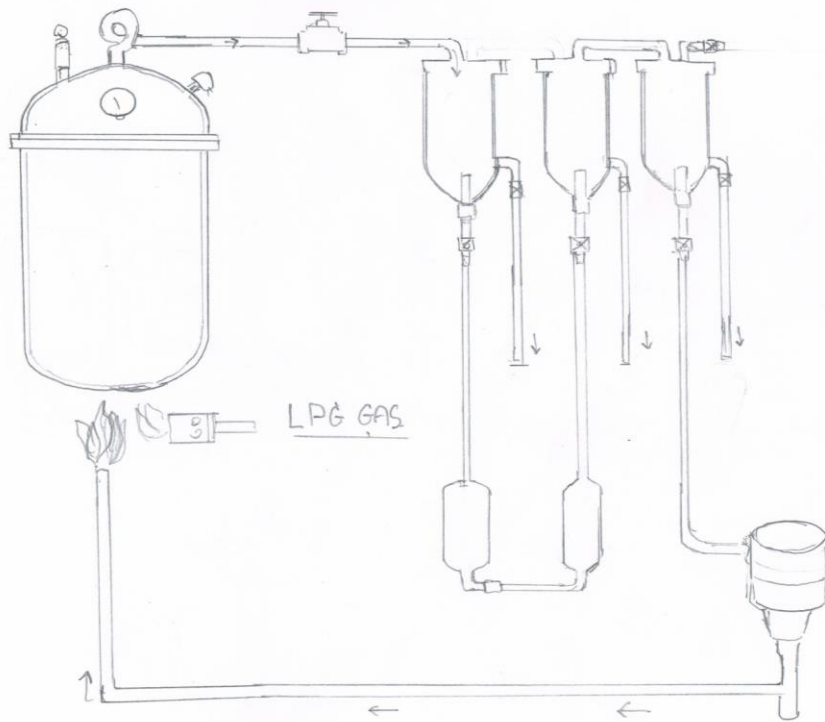
Gas fuel prices including cooking fuel are likely to remain high for the foreseeable future. Thus a possible path to avoid high prices is to produce cooking fuel from plastic waste.

Most plastics do not biodegrade and are a major source of pollution. Converting such is both good for the consumer and the environment.

This machine works to convert plastic to gas using the heat of the sun to power an electric motor.

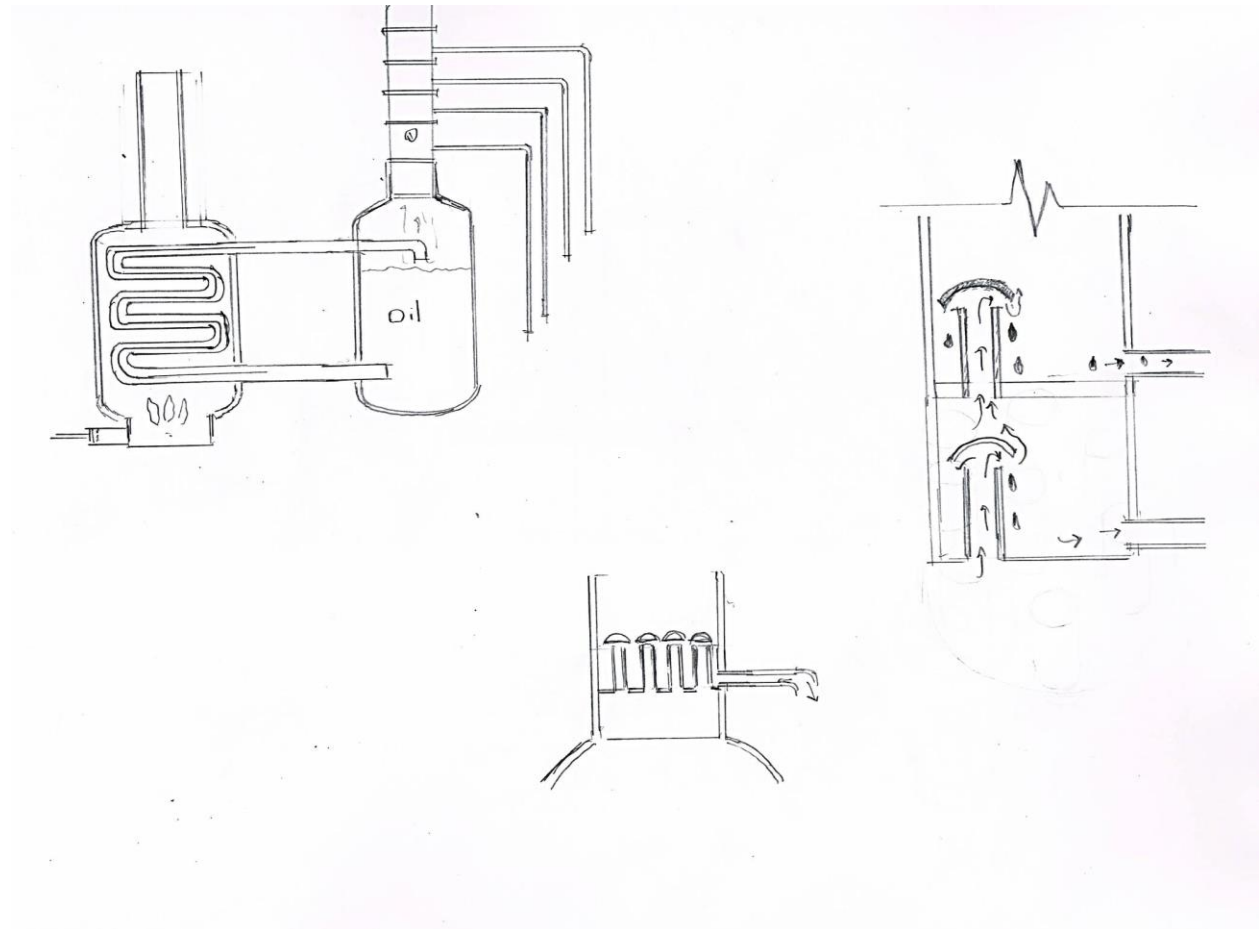


Turn all kind of garbage to fuel oil

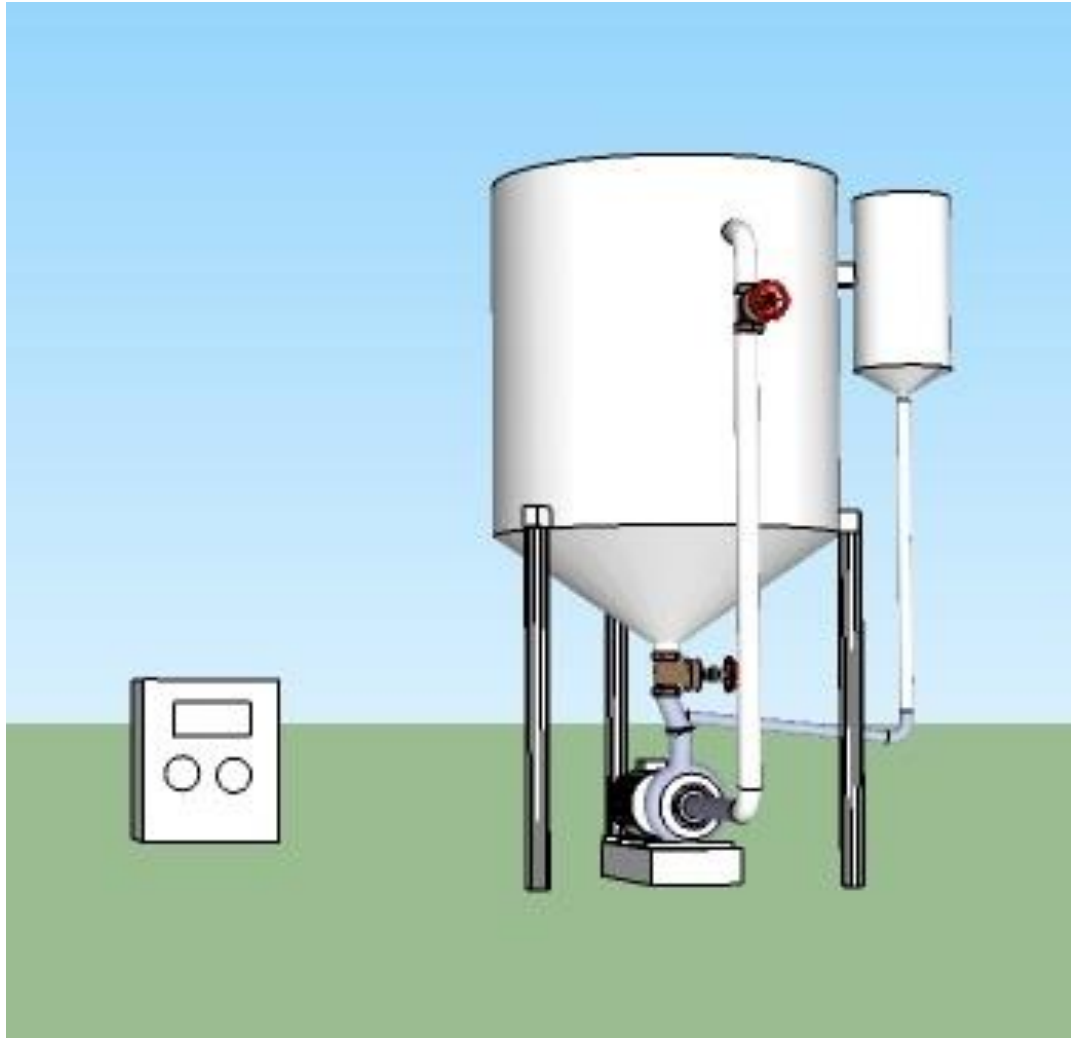




## Condenser Tank



## Community Biodiesel

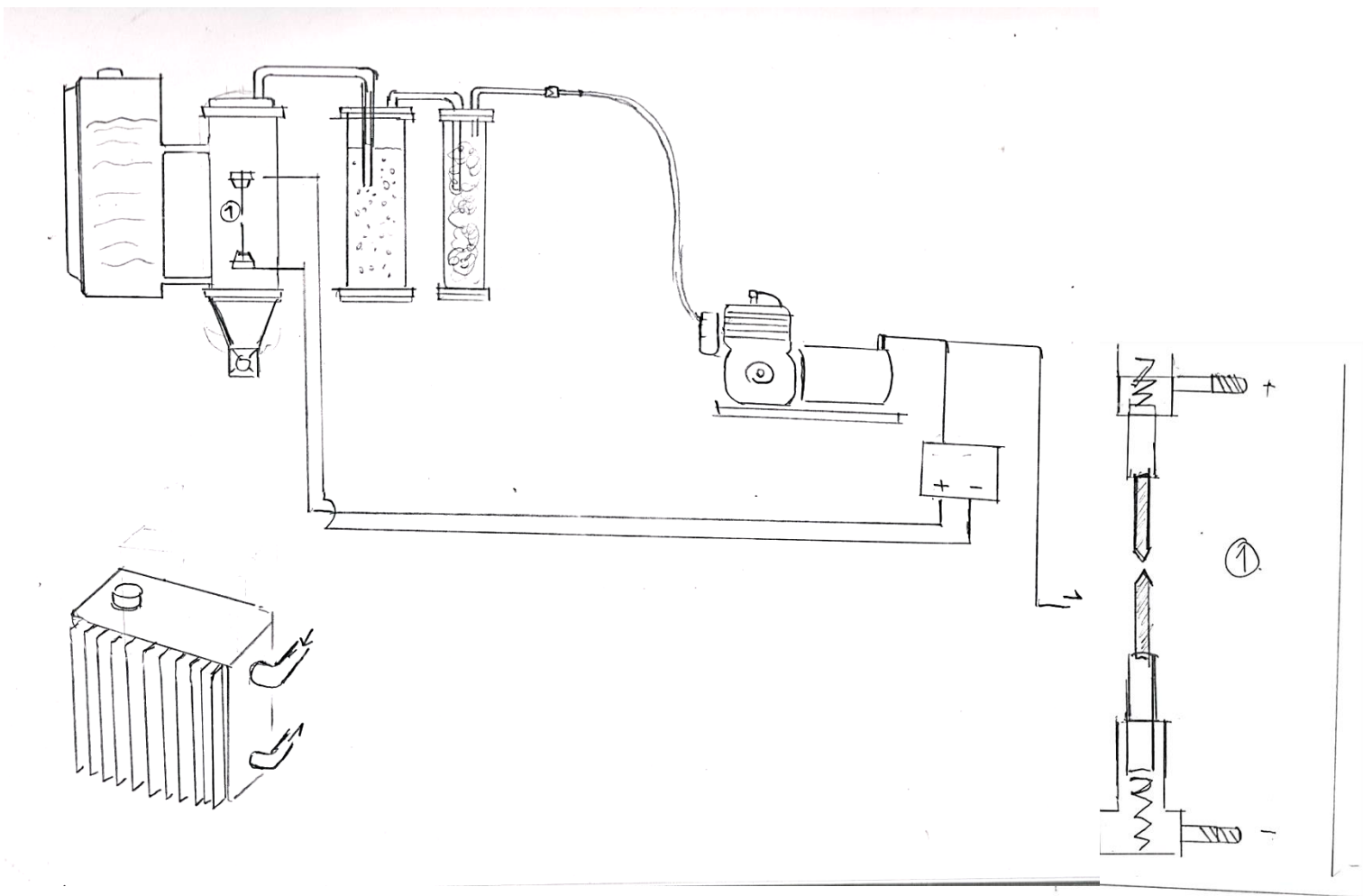


# **Water-generated Energy**

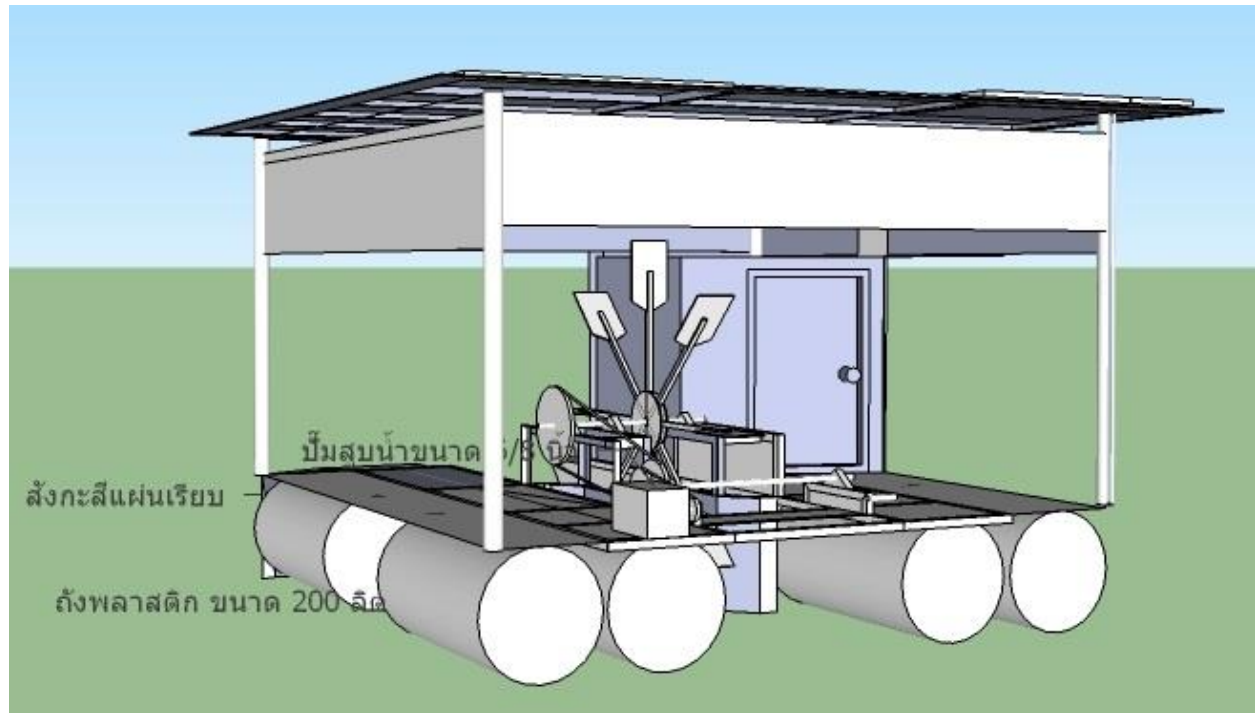
## Renewable energy and water treatment

To aerate and clean water from wastewater treatment requires a lot of electricity consumption. The idea is to off-set the energy consumption of the treatment plant via intervening in the cleaning process.

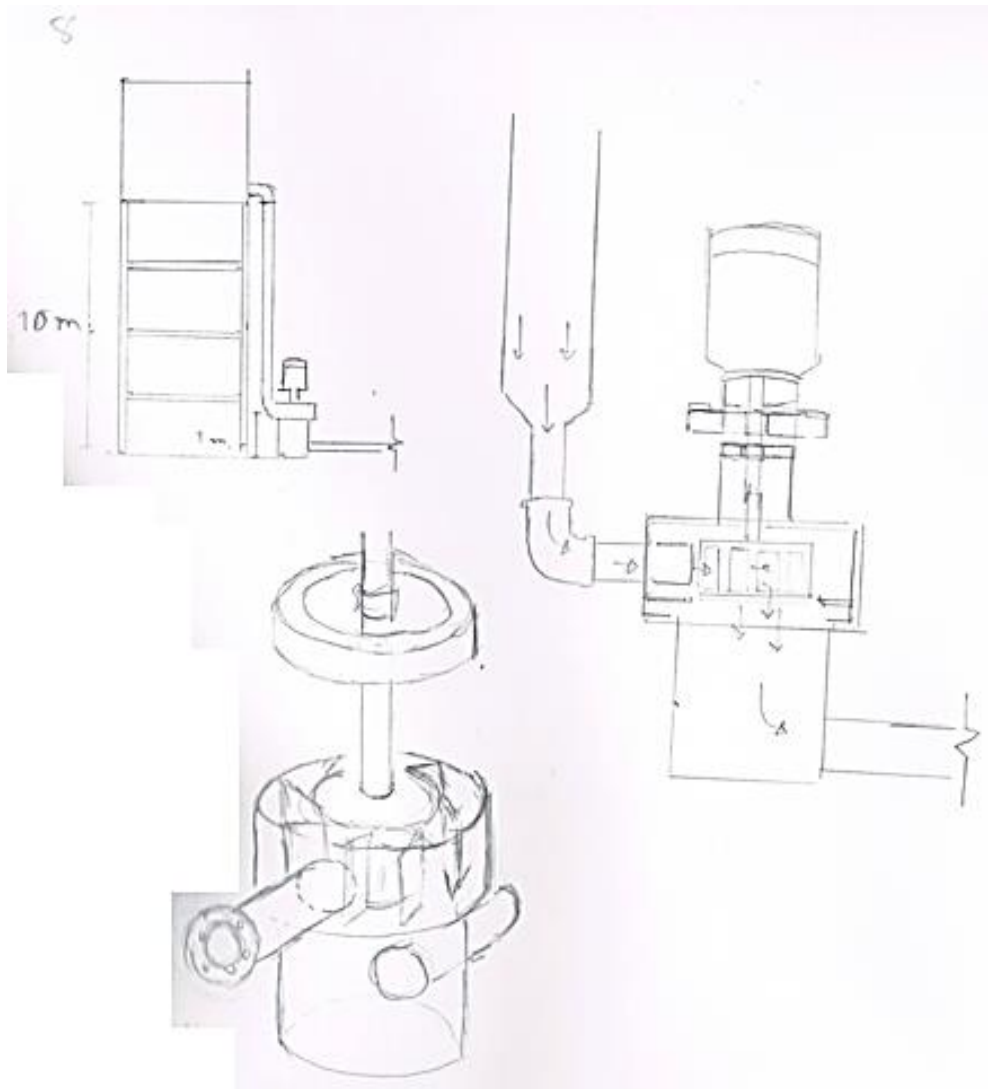
This system uses two metal rods pointed at each other with current running through both bars. At the end of the metal rods a depolarized collision will cause a high voltage spark of more than 1,000 degrees creating ionized gas to use as fuel to off-set the power loss in the electric generator used to aerate wastewater.



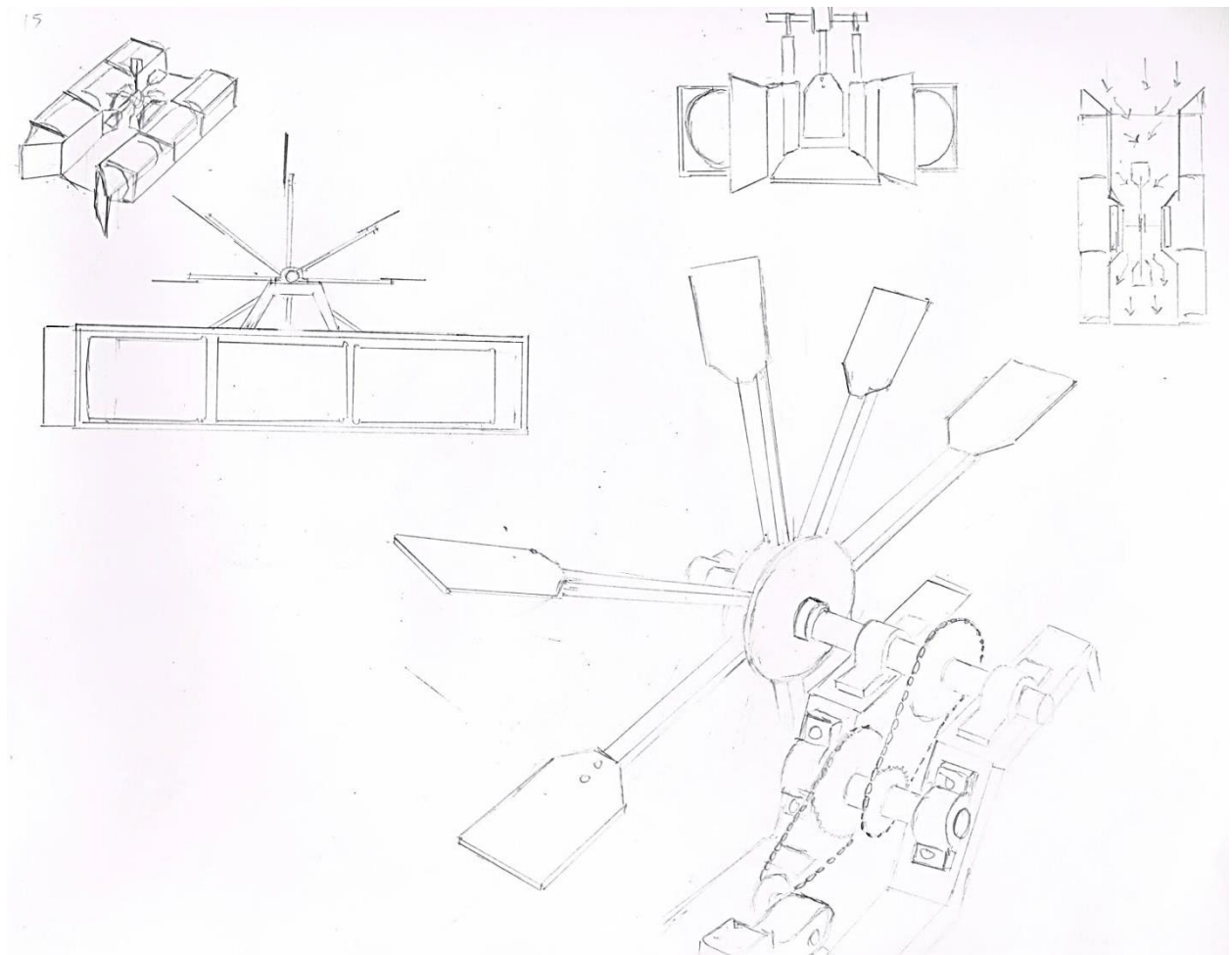
## Water turbine Pump



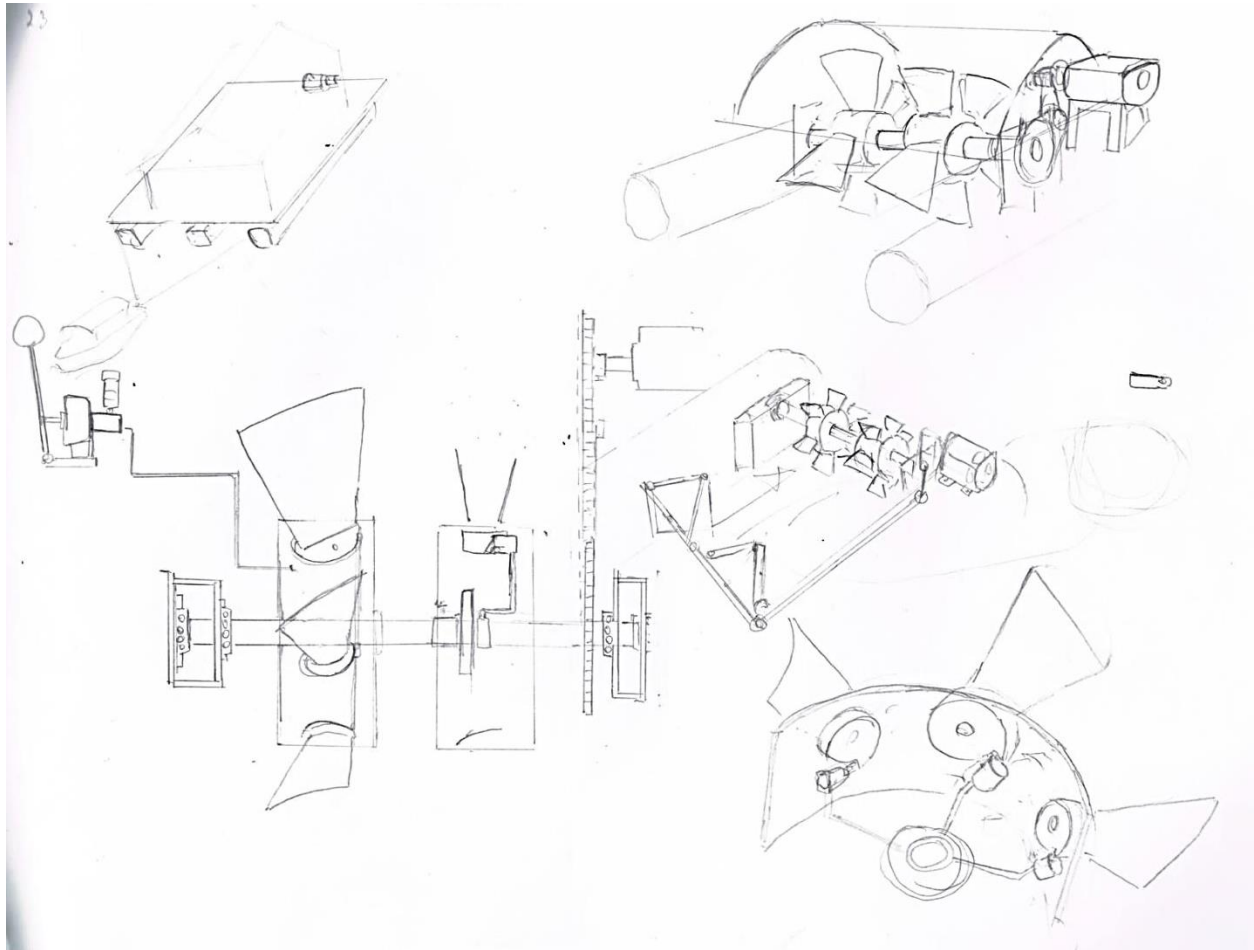
## Electricity Water Tank



## Water turbine forward-reverse Pump

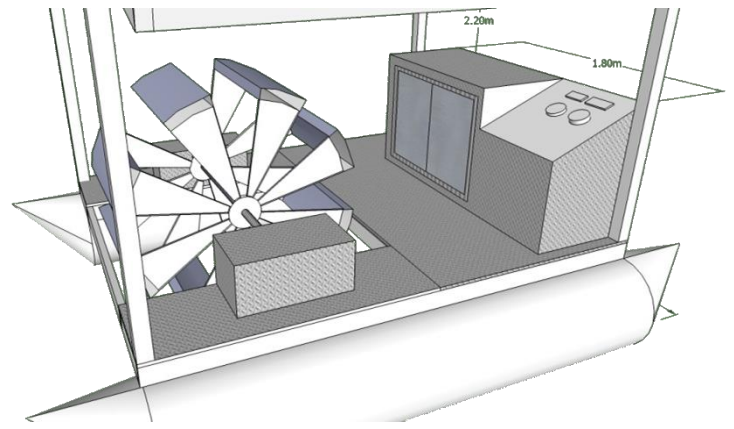
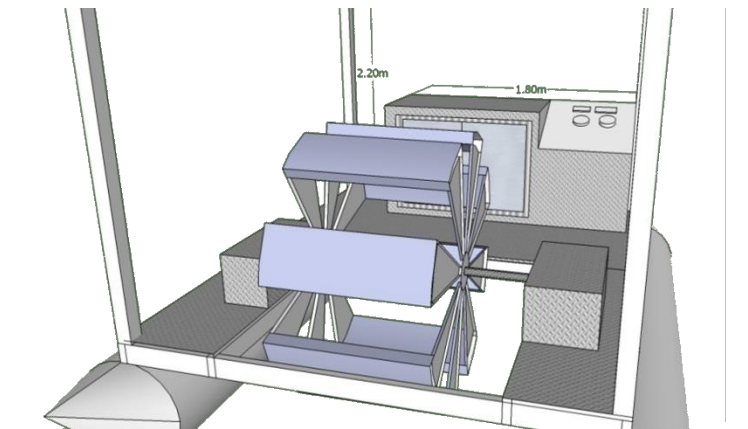
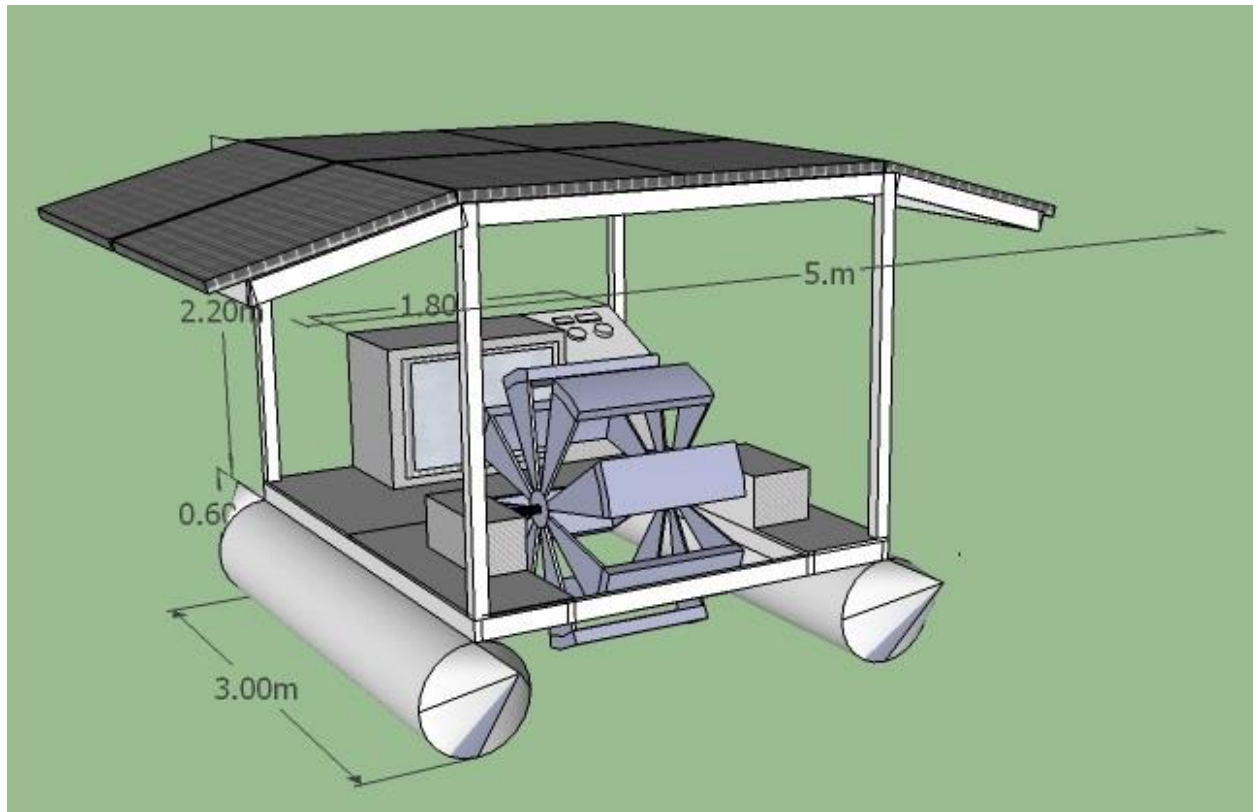


## Hydro Turbine for a Raft

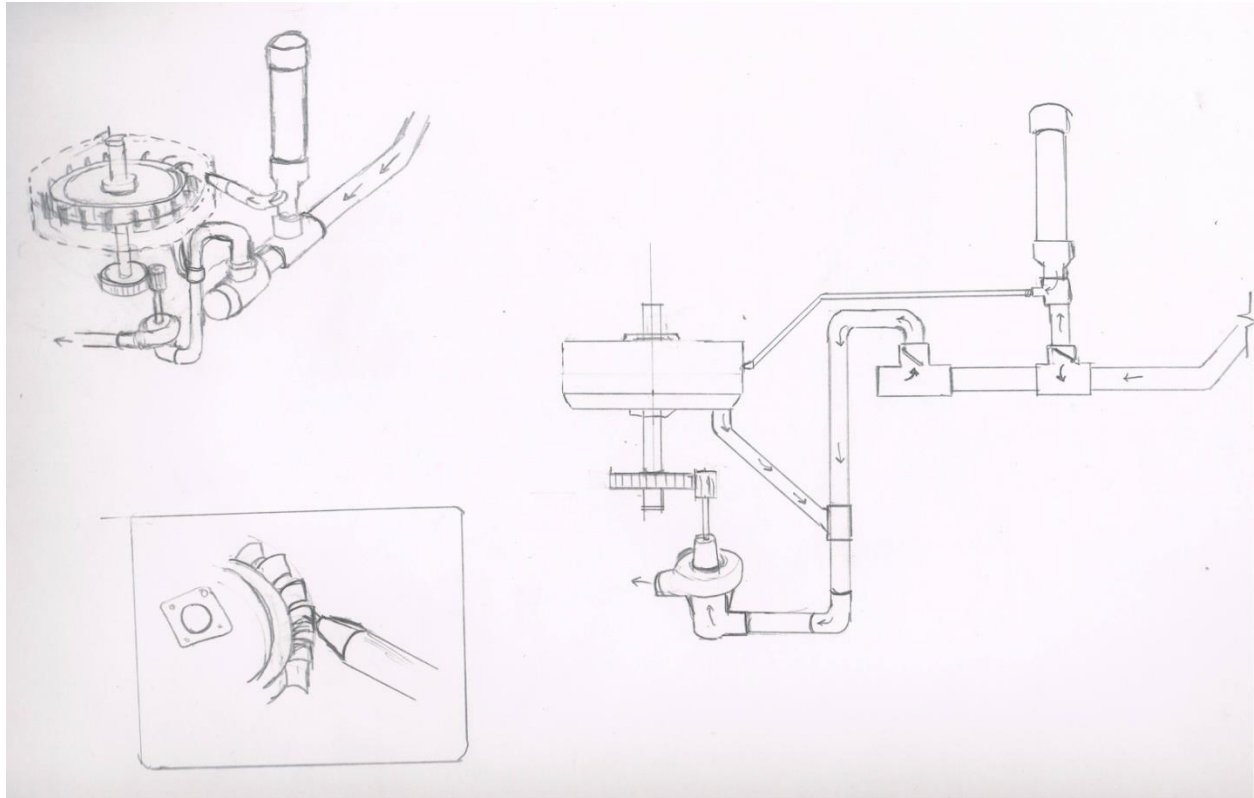




## Water Turbine Aerator



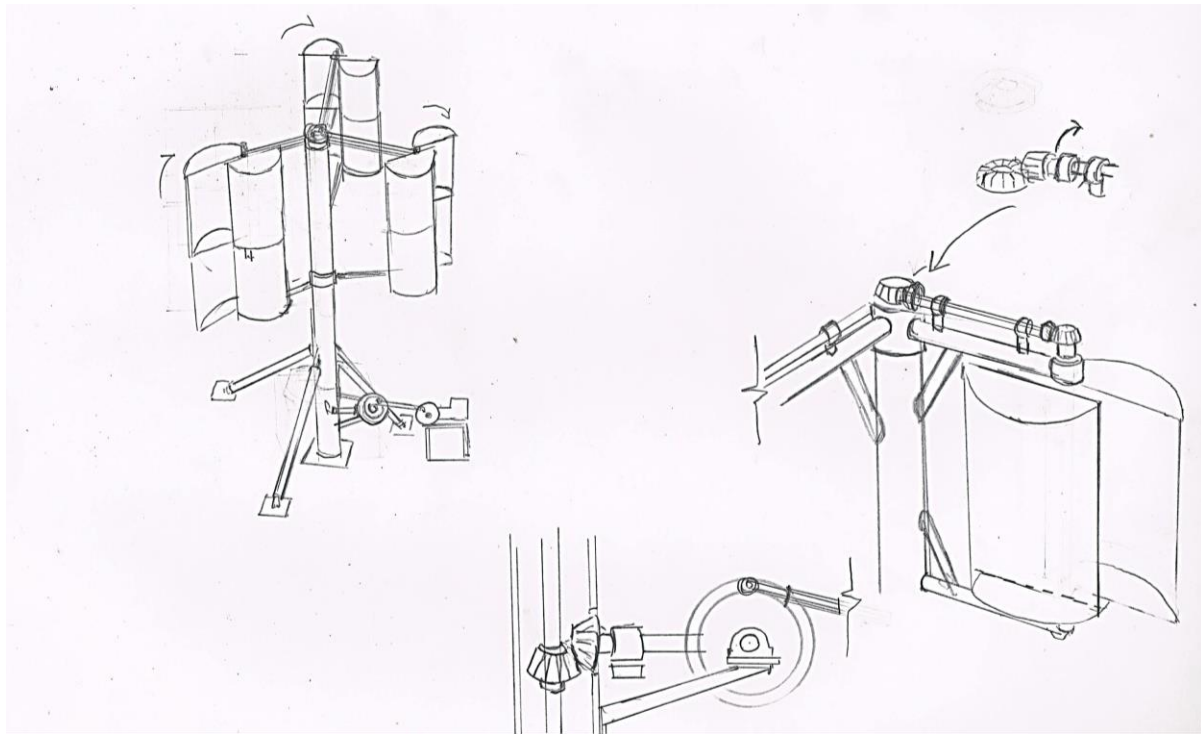
## Super Hydraulic Pump



# **Wind-generated Energy**

## Reduced vibration wind turbine

- Areas with little breeze necessitate a wind turbine that can function under such conditions and also be resilient enough to not breakdown in high winds.
- Varying rotation speed will create vibrations and cause turbine imbalance. To avoid this problem a wide turbine can be developed to reduce propeller vibration that features three leave rotor that transfers to energy directly to the core To reduce the vibration of the wind turbine.
- The tripod design adds stability and the entire turbine can sourced from local materials

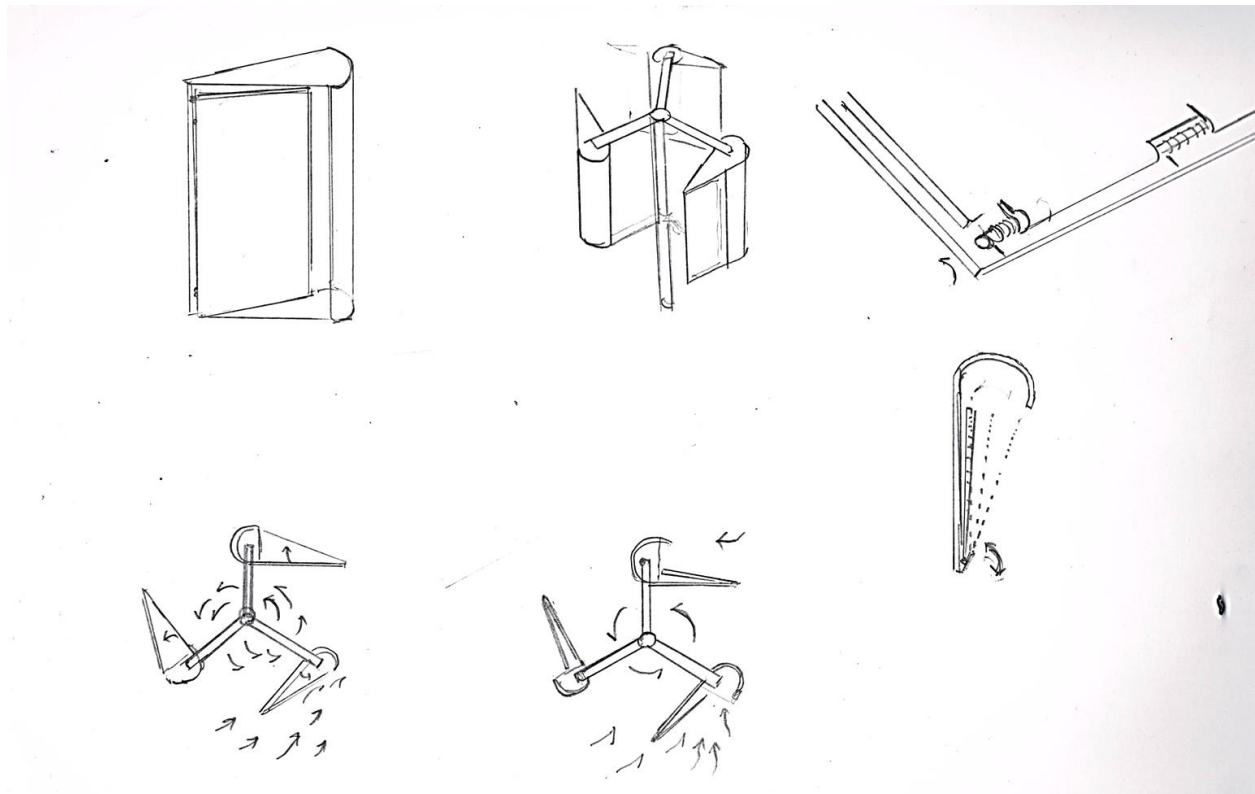


## Reduced speed wind-turbine model

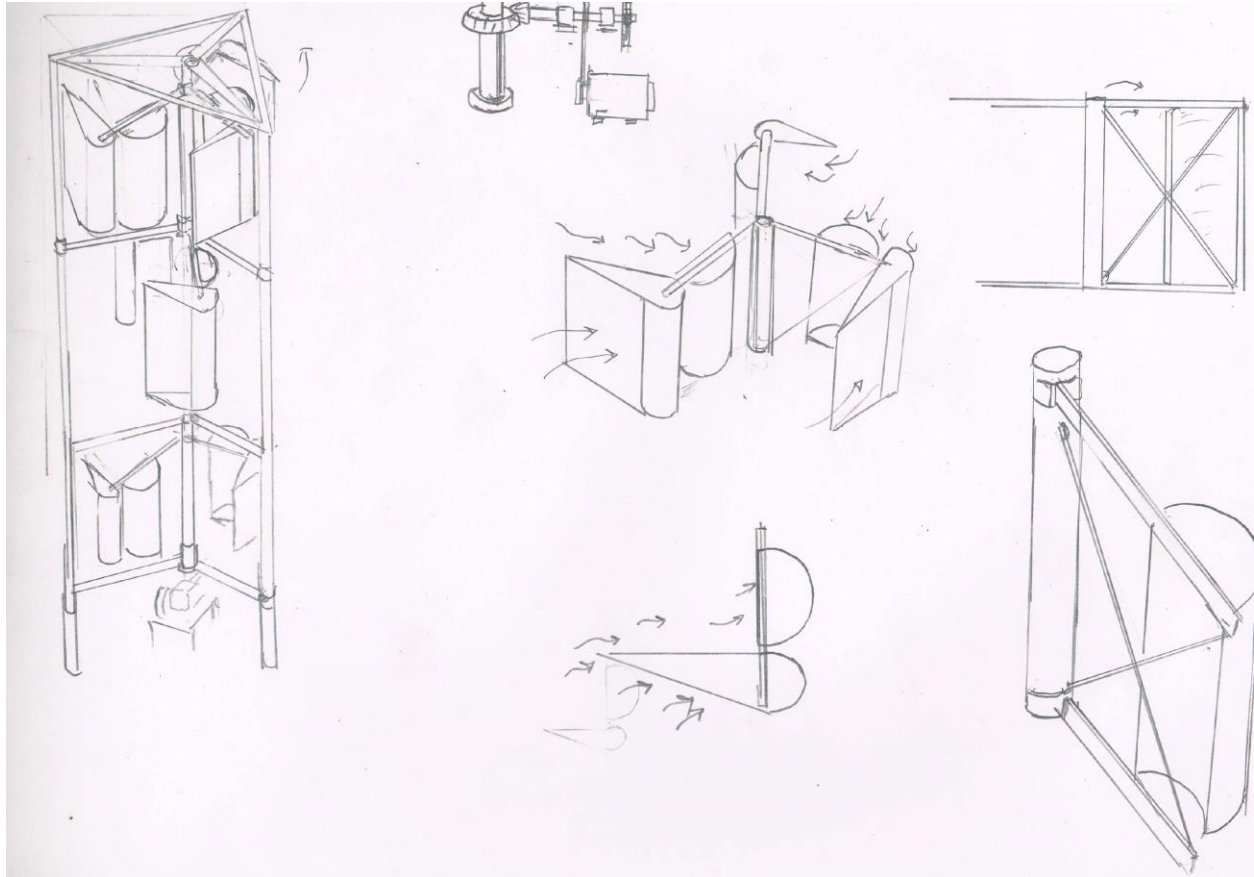
In the current climate of uncertainty . It is a problem to design a wind turbine that will provide the needed amount energy due to highly variable wind velocities. Thus a wind turbine that can generate energy at low velocities is a more viable off the grid option.

The wind turbine blades are designed from (3 m / s swept area) up to (7 m / s swept area) to function at very low wind velocities via the centrifugal force acting on the turbine blades and by setting off a spiral spring . Low specific capacity-high specific area turbines increase the average power that can be delivered and it can be delivered for a longer period of time.

Low specific capacity-high specific area turbines are the kind of technology needed to make wind energy an essential low-cost component of moving society toward 100 per cent renewable energy



## Wind Turbine for low-speed wind

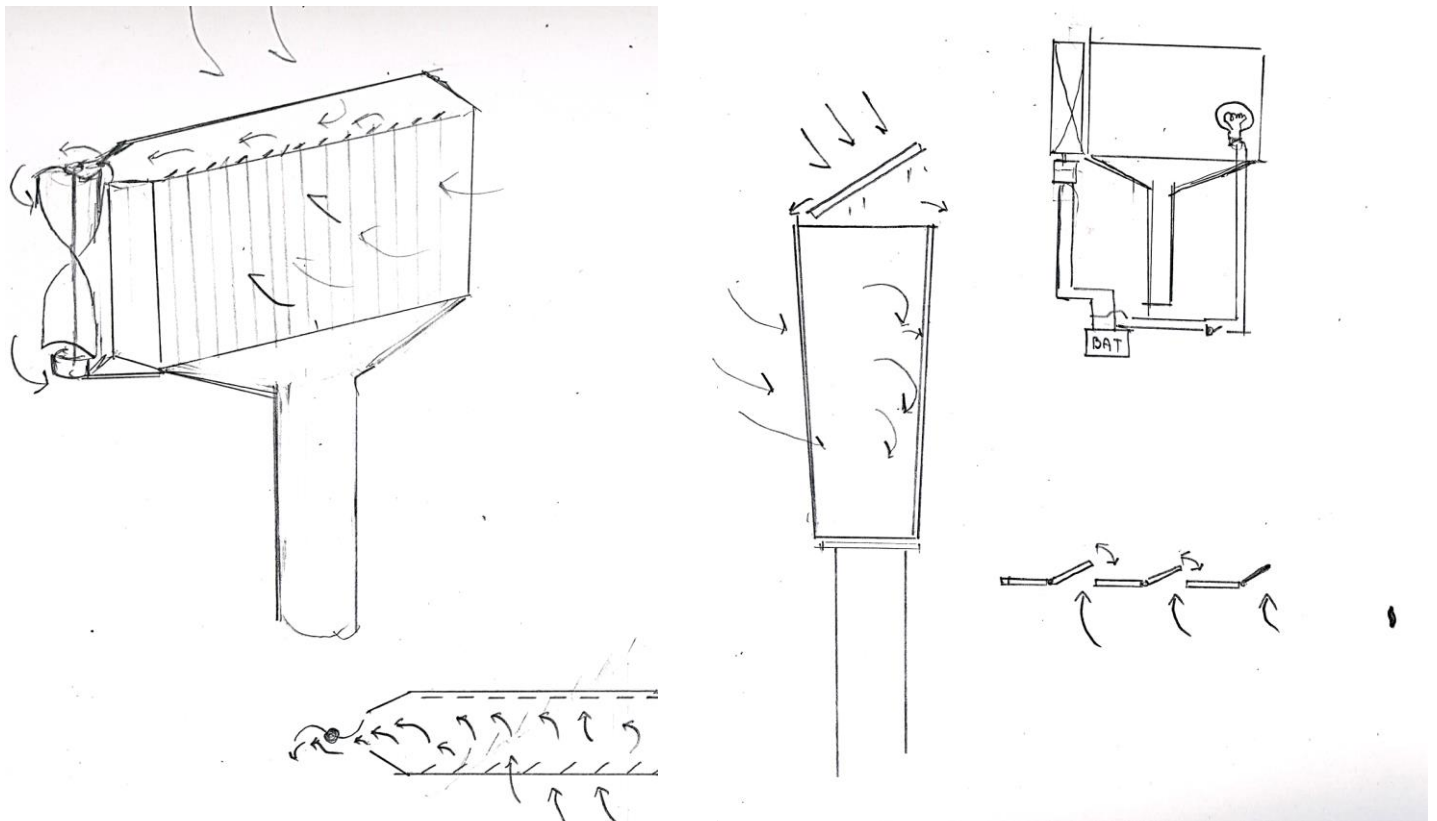


## Billboards that generate their own electricity

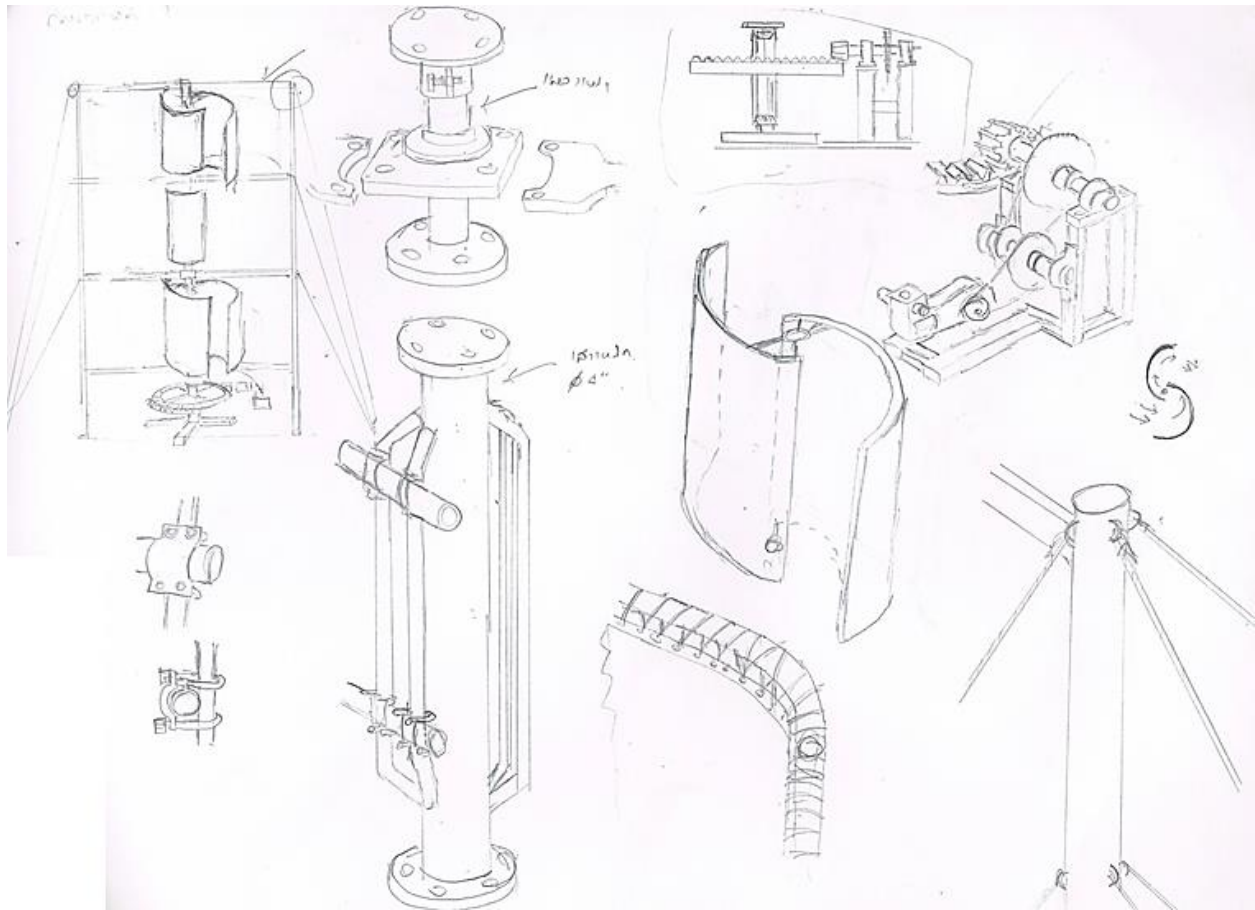
To advertize on a billboard requires electricity to light the billboard at night. Due to the visibility needed for the sign to be seen, the location of billboards are often conducive to collecting wind energy.

With the above in mind, the concept is to design a billboard that can also generate its own electricity as well as allowing the labeling to be unaffected while functioning as a wind turbine.

The signboard can be vented to allow wind to get through to operate a turbine and generate electricity to power the billboard.

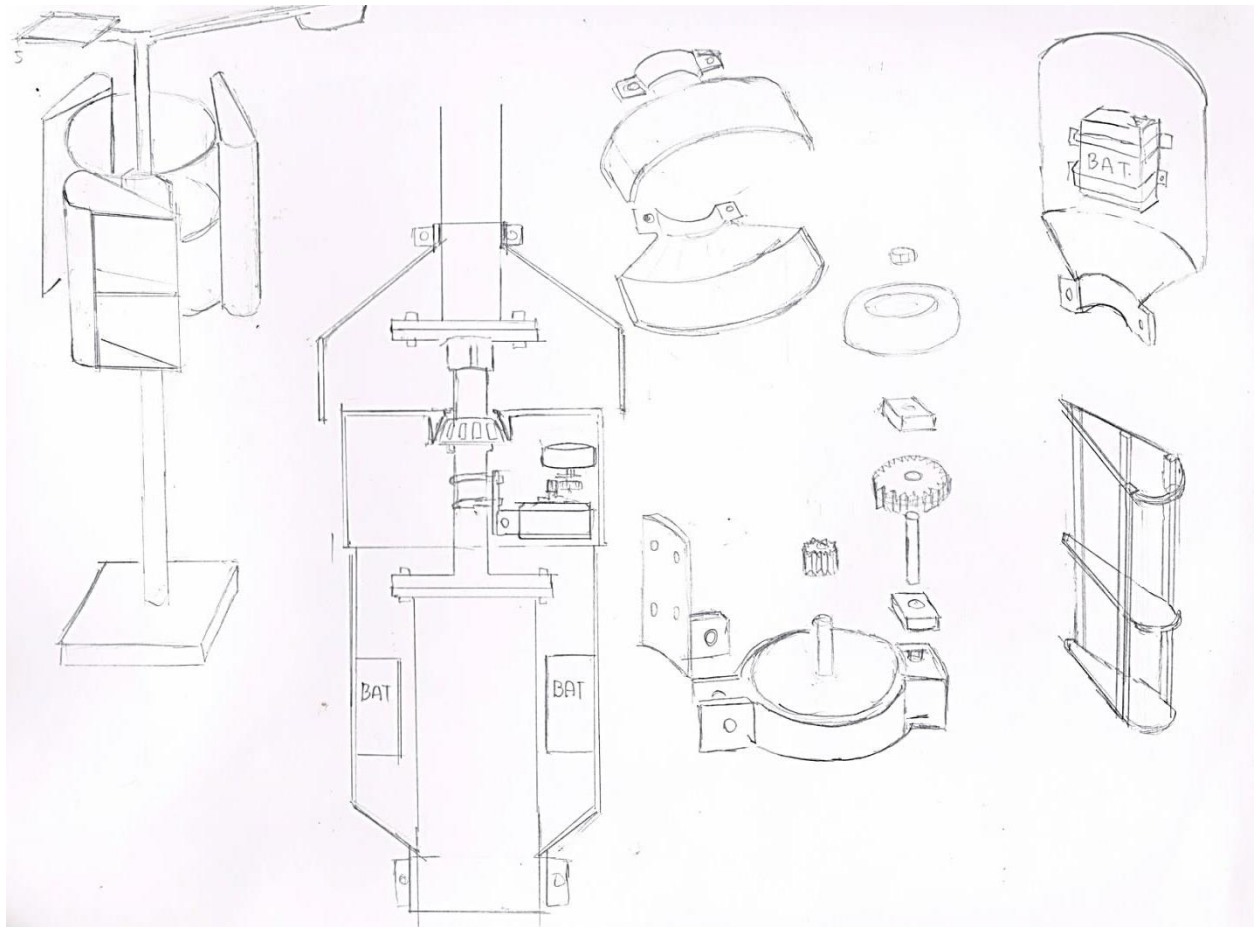


### 3 level wind turbine

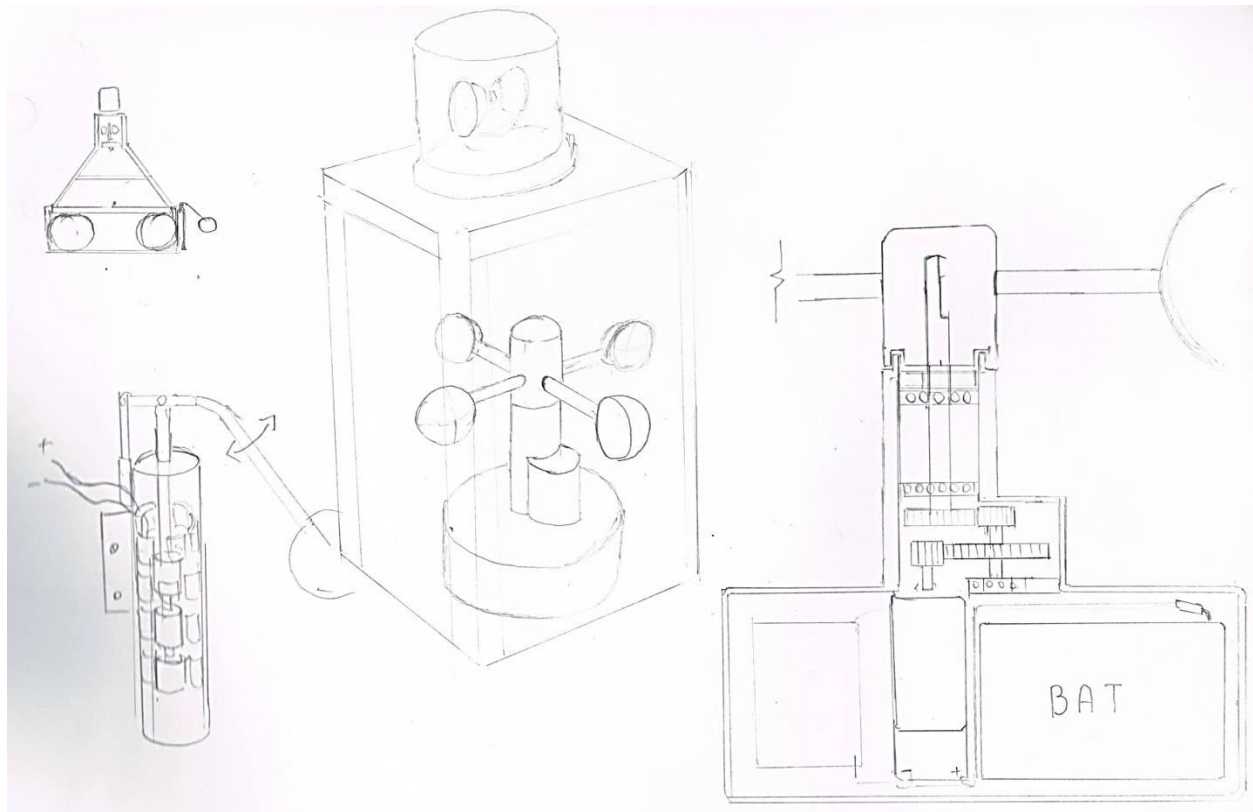




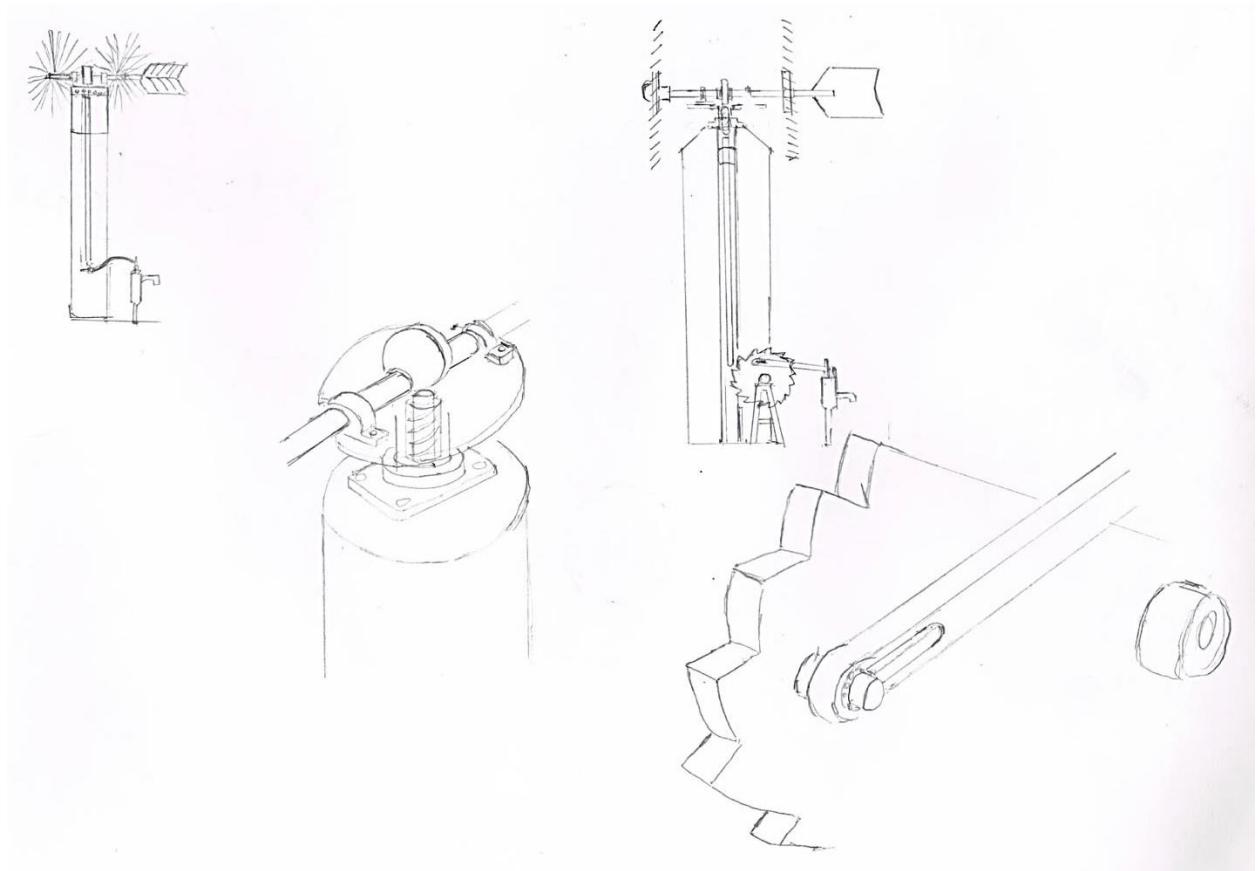
## Roadside Wind capture



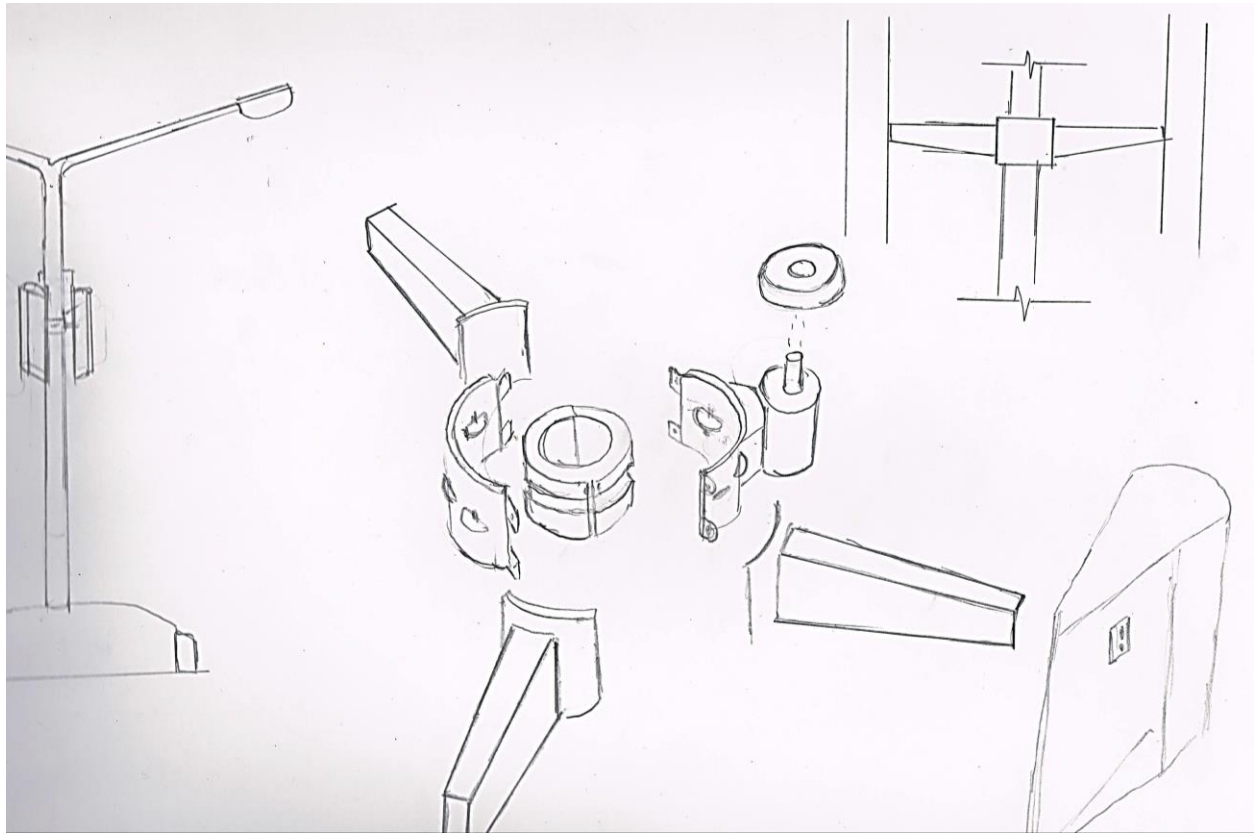
## Wind Turbine Emergency Light



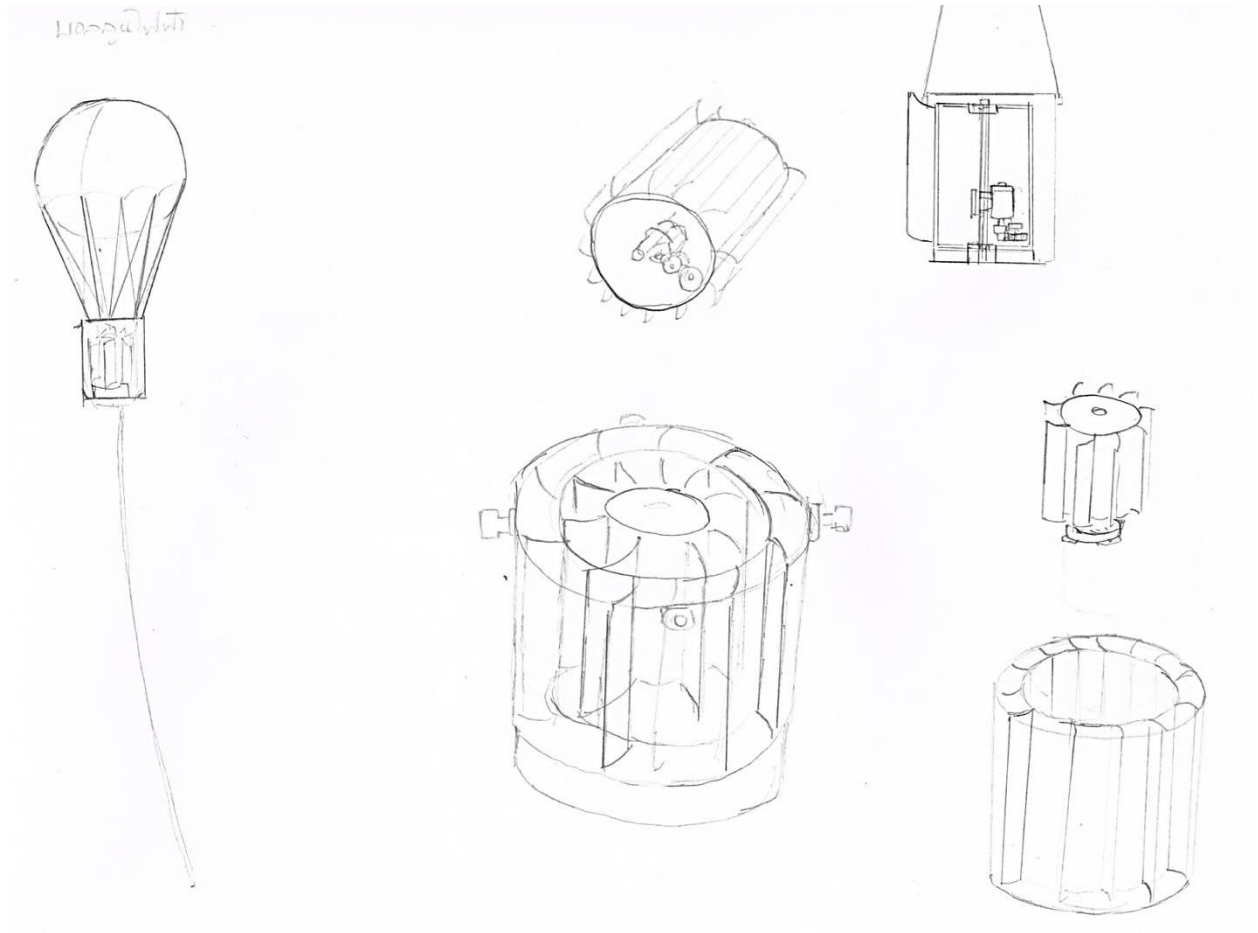
## Wind Turbine Combine with Air Pump



## Toolkit to change light pole to wind turbine light pole



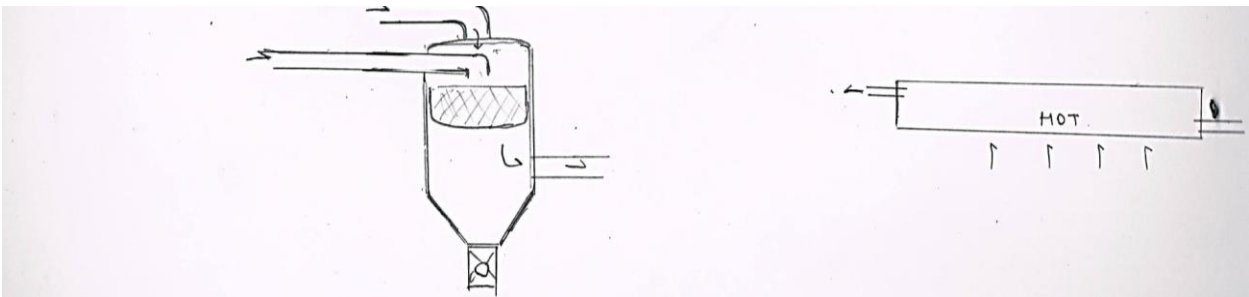
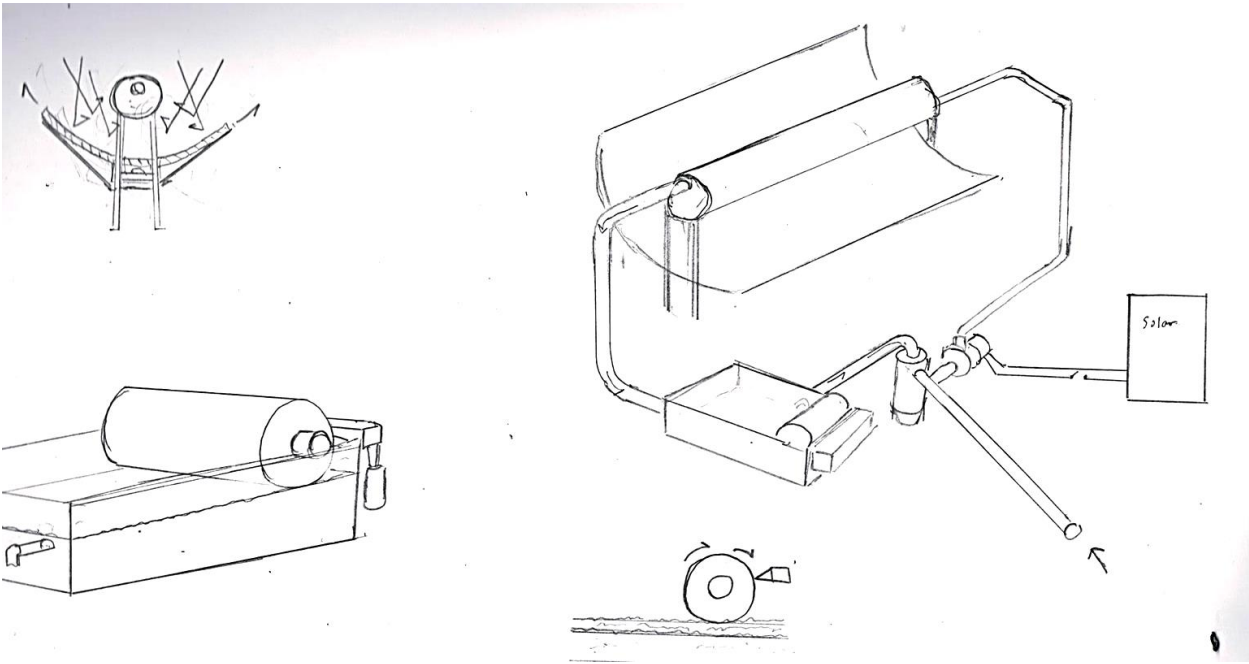
## Balloon Energy



# **Heat-exchange Generated Energy**

## Trapping oil from fat

- Fats and oils can be used to produce biodiesel via a thermal well. This technology uses heat energy from the sun in combination with solar cell technology;
- The working principle uses water from fat and heat with the oil draining into the tray. The system is also has a ventilated system for oil storage . Such a system inhibits the growth of microorganisms eliminating any foul odors.

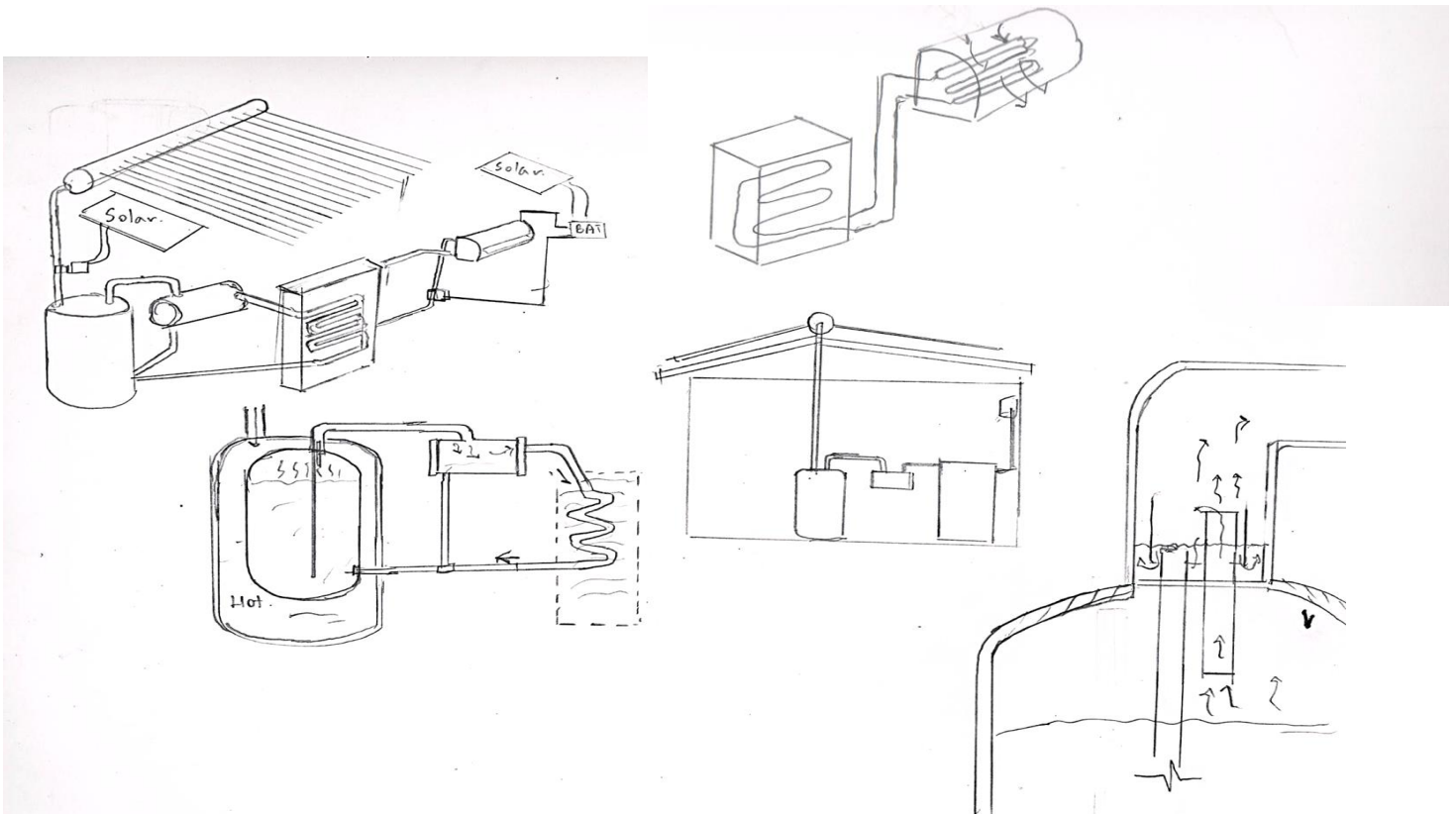


## Converting heat generated by a roof to cool a home

A roof can generate a lot of heat especially in tropical climates. To take advantage of this the roof can be used to cool a house.

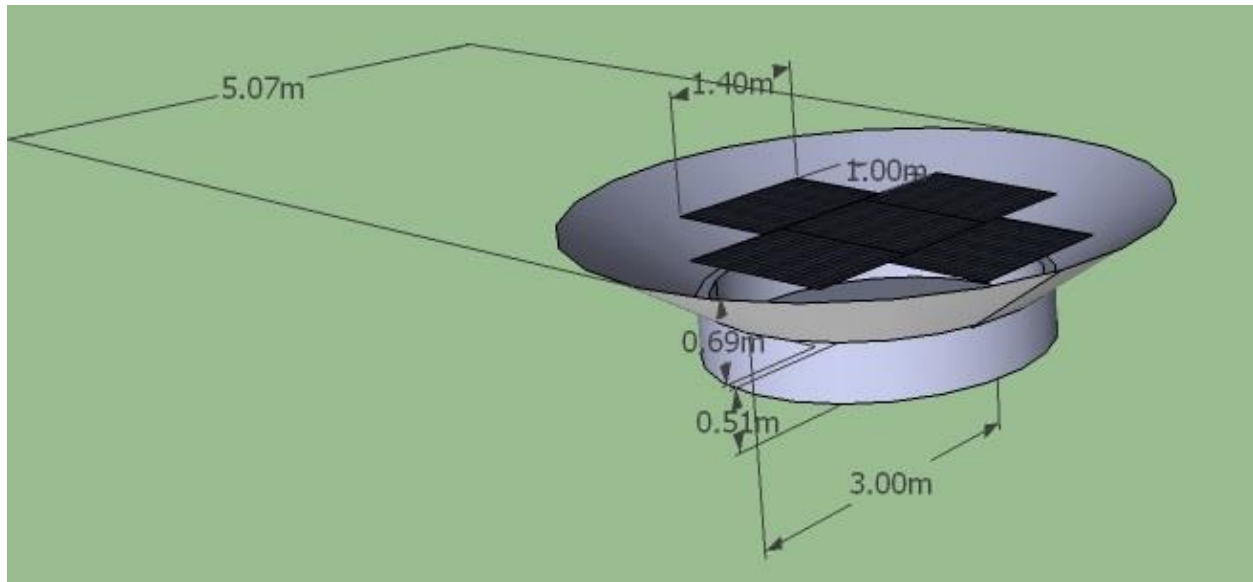
This technology uses a refrigerant, and a boiling heat flux using the heat from the refrigerant process to change water to steam. As the system cools it forces the heat down and condensates thus converting into liquid water that flows through the tank. Using the heat as energy the system then chills the water.

The cold water circulates through pipes to cool the home.

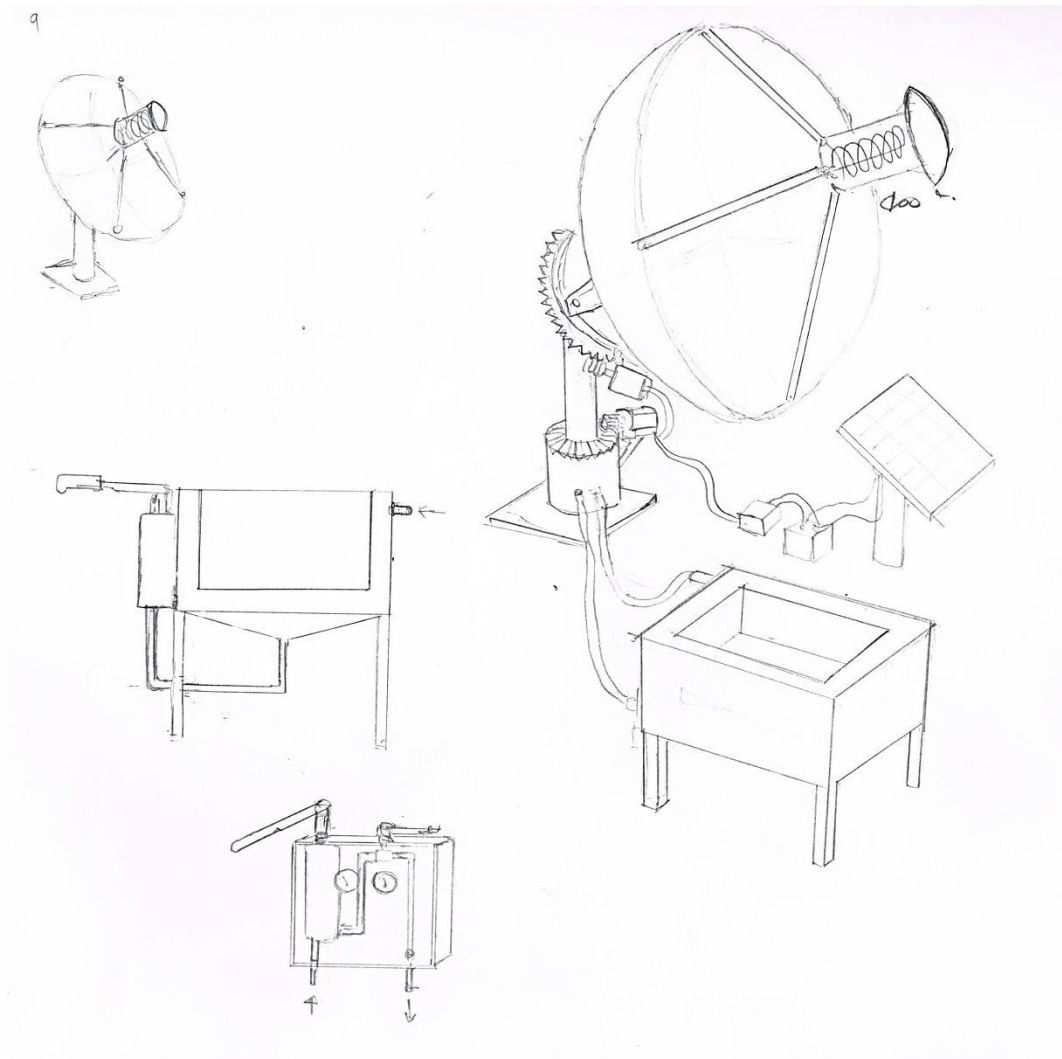




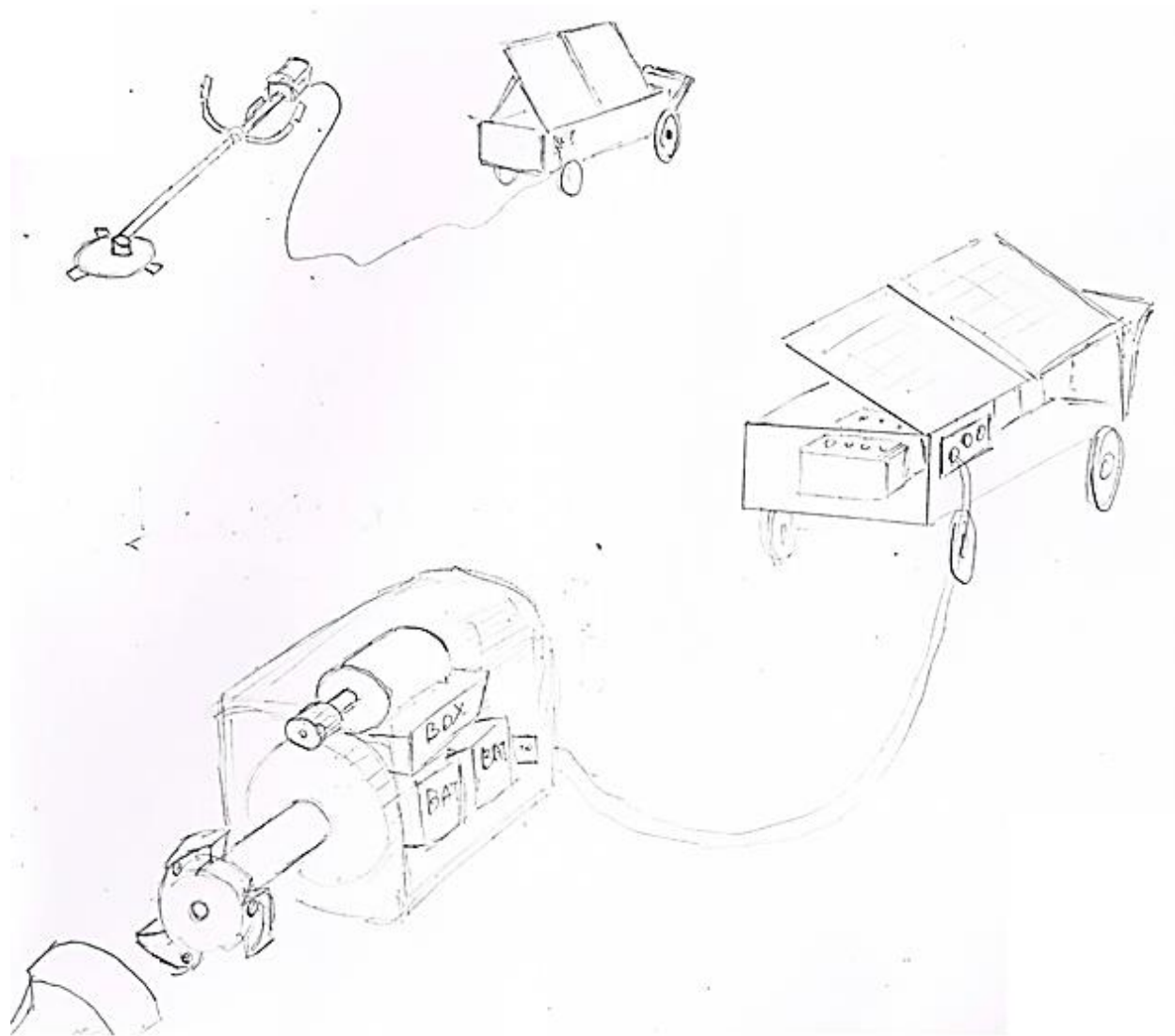
## Solar Intensive Light Pan



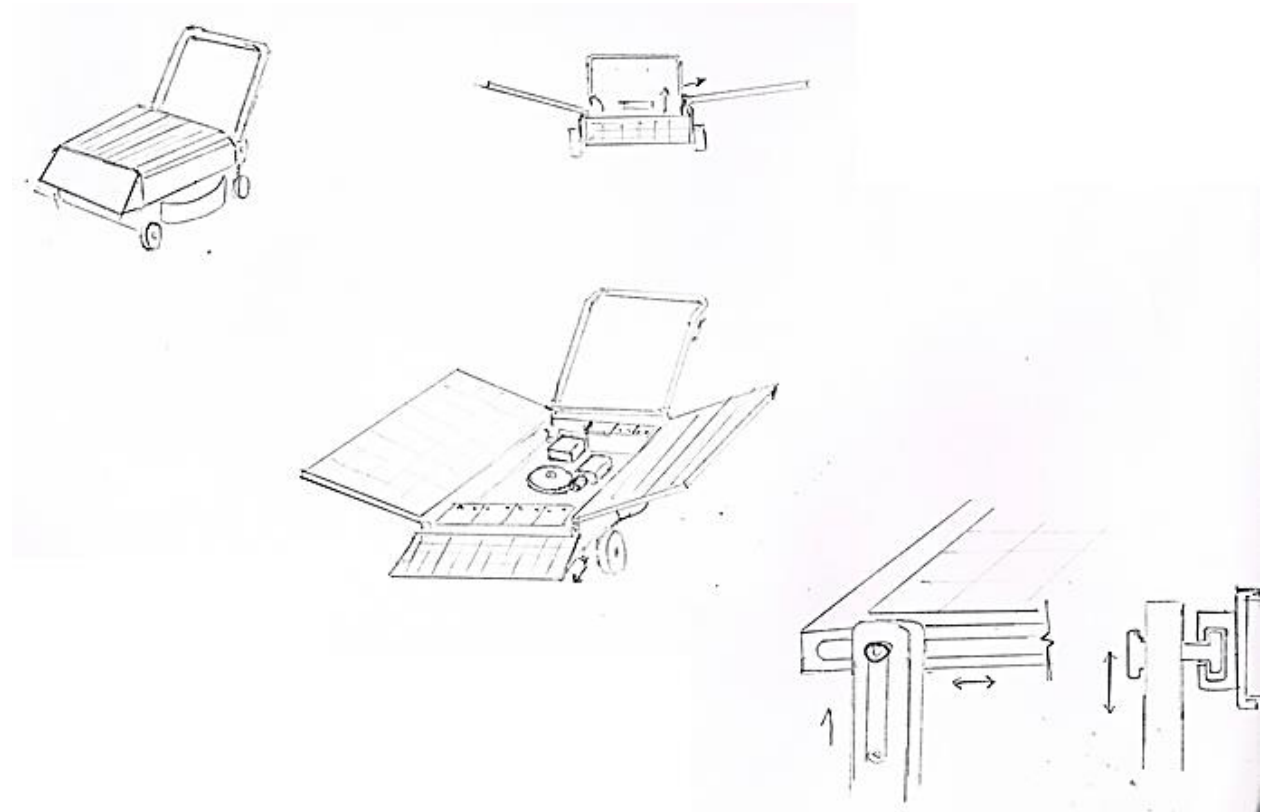
## Solar Frying Pan



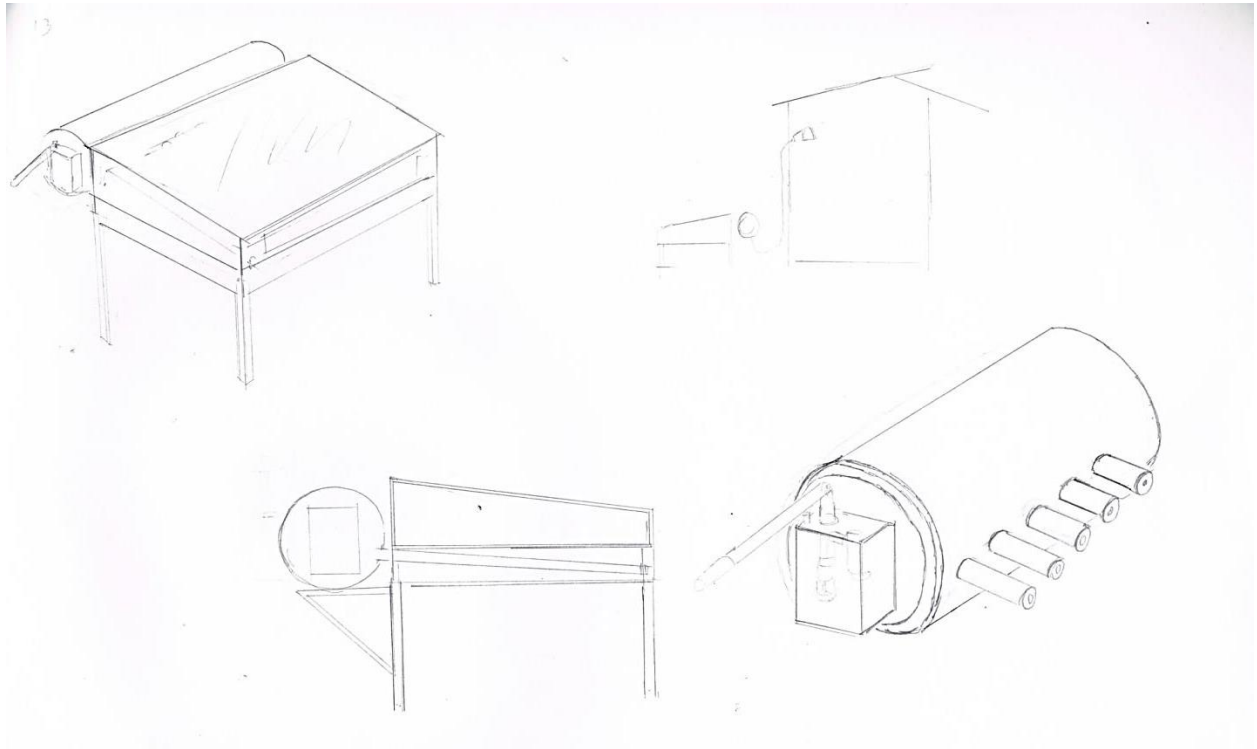
## Solar Mower



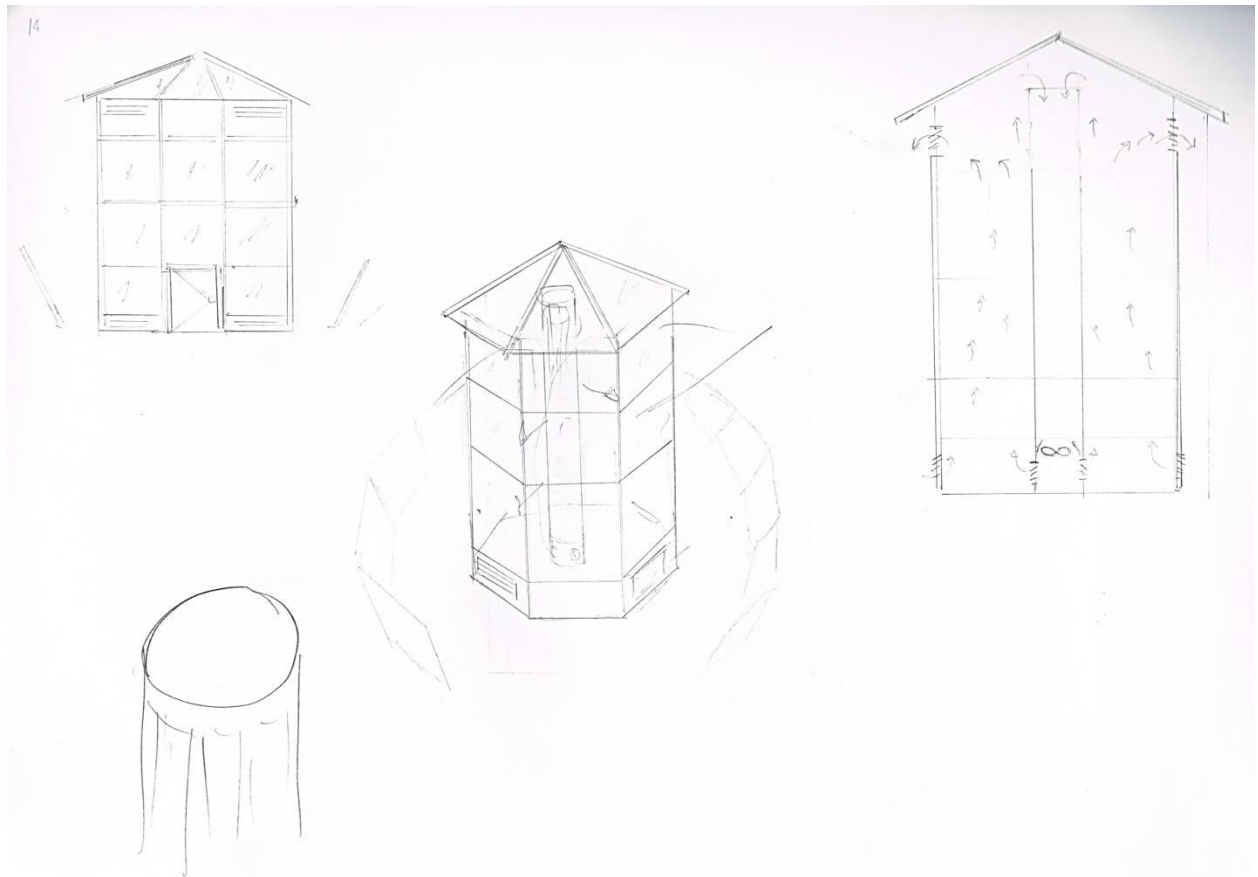
## Solar Mower II



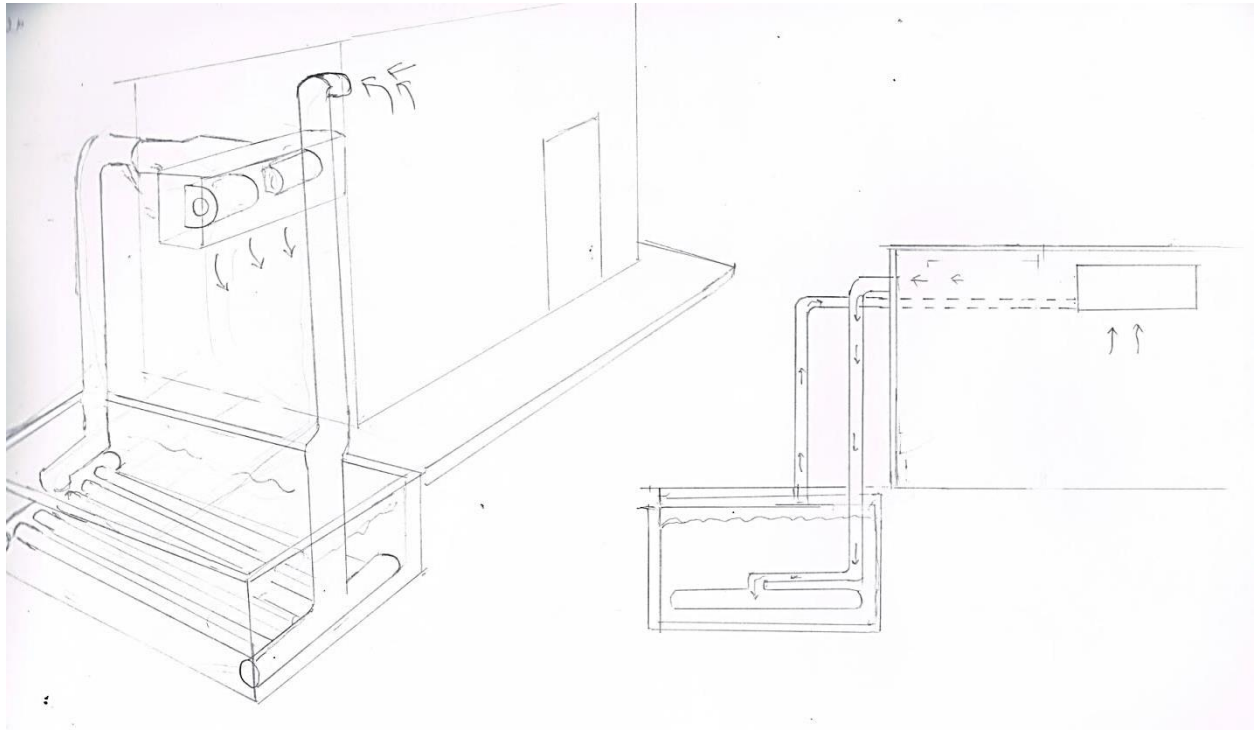
## Solar Hot Water



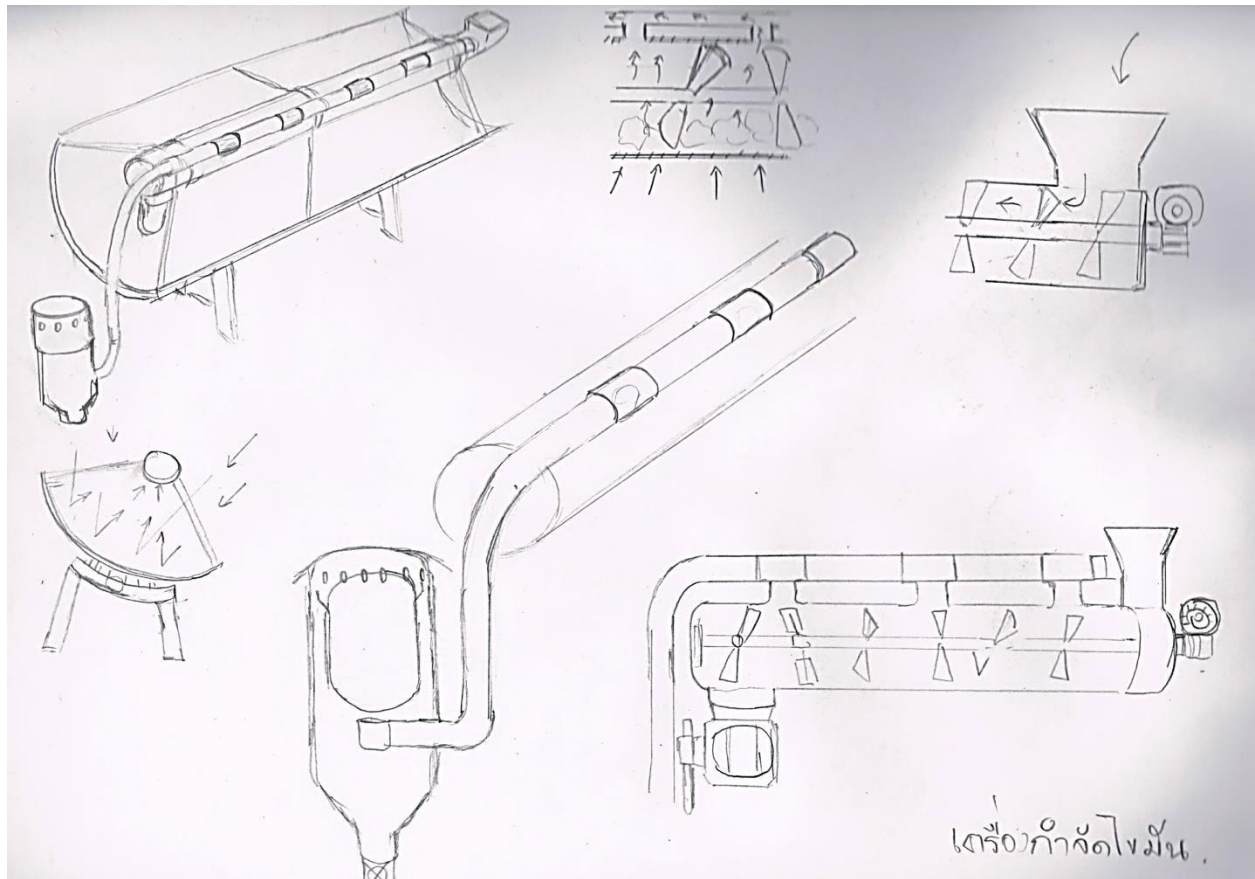
## Super Solar Dryer



## Underground Cooling

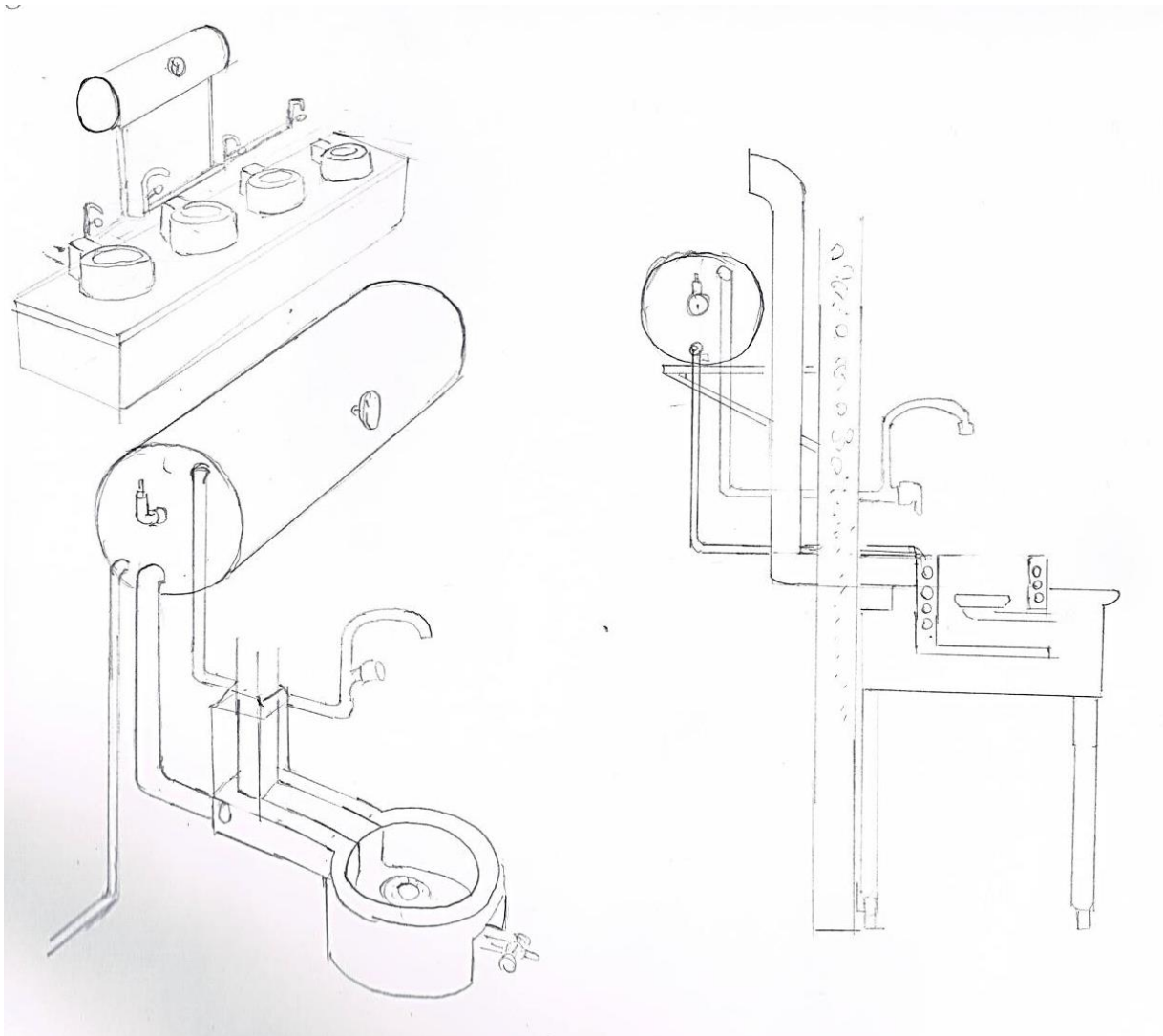


## Eliminate Lipid Machine

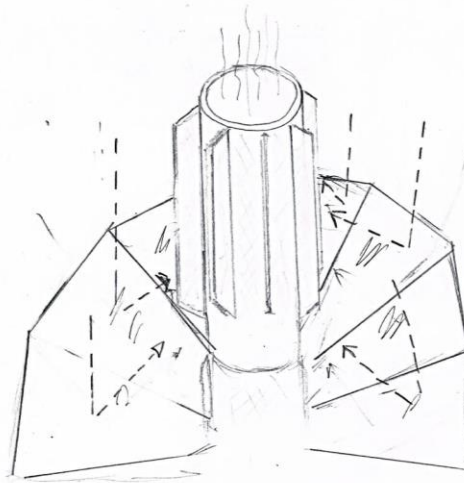
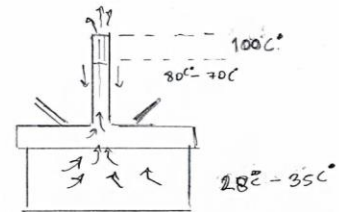
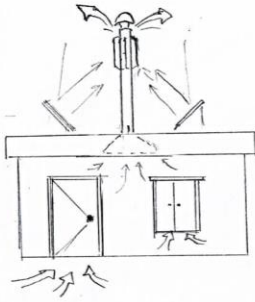




## Hot Water from Cooking stove's waste heat



## Home's Cooling system



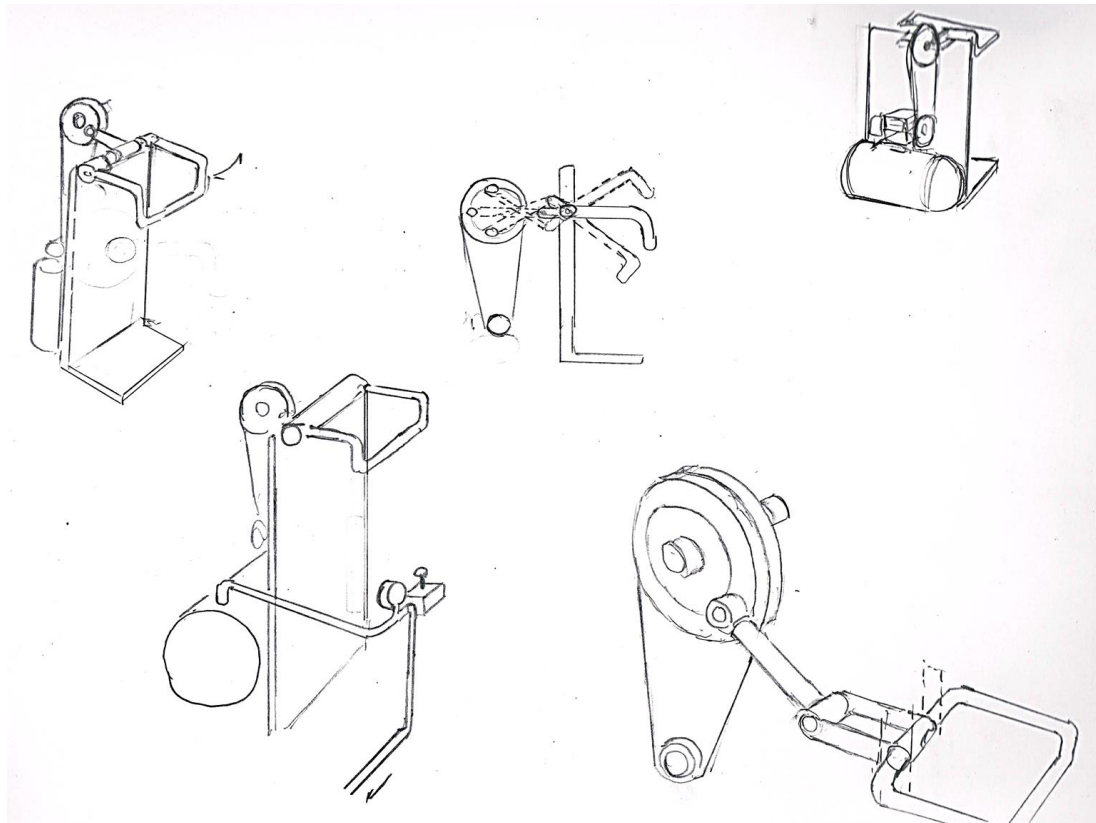
# **Life-generated Energy**

## Exercise machines as air compressors

Exercise machines set-up to exercise ones arms can serve as the mechanical energy to power an air compressor.

The up-and-down motion generated in operating the machine provides the mechanism to convert the wheel rotation into mechanical energy.

The system can convert the compressed air into electricity to operate a pump.

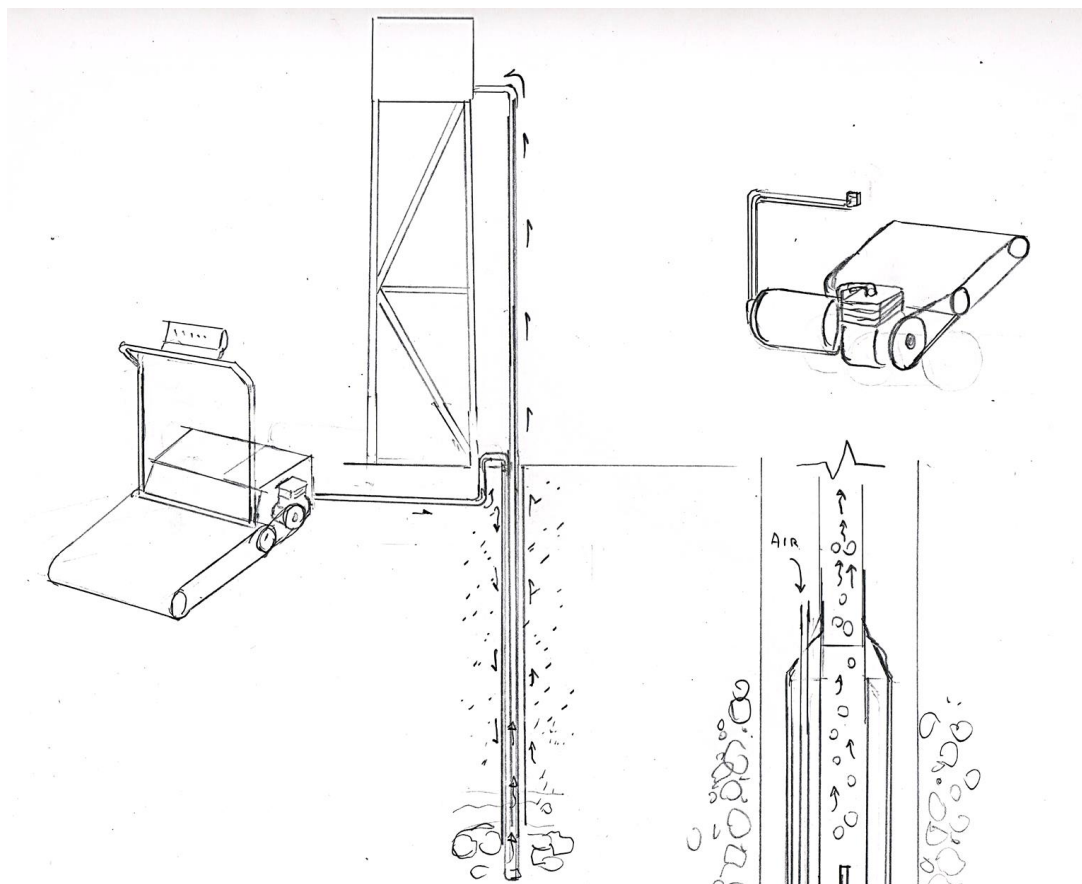


## Treadmill water pump

This design concept uses a treadmill exercise machine to act as a turbine similar in function to how a wind turbine is used to extract water. In this case the power supply is human.

The use of this machine can cut resistance of the air pressure contained within the air tank thus pumping water to the surface and satisfying those who prefer to exercise and stay fit on a daily basis.

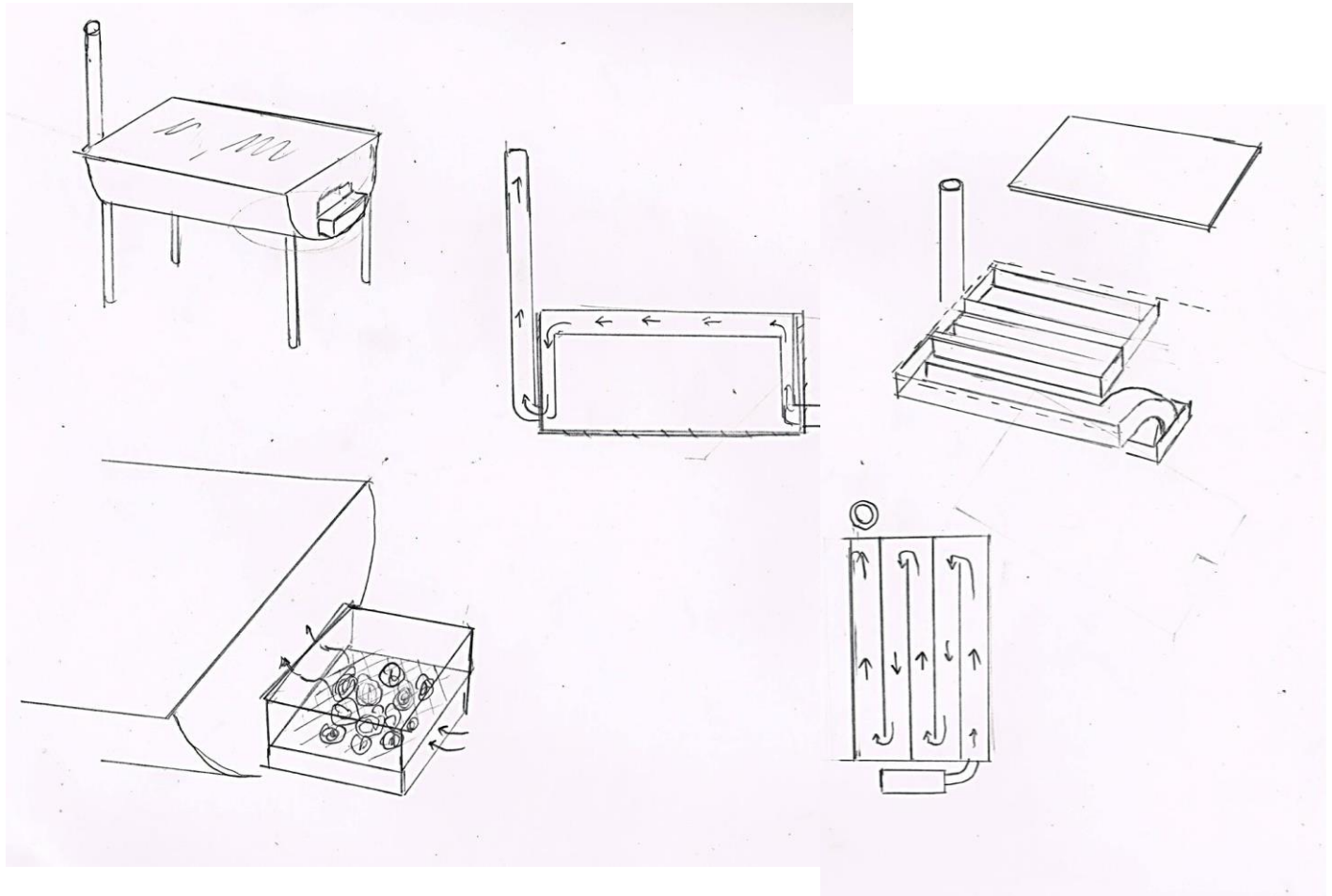
Pumping groundwater via this system only needs PVC pipe to move air bubbles down to bring ground water to the surface



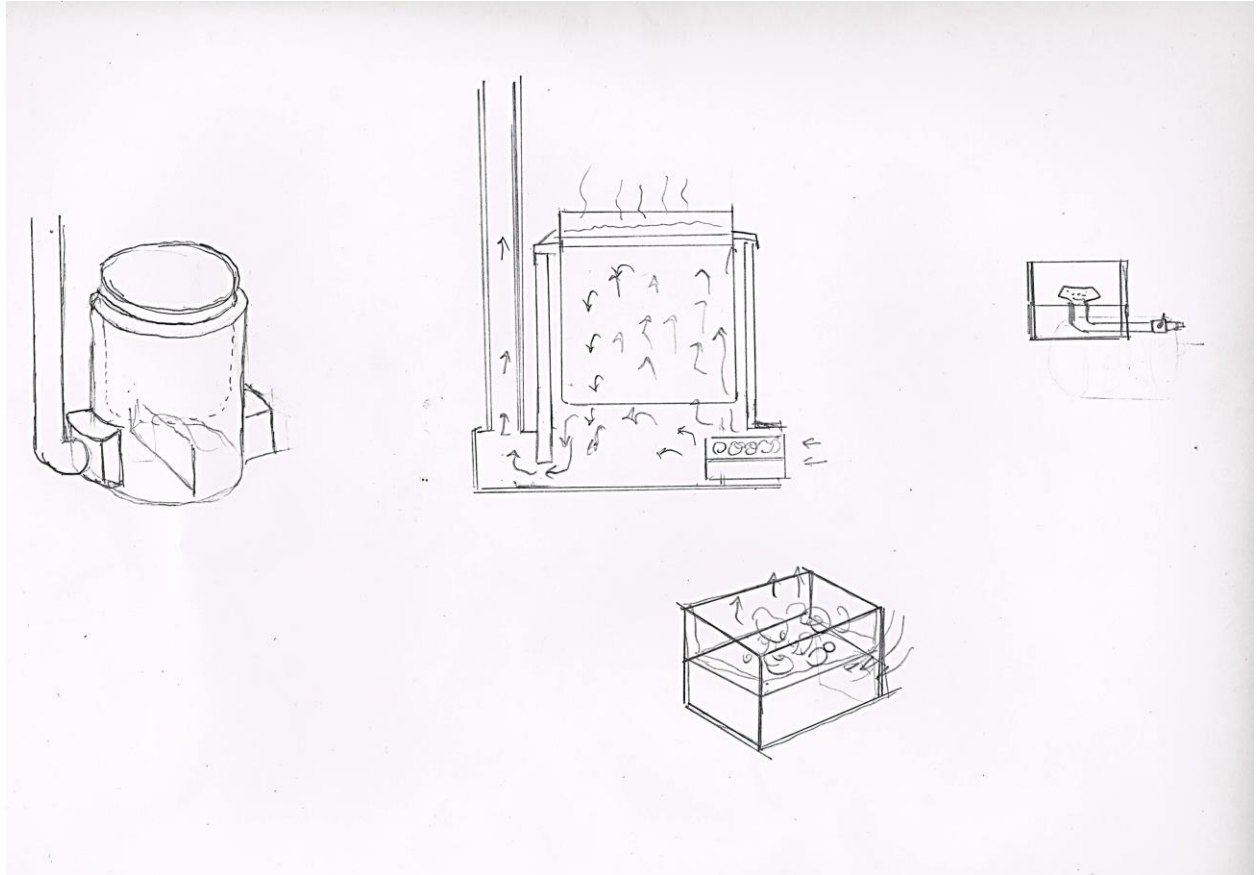
## Tar free grill

Tar build-up from grilling food can lead to excess tar ending up in ones food.

To avoid the above , the technology creates a hot grill via circulation of heat through the grill itself and keeping tar away from the food on the grill. It also produces more efficient use of heat and helps use less fuel such as wood or charcoal.



## Super Soup pot



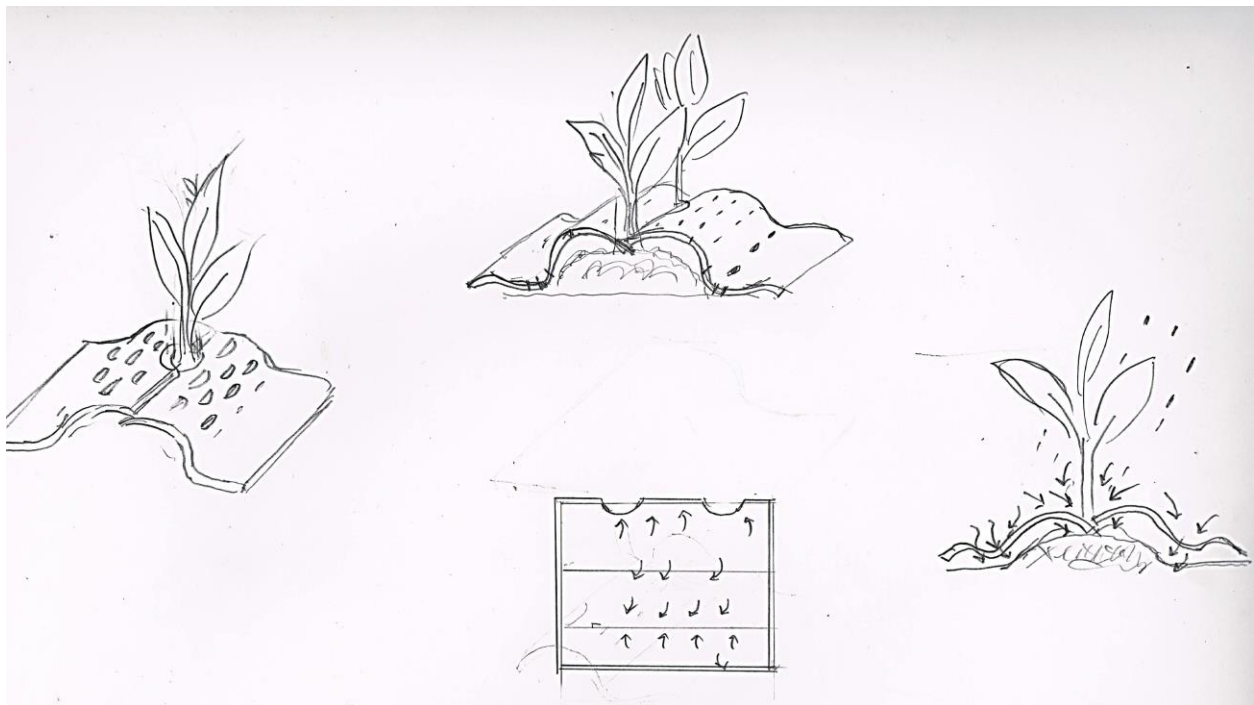
## Plastic sheeting to prevent weeds

Current industrial agricultural practices rely heavily on fossil fuel based chemicals such as herbicides to control weeds and pests. These chemicals are very damaging to the environment polluting water and creating dead zones in the oceans.

One solution is the application of perforated plastic sheeting placed around the crop.

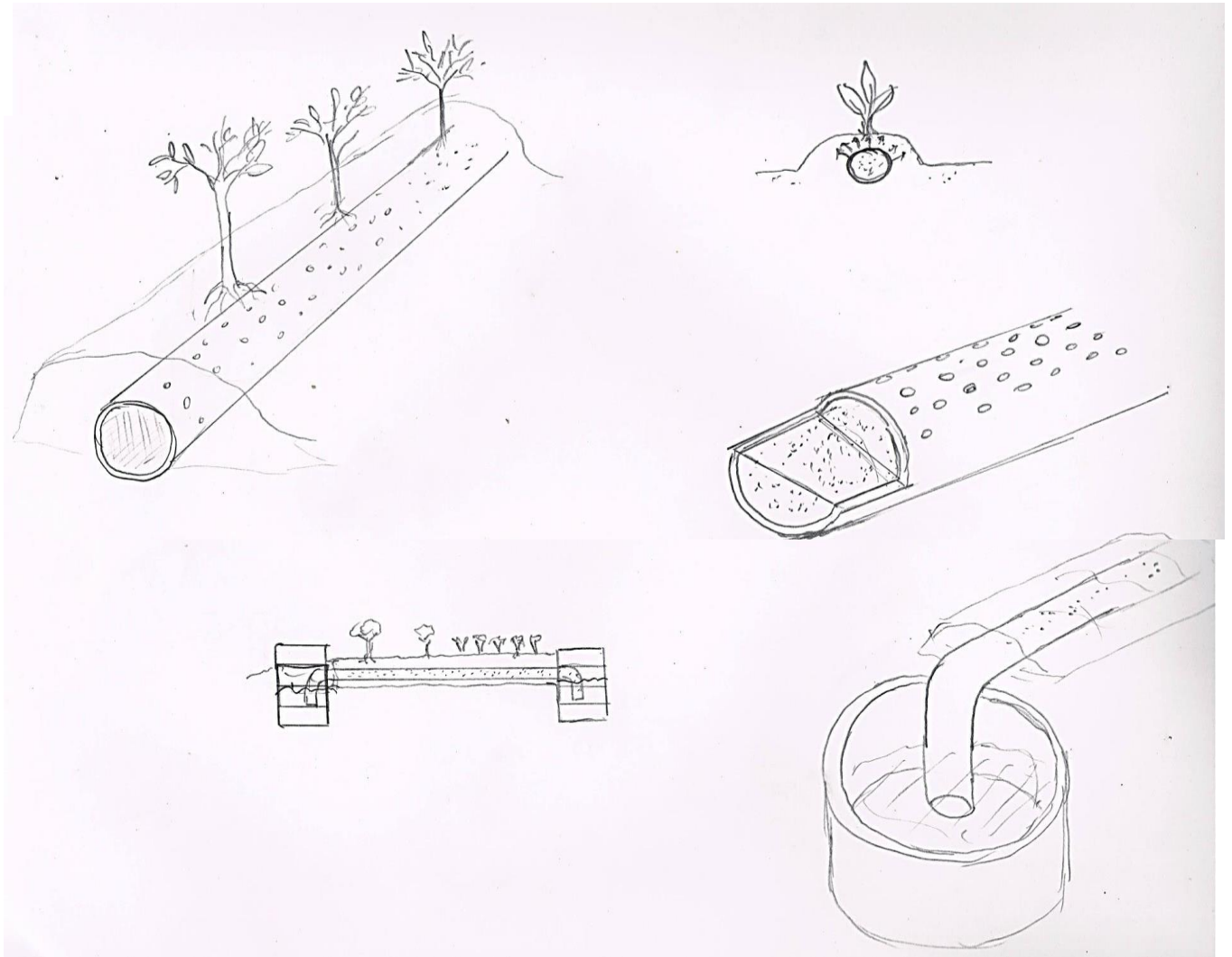
This invention is designed to allow water to flow into the soil yet inhibit weed growth. The perforated plastic does not inhibit the growth of the crop and allows the soil to retain more moisture along with proper air circulation at the surface of the soil.

Via applying this system a farm can reduce input costs while growing food that is healthier for consumers.

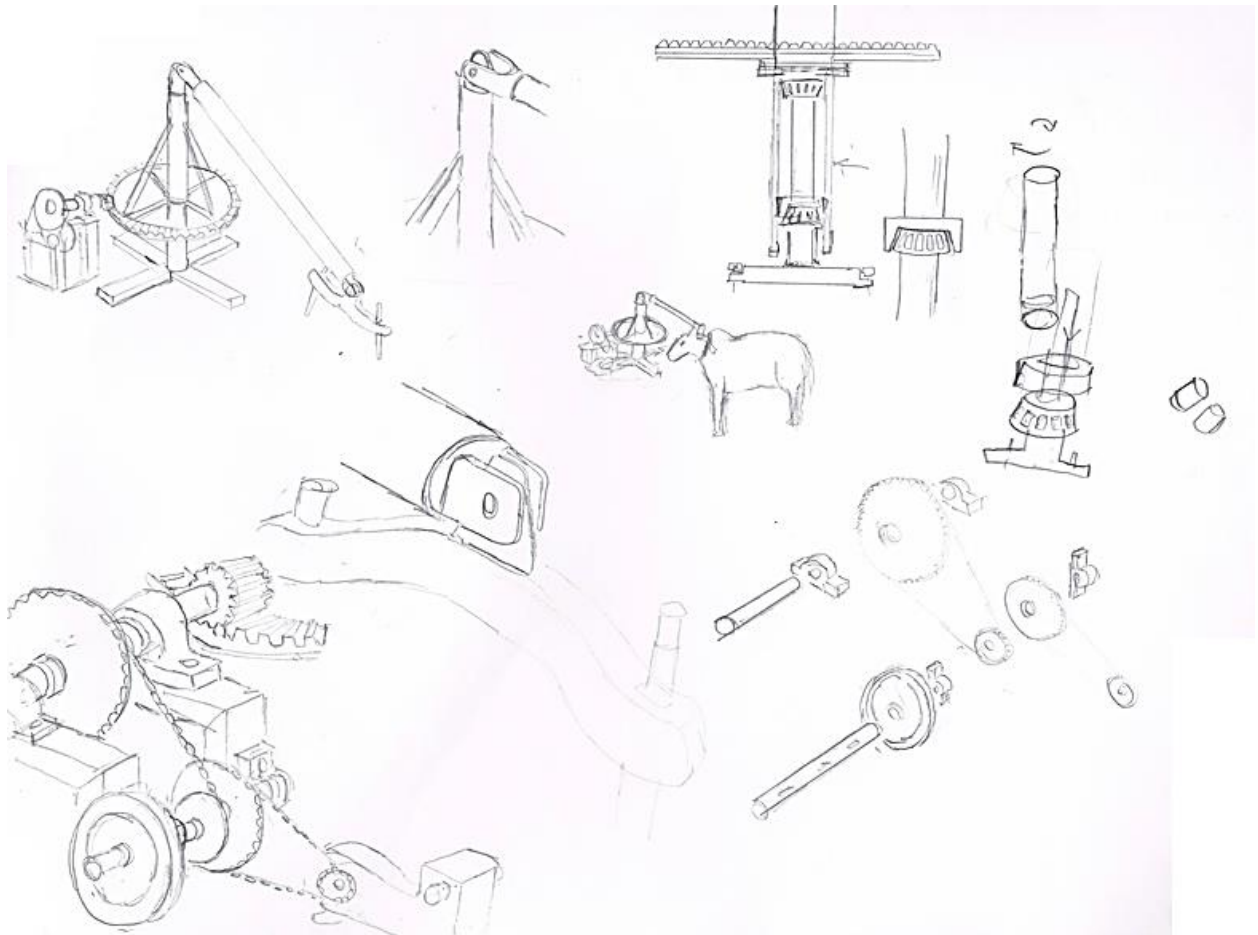




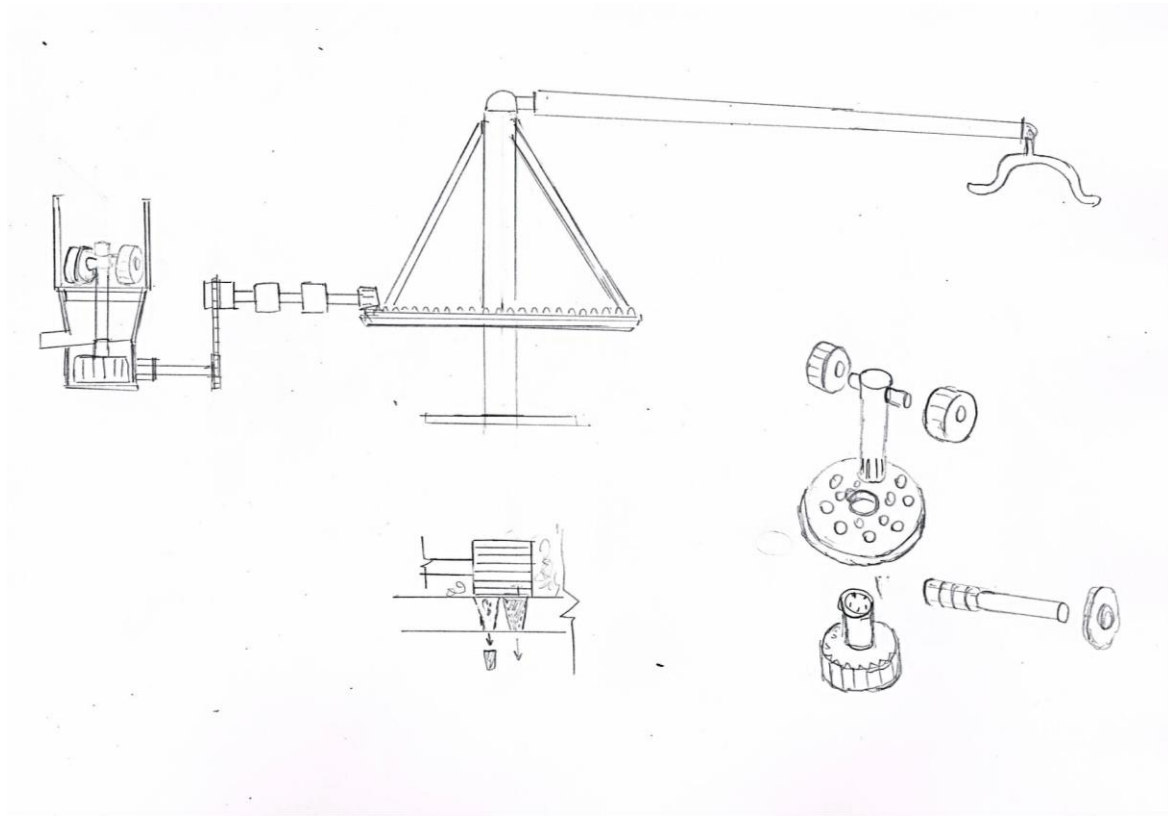
## Storage underground water system



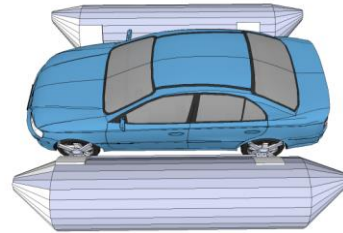
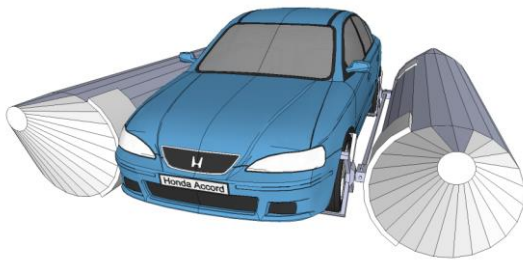
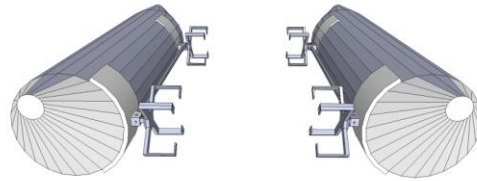
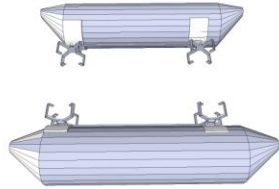
## Cow Pump



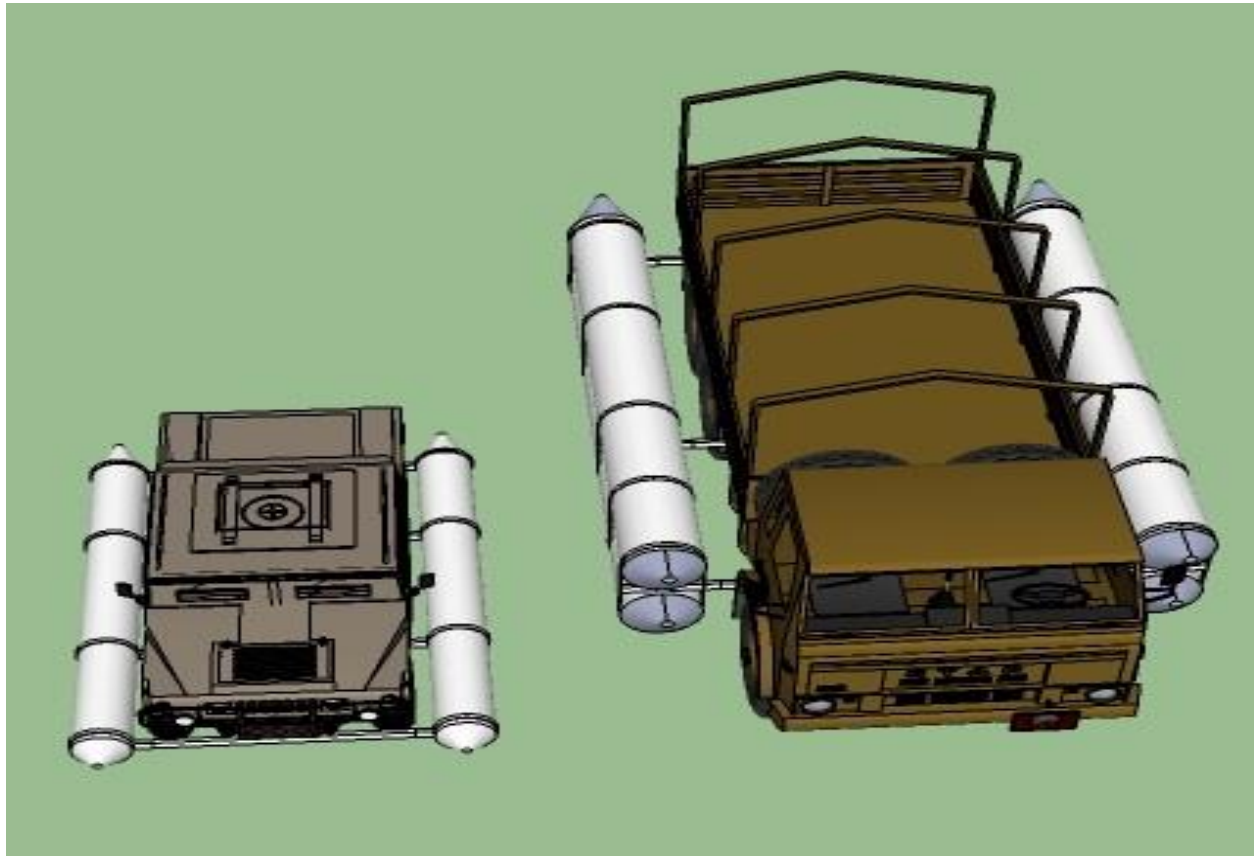
## Green briquette by cow power



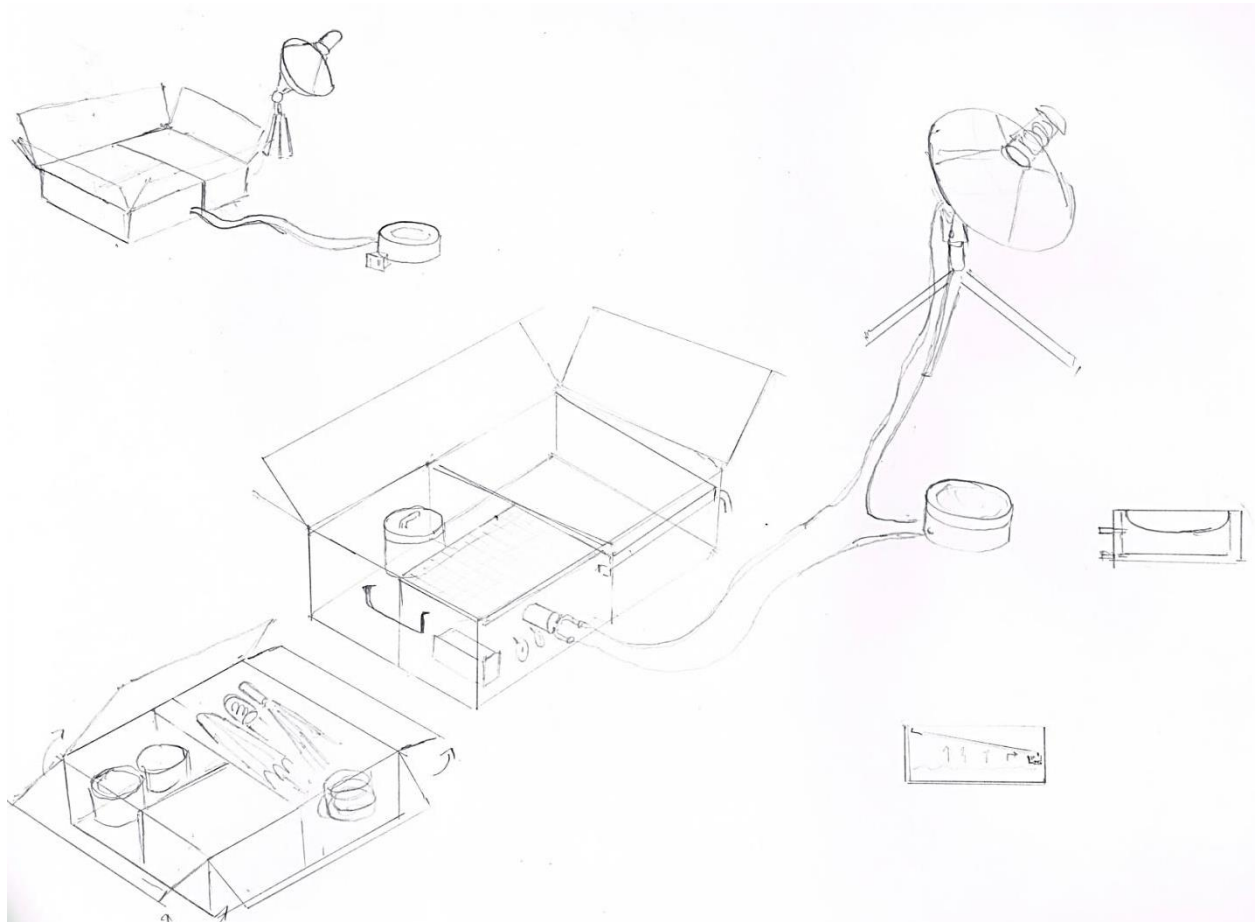
## Catamarans float system to keep your car dry



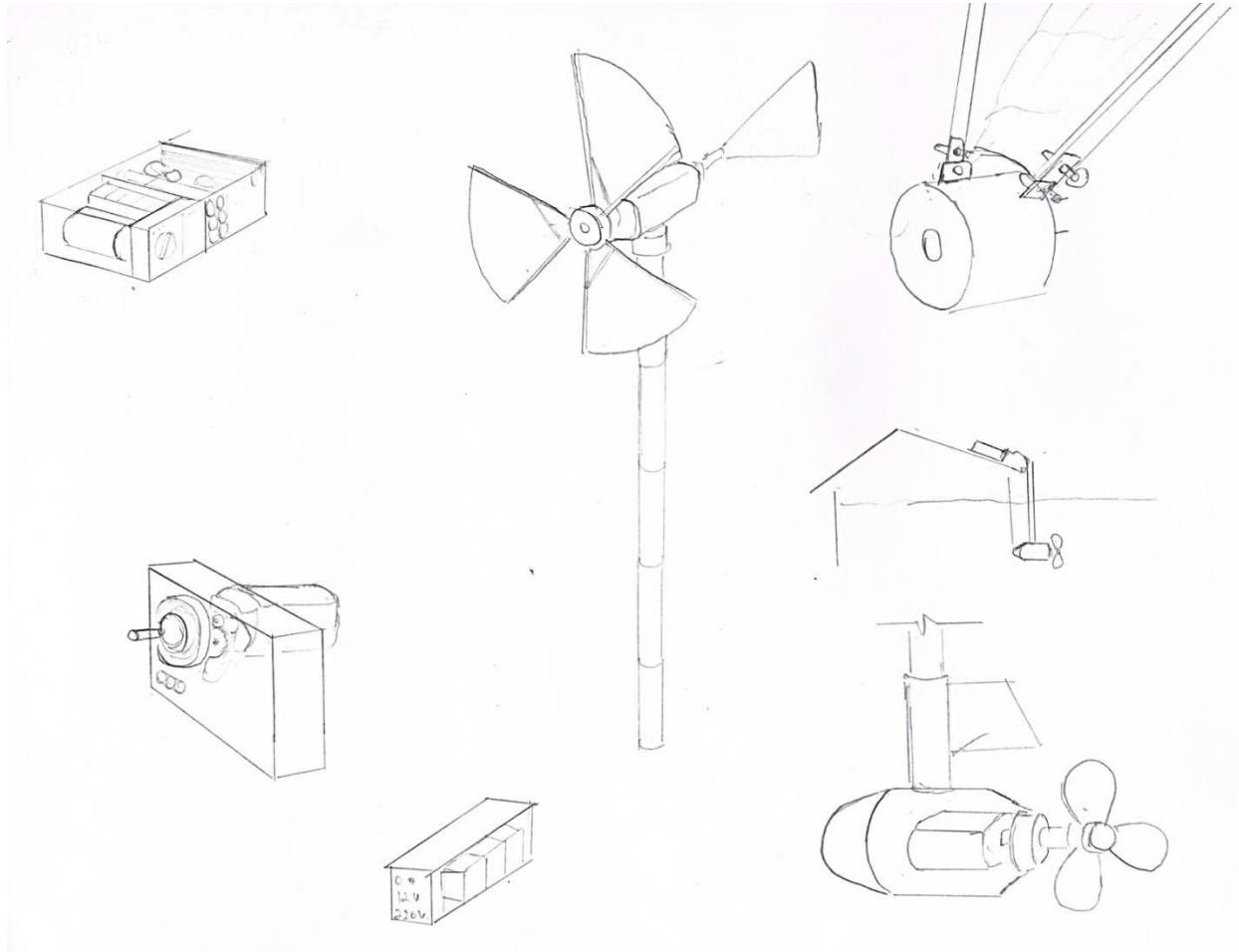
## Floating Army's Car



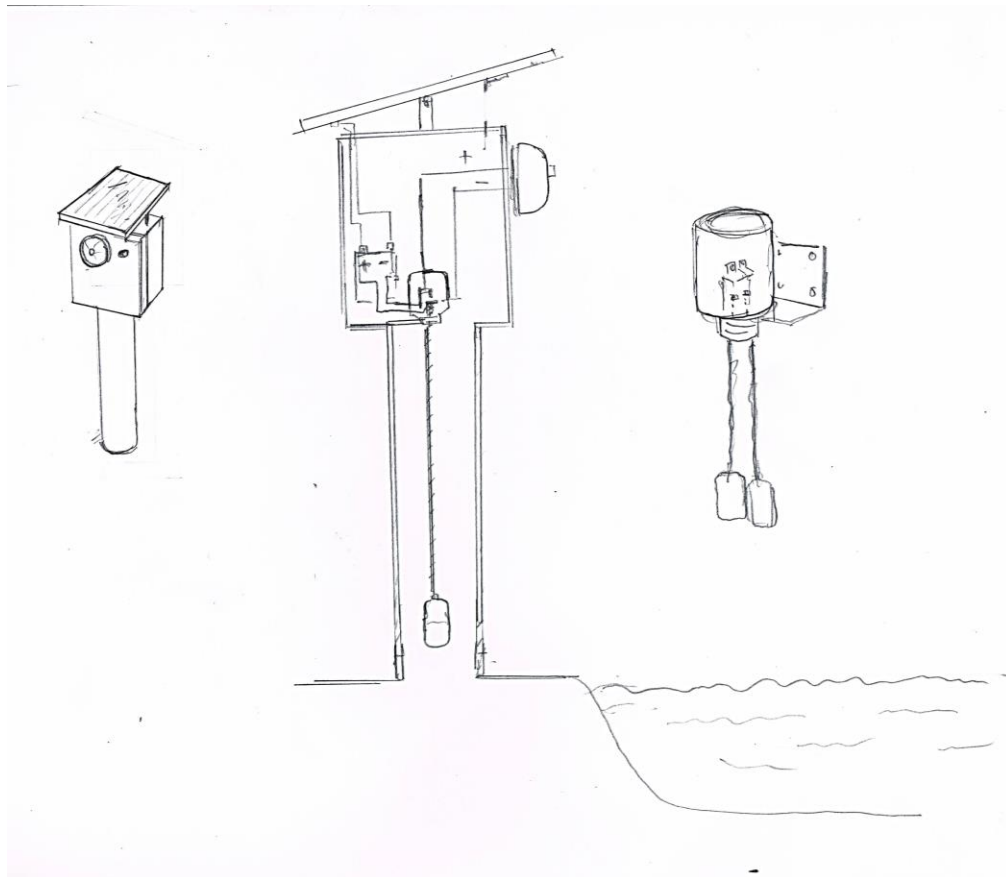
## Solar Cooking Tool on the roof (when flooding)



## Generator when Flooding

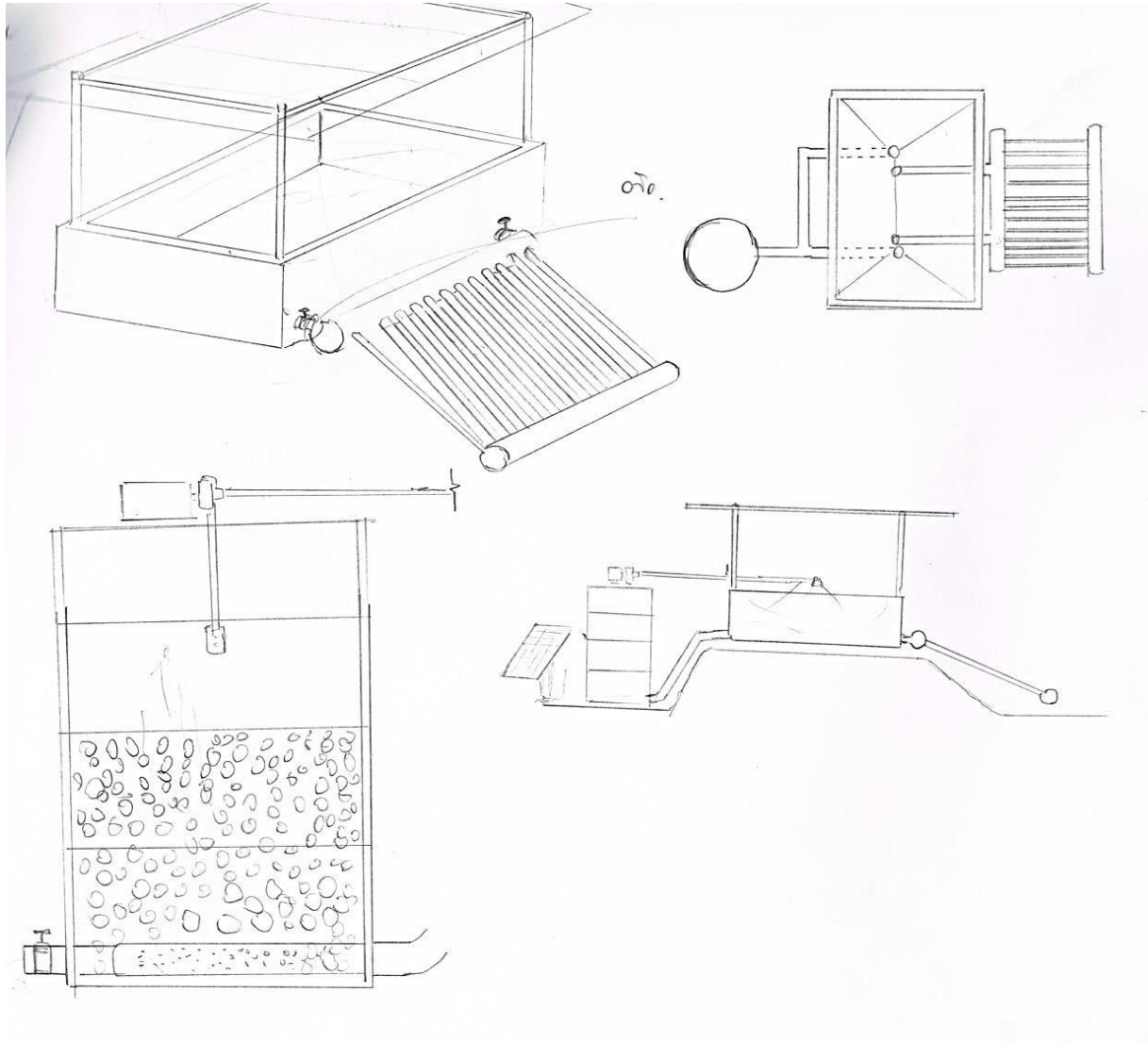


## Solar flooding Alert

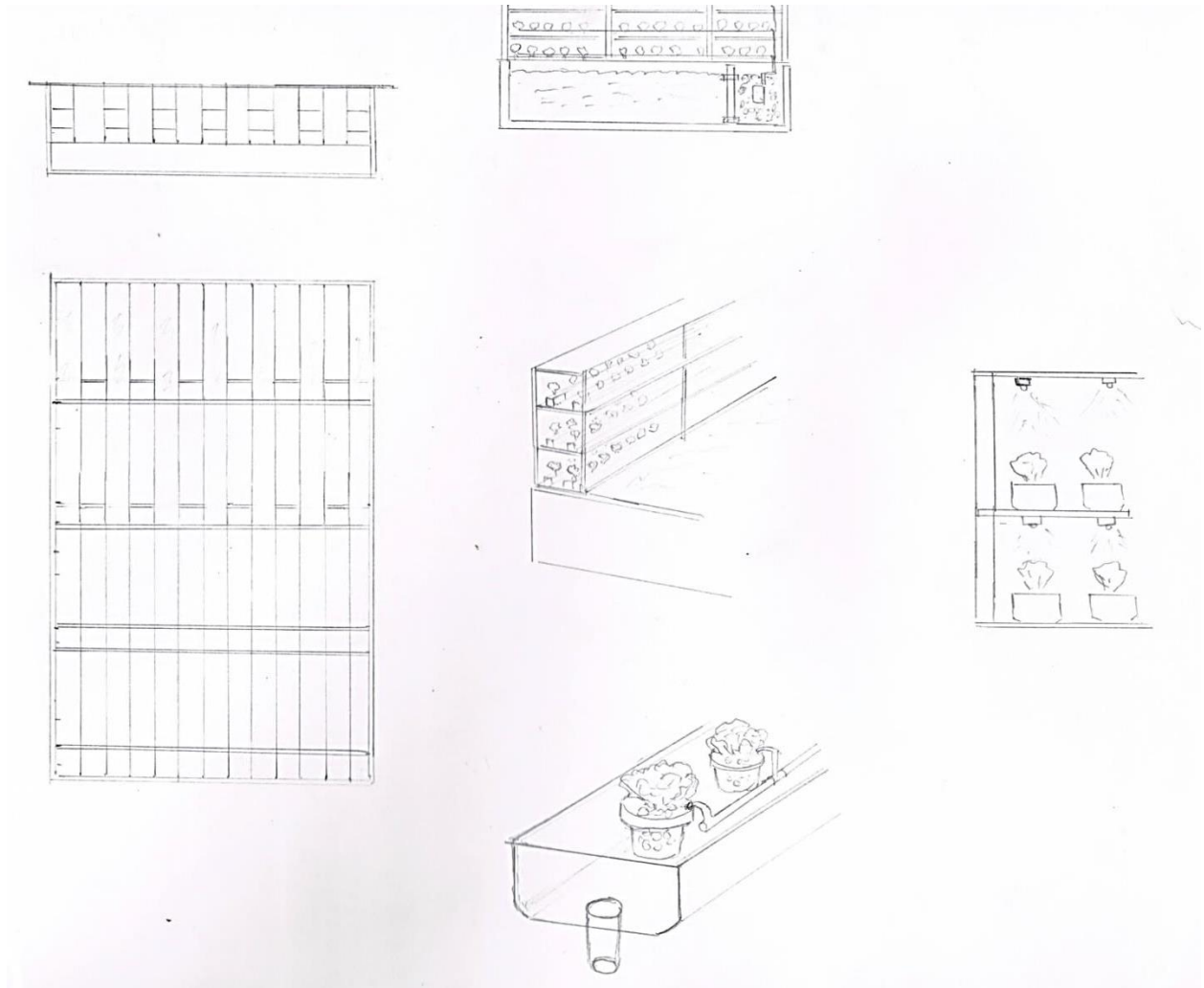




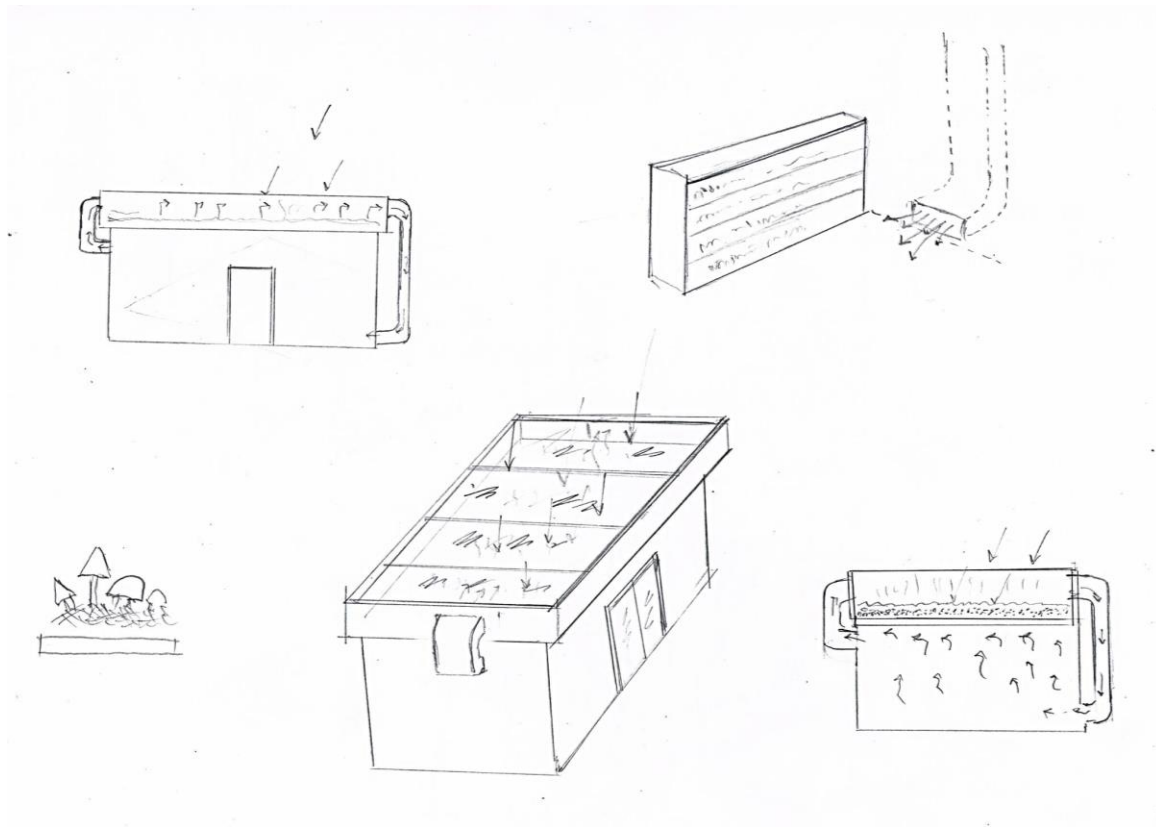
## Adjustable Temperature Fish Pond



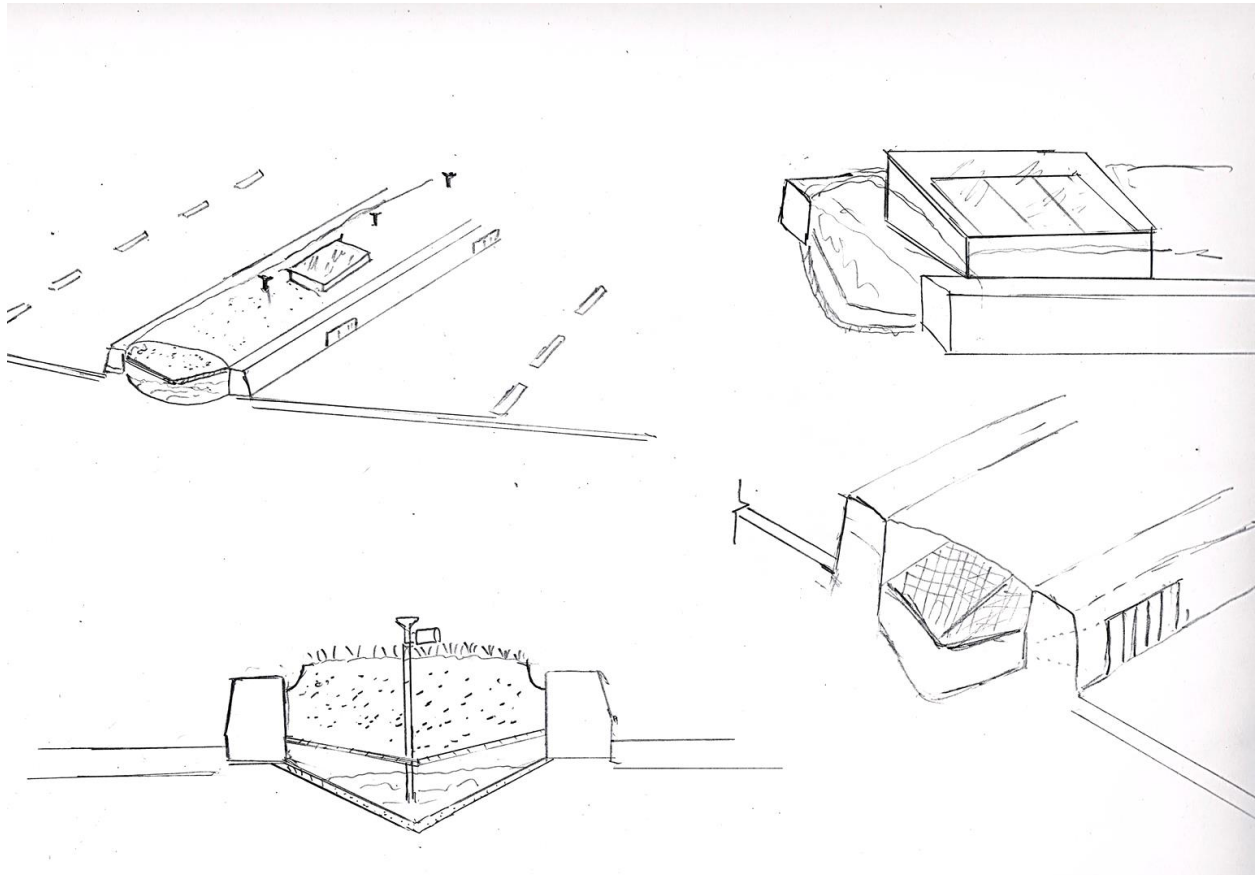
## LED Intensive Planting



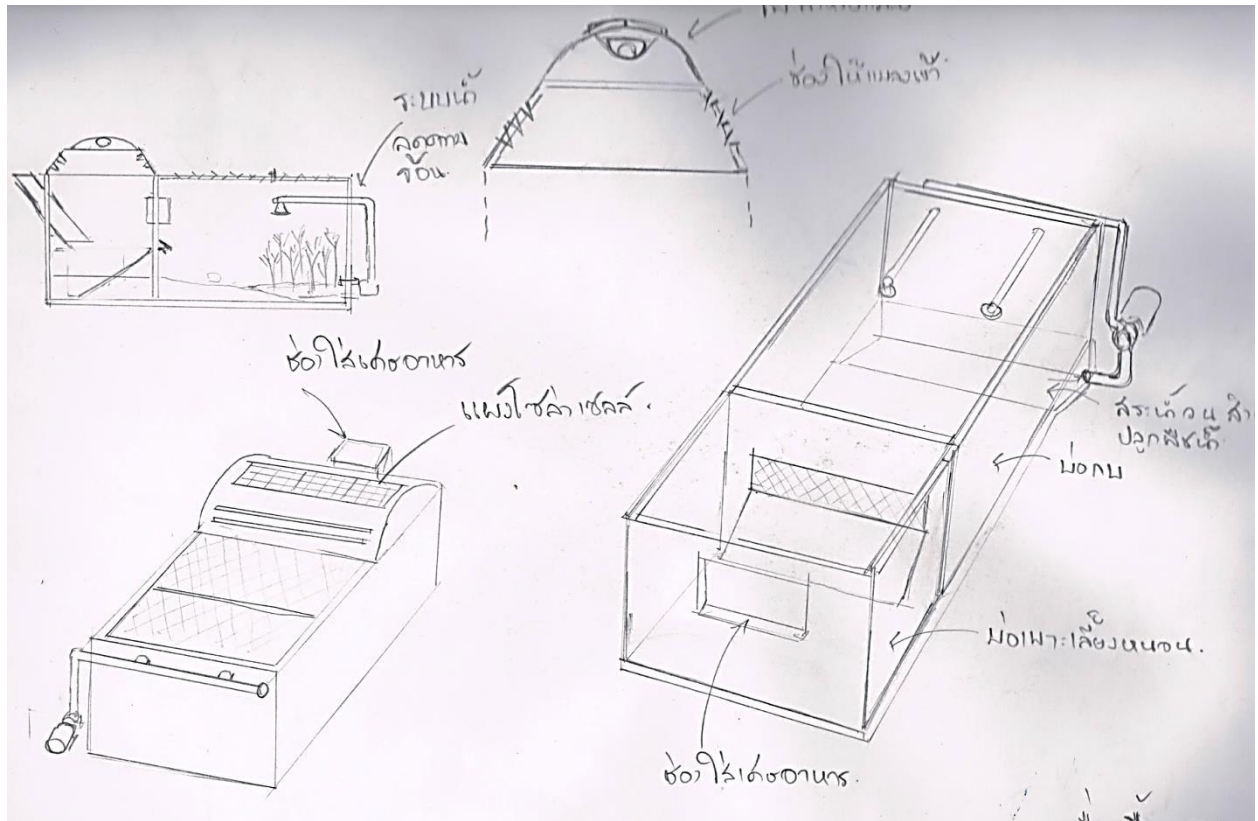
## Heat controller for Mushroom plant



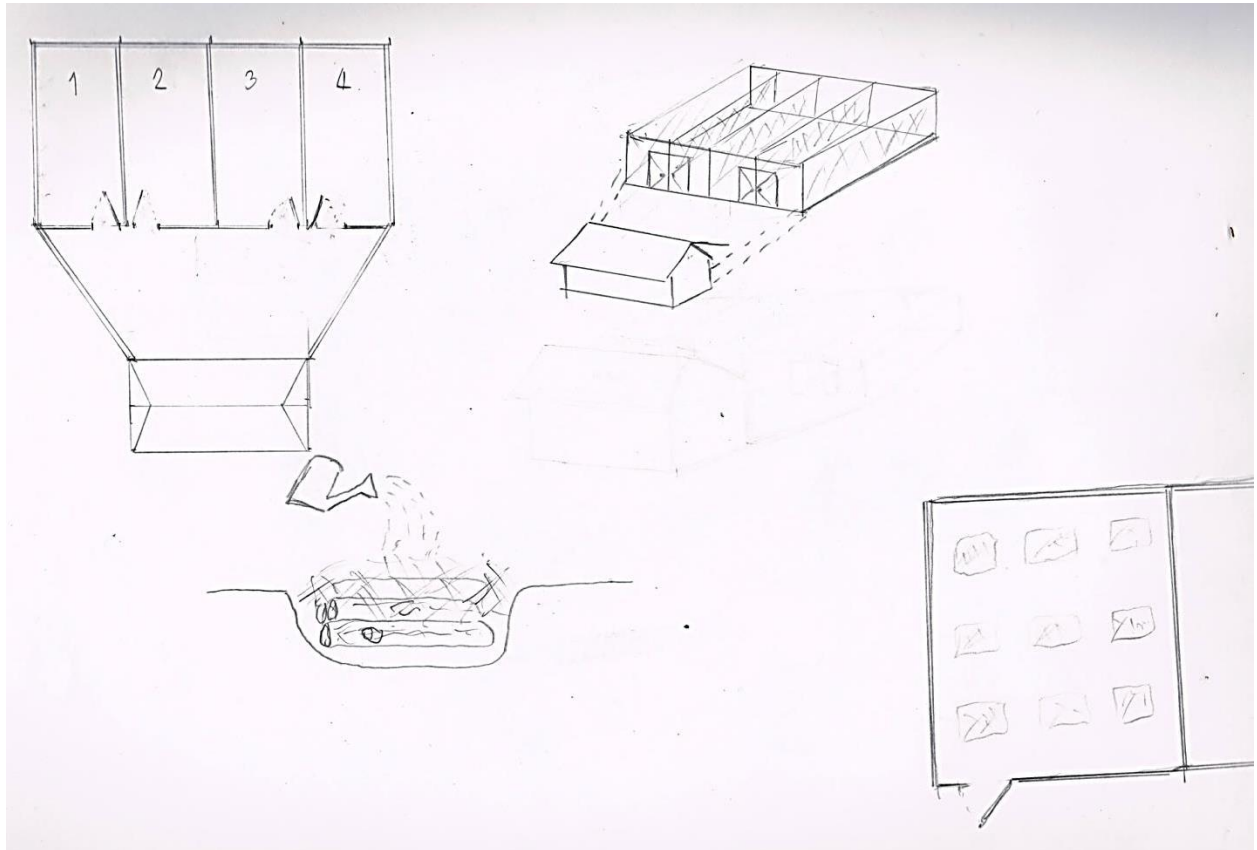
## Automatic watering system for roadside garden



## Super Frog Pond



## Organic Chicken



## Scrap candle collecting machine

