

Overview of Green Technologies for Rural Areas

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“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.”

ESCWA and ESCAP Collaboration

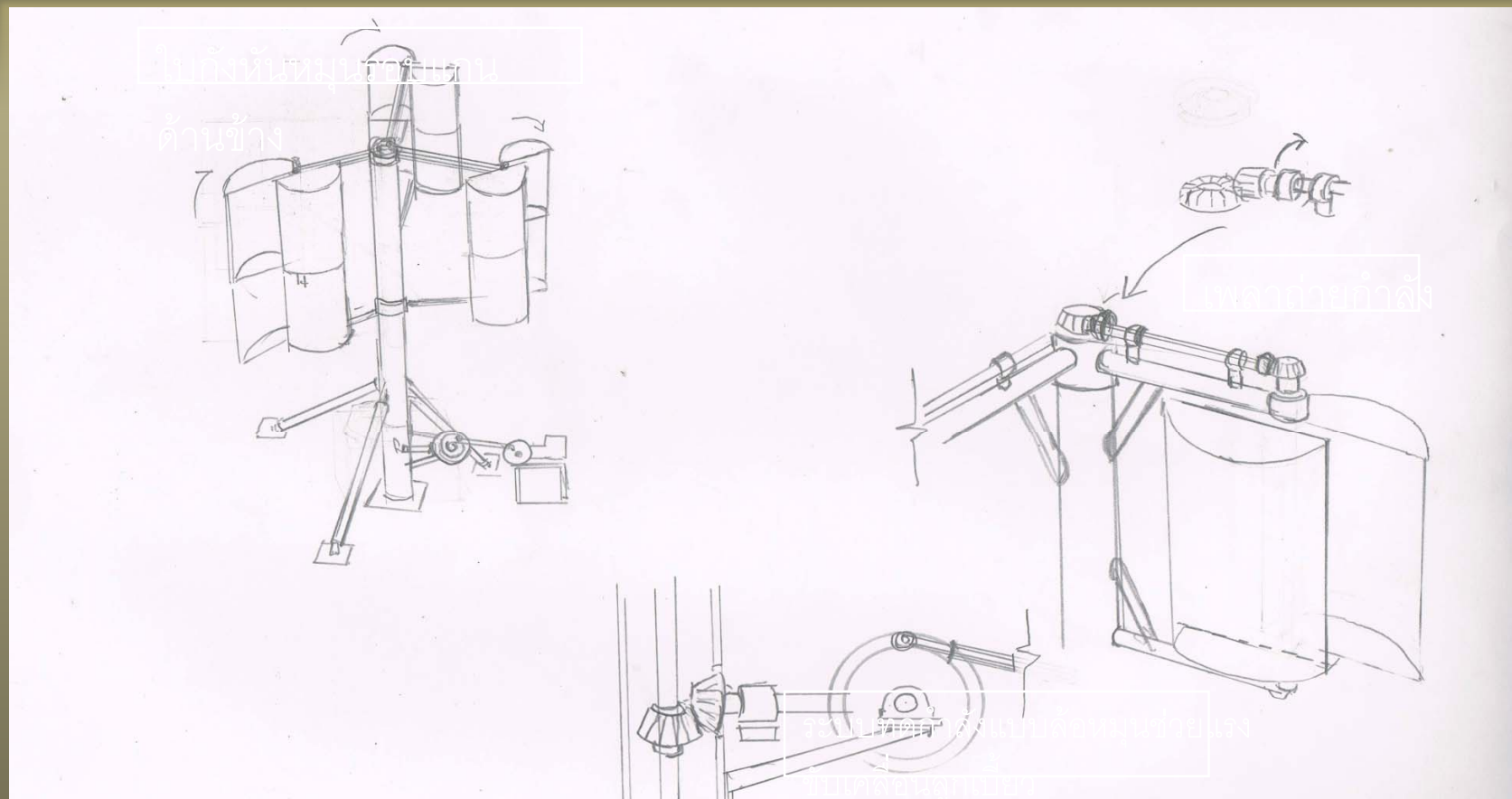
Booklet on Renewable Energy Innovations for Rural Areas

- This Presentation is an overview of *the Booklet on Innovative Green Technologies for Rural Areas* developed by Khun Yuttakan at the Institute of Renewable Energy Development of Asia Pacific Foundation located in Kanchanaburi Province, Thailand.
- The development of the Booklet is supported by both ESCWA and ESCAP and represents a successful and substantive on-going collaboration between these two UN Regional Commissions.

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

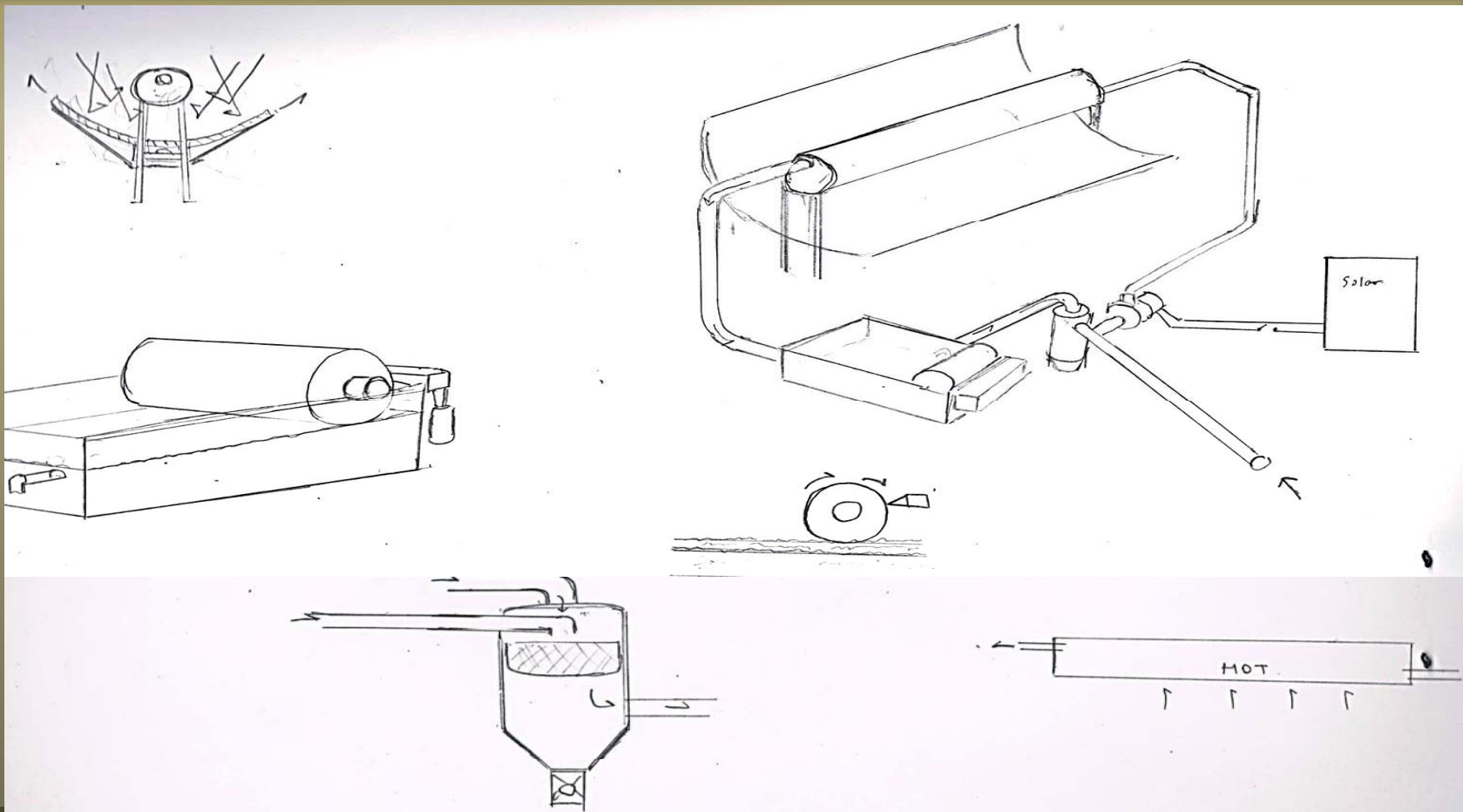
Reduced vibration wind turbine



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.

Trapping oil from fat (drawing)



Gasification Tar Removal Machine model

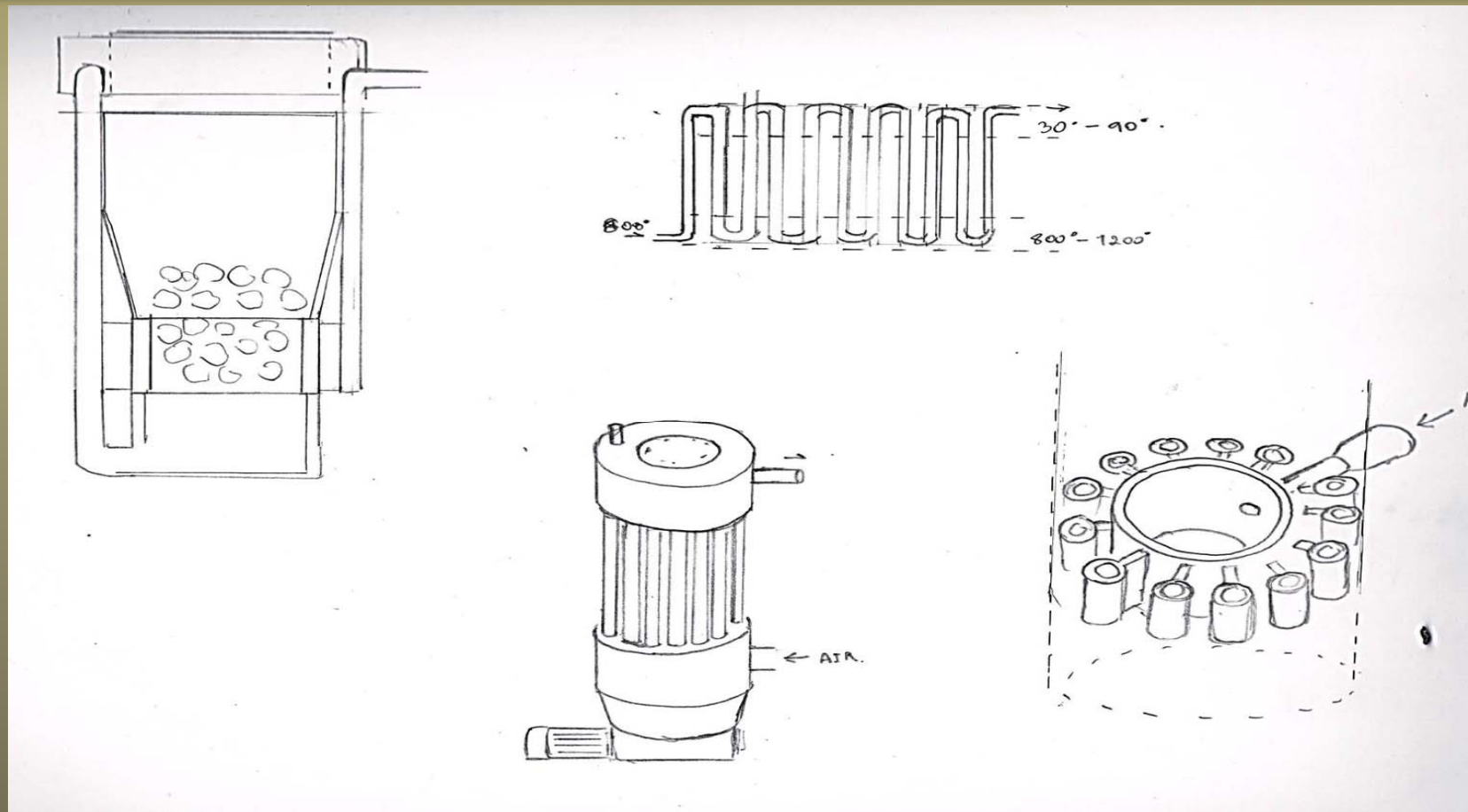
Gasification technology can solve the problem of tar build-up during the gasification process via chemical separation.

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 equipments.

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.

Gasification Tar Removal Machine model (drawing)

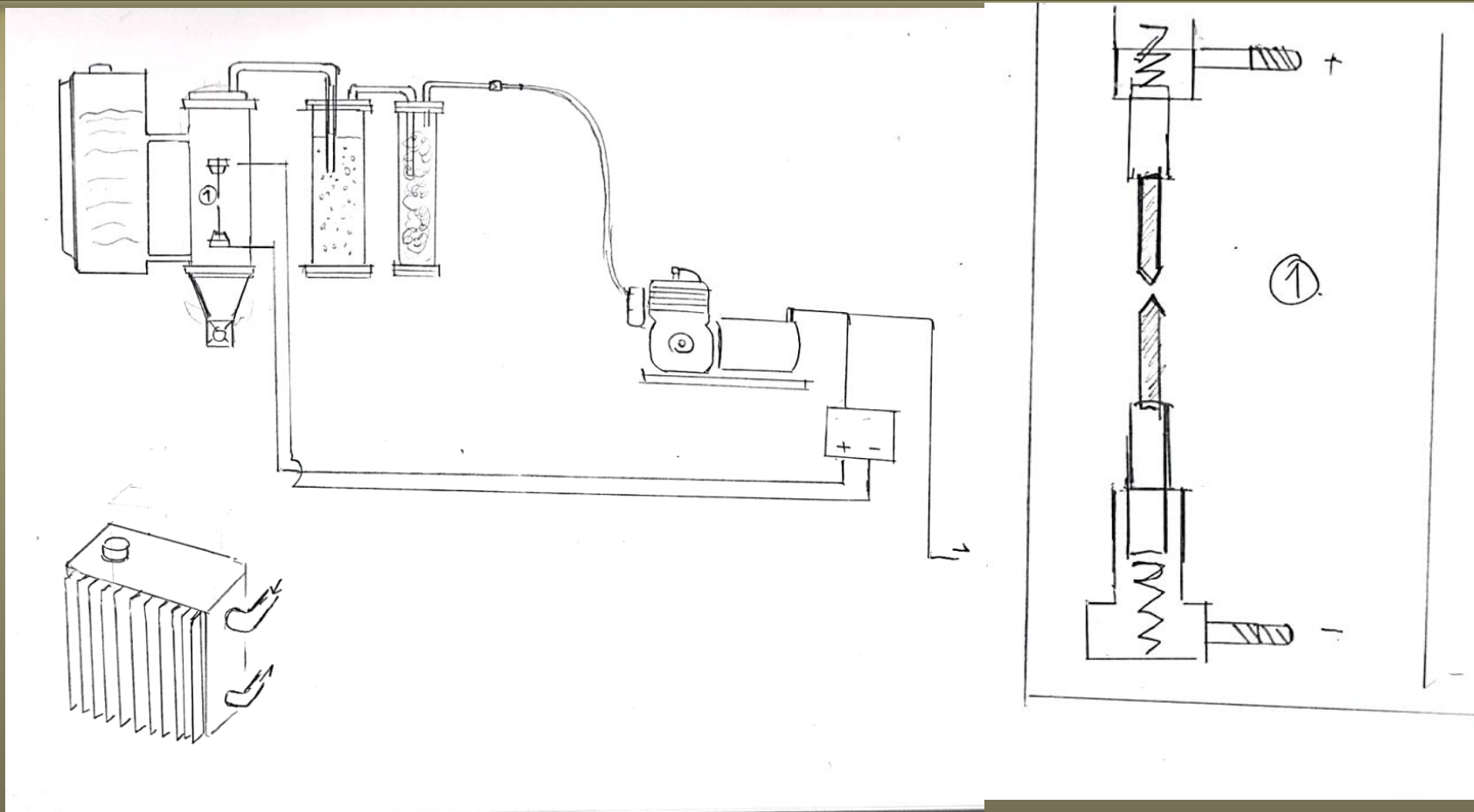


Renewable energy and water treatment

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 –separating oxygen, hydrogen and hydrocarbon. This gas will be used as fuel to off-set the power loss in the electric generator used to aerate wastewater.

Renewable energy and water treatment (drawing)



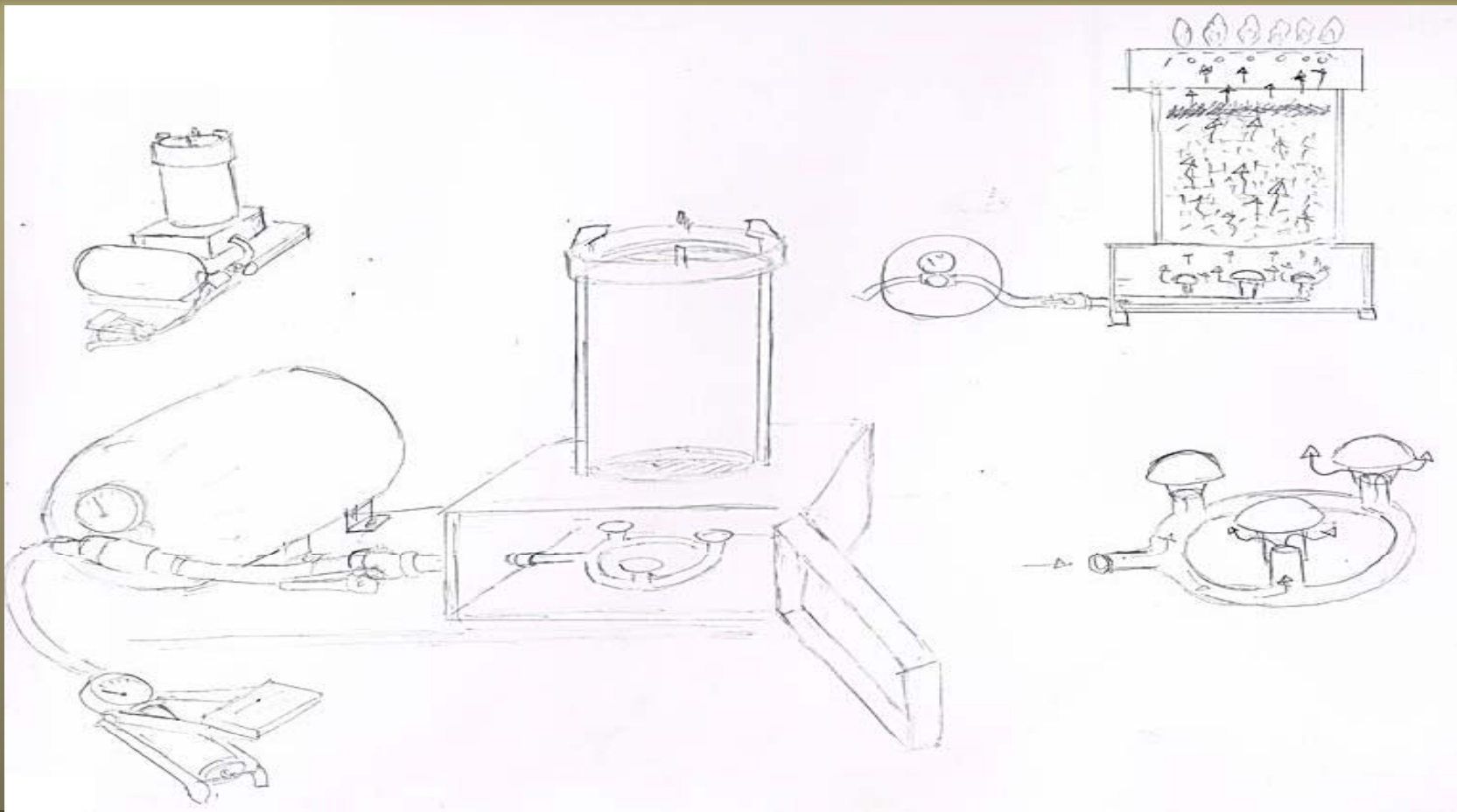
Alternating air biomass gas production system

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.

Alternating air biomass gas production system (drawing)

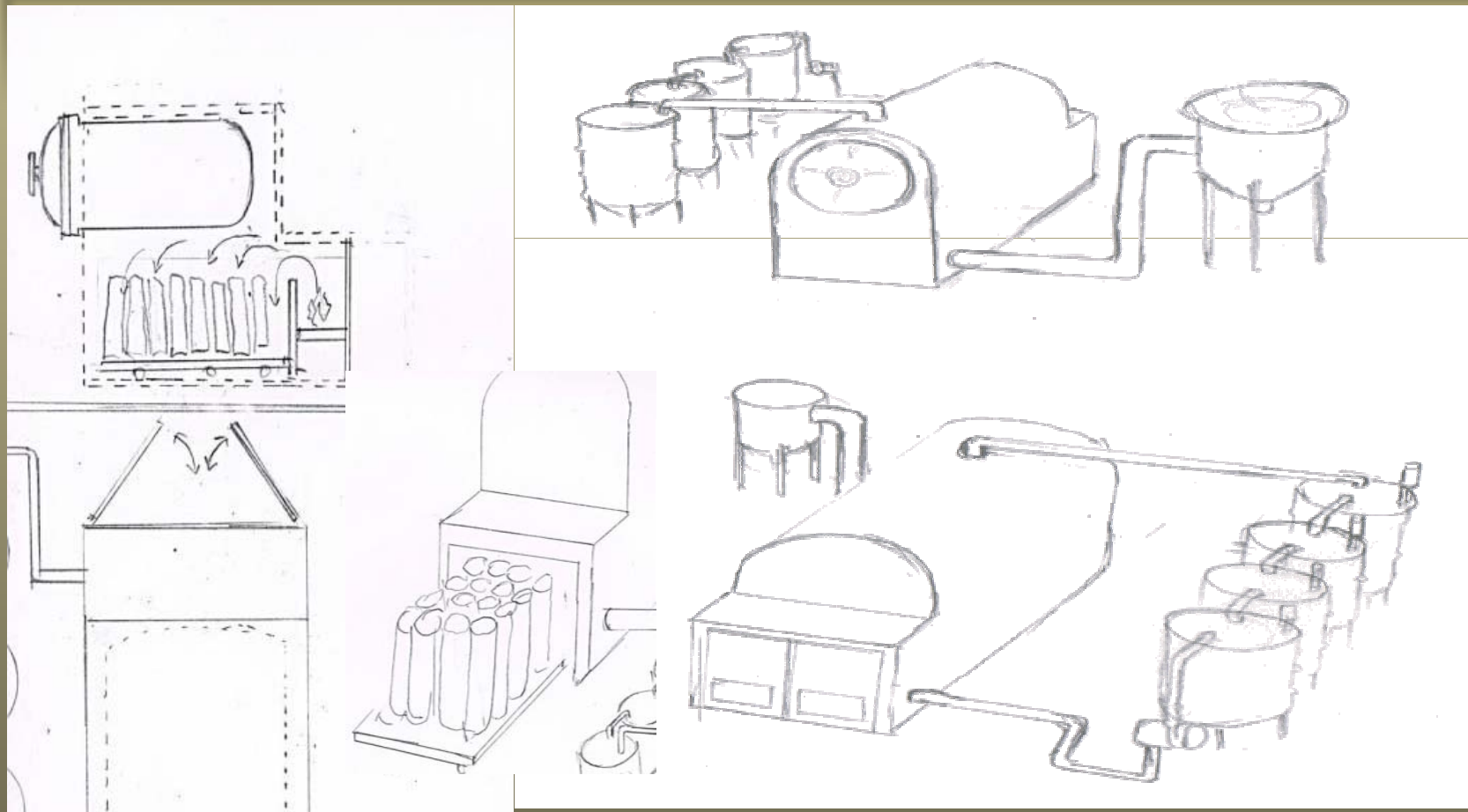


Extracting oil via burning charcoal

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

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.

Extracting oil via burning charcoal (drawing)



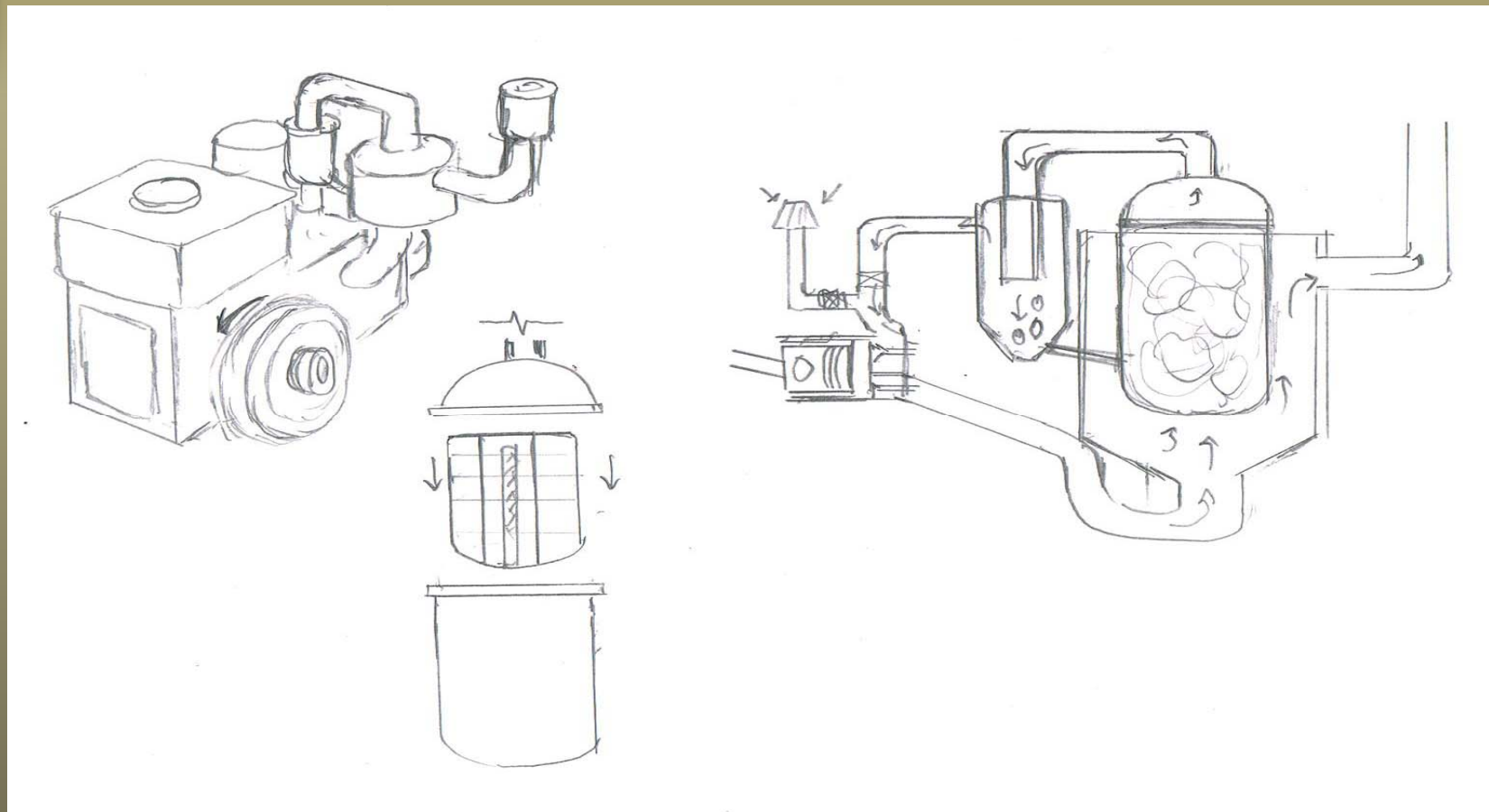
Converting plastic to diesel

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

Converting plastic to diesel (drawing)



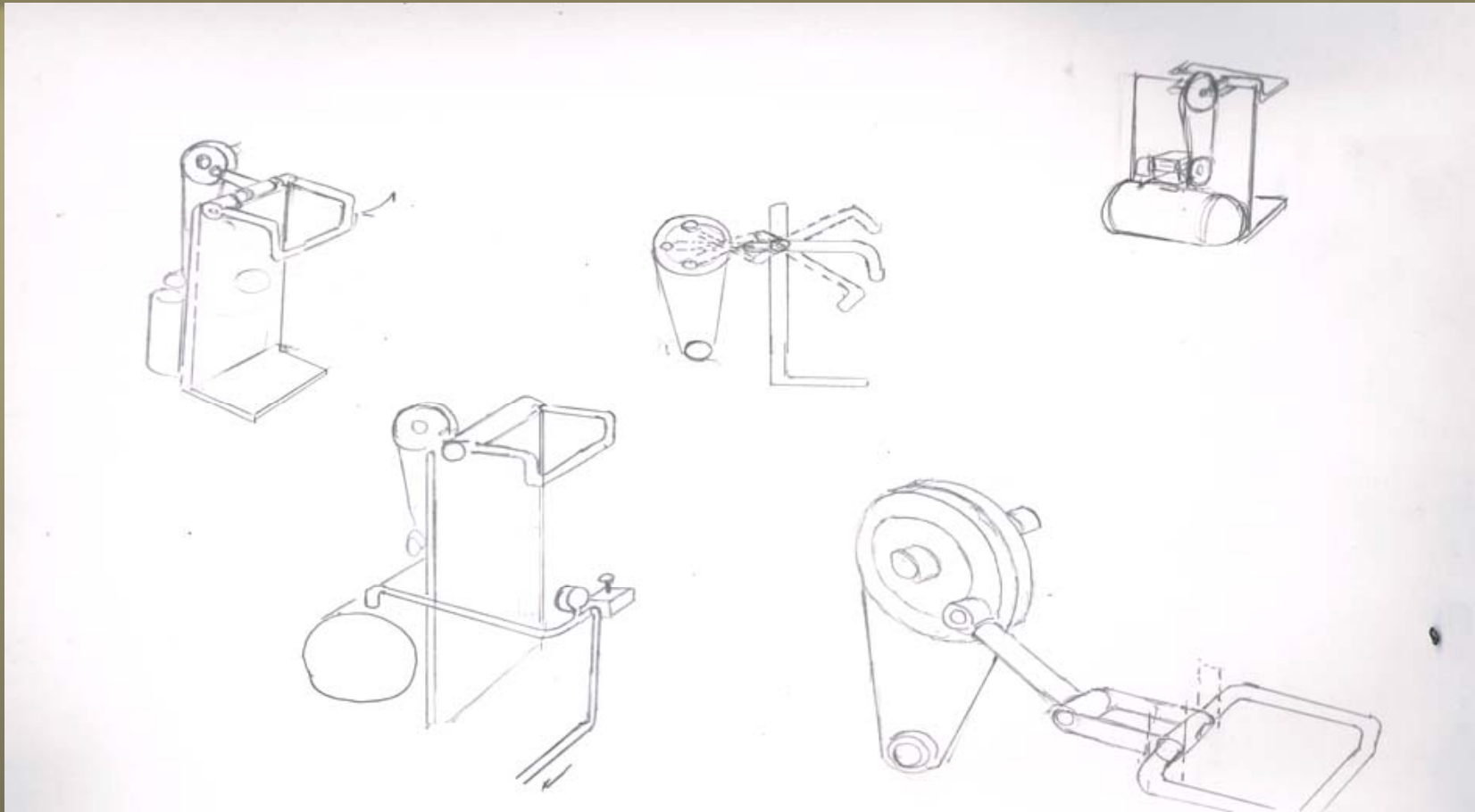
Exercise machines as air compressors

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.

Exercise machines as air compressors (drawing)



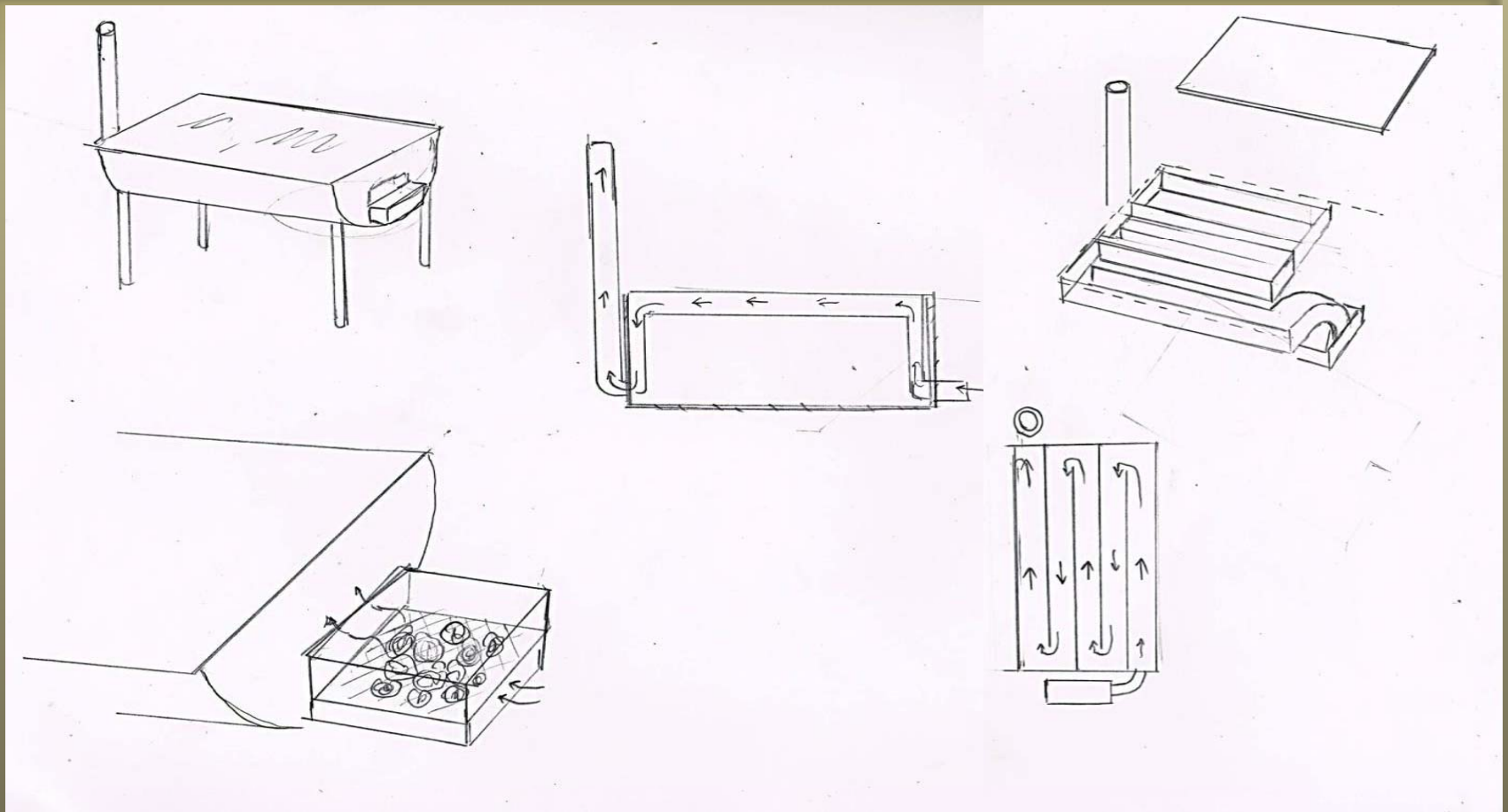
Tar free grill

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.

The grill is designed to use a number of fuel sources.

Tar free grill (drawing)



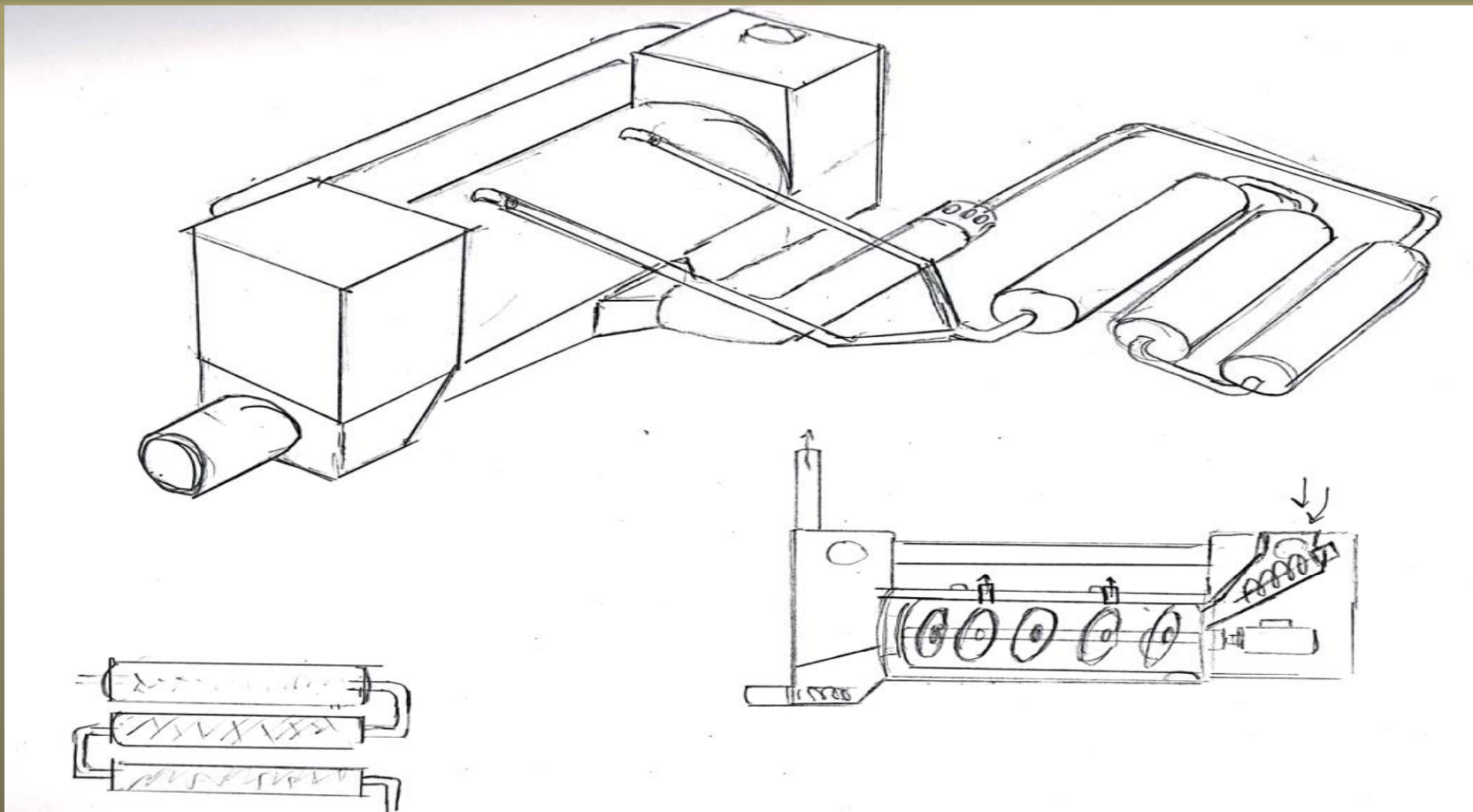
System for continuous conversion of plastics to fuel

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 without 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.

System for continuous conversion of plastics to fuel (drawing)



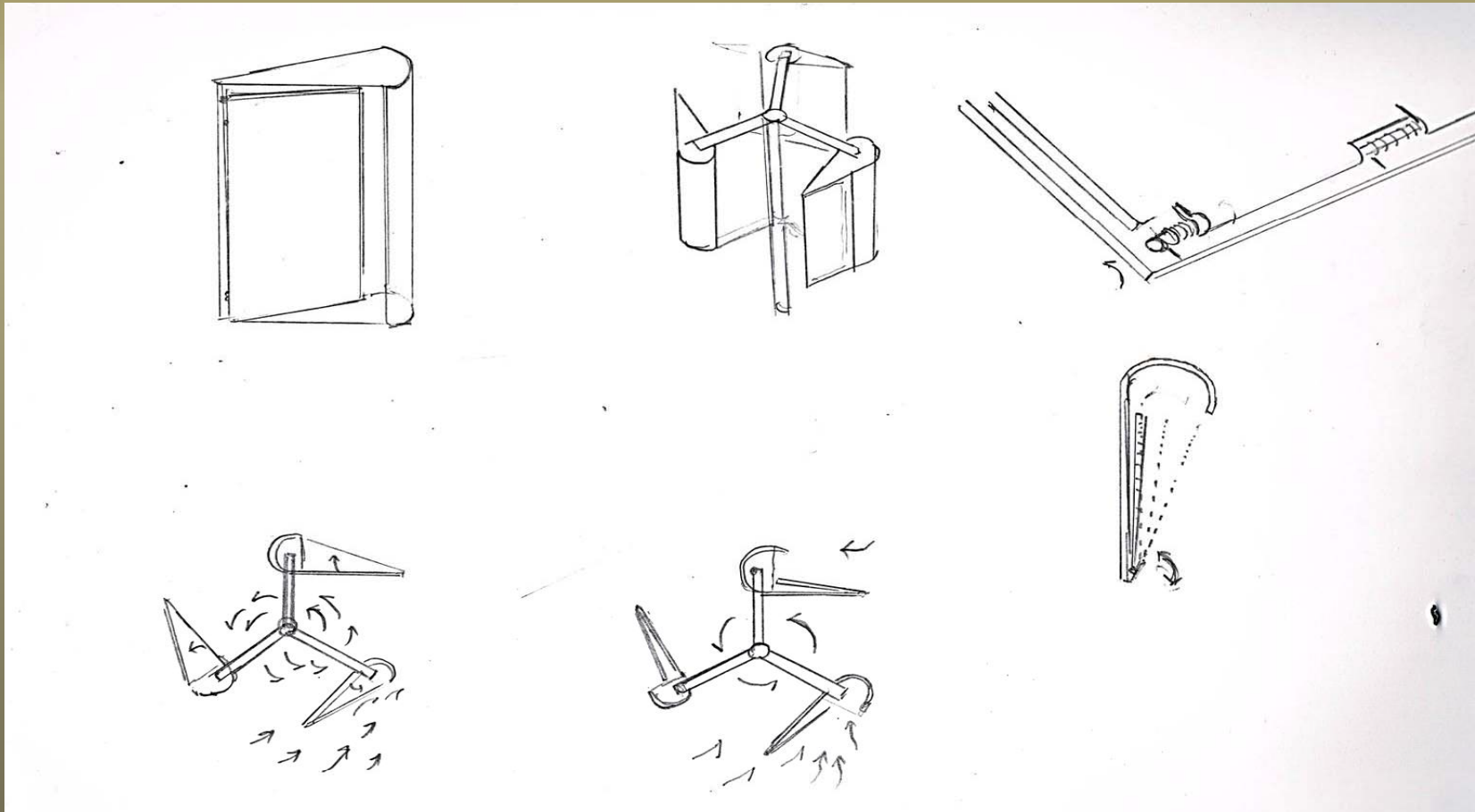
Reduced speed wind-turbine model

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.

Reduced speed wind-turbine model (drawing)



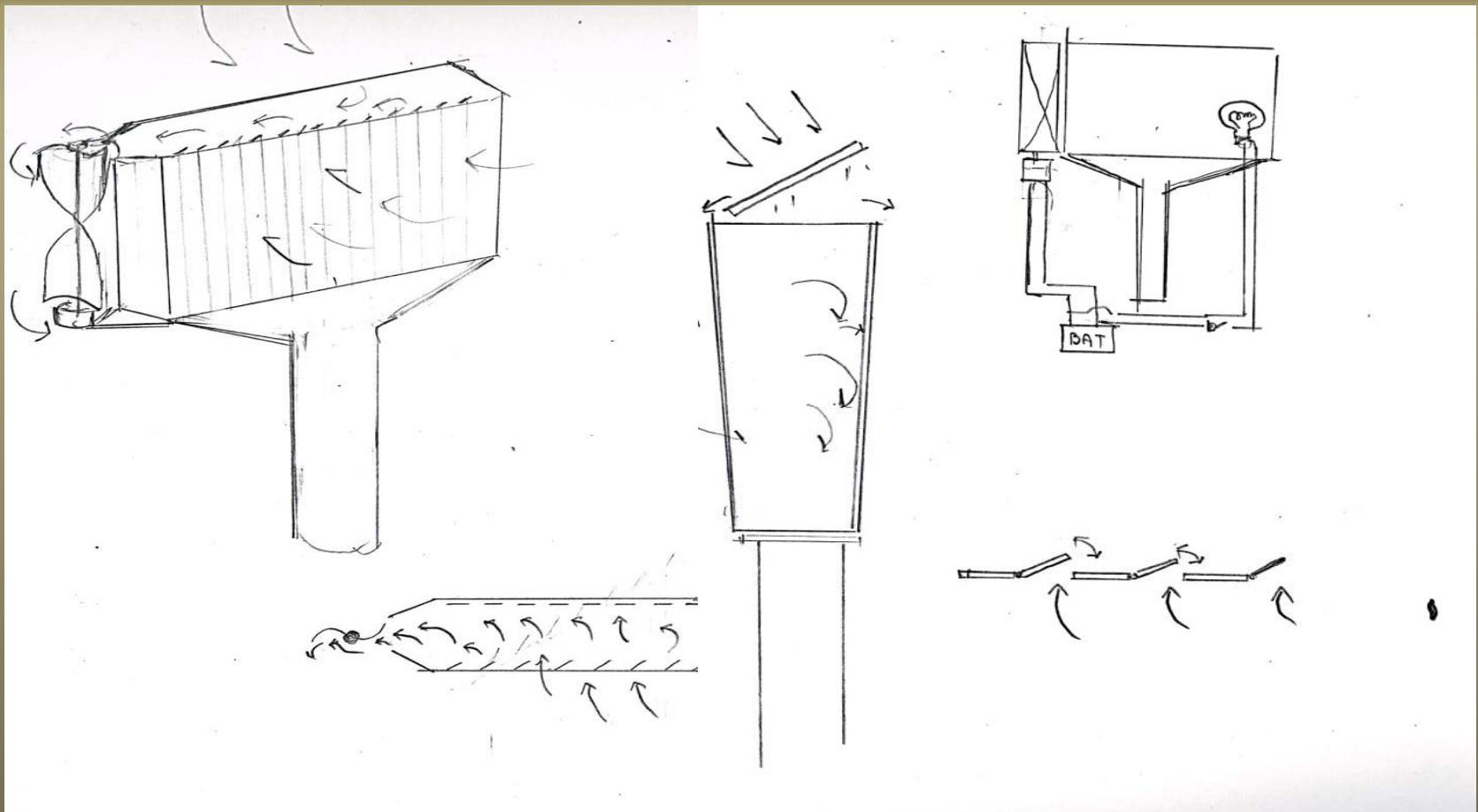
Billboards that generate their own electricity

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.

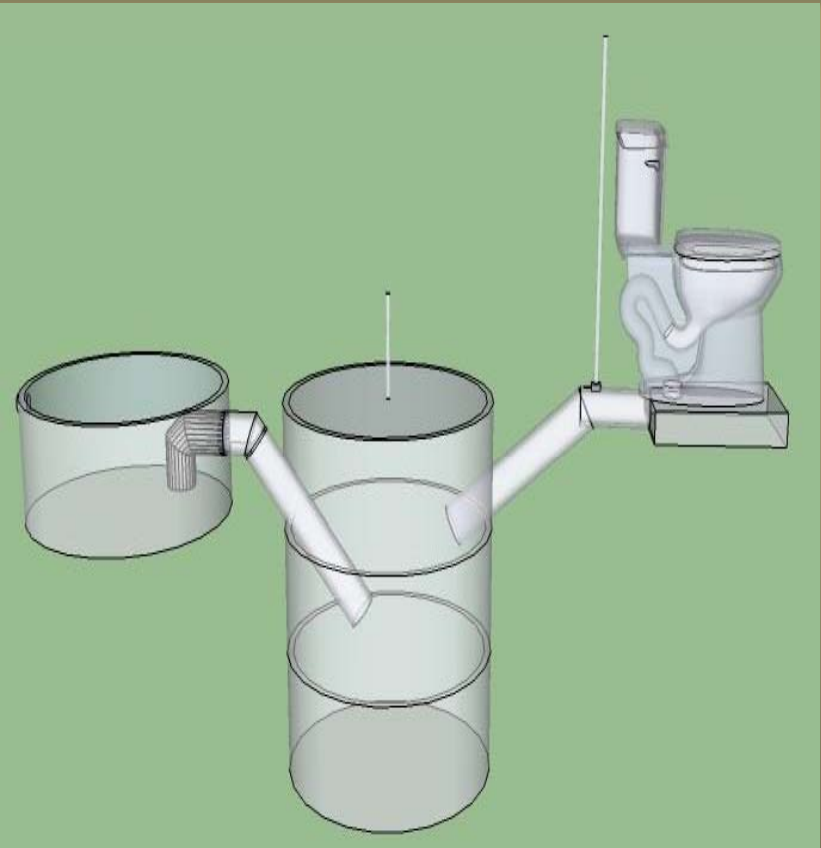
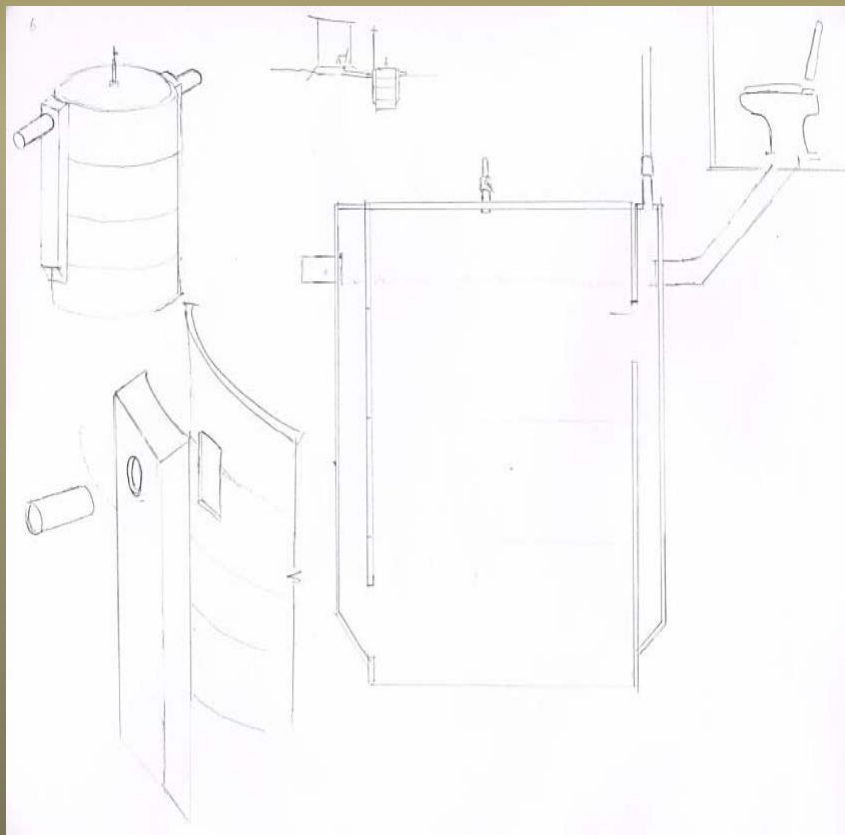
With the above in mind, the concept is to design a billboard that can also generate its own electricity as well as allowing the labeling to be unaffected while functioning as a wind turbine.

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

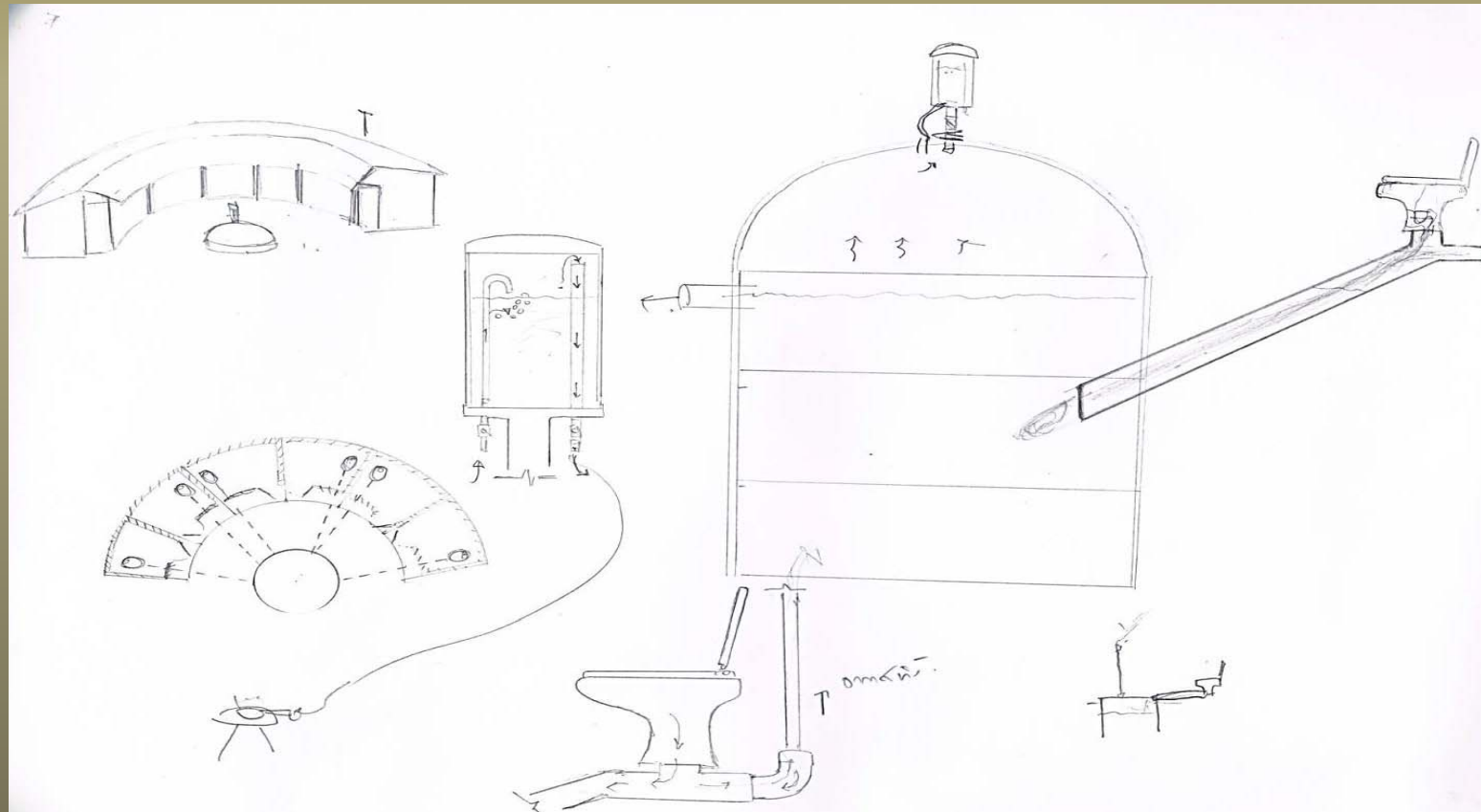
Billboards that generate their own electricity (drawing)



Home toilet that converts human waste to biogas (drawing 1)



Home toilet that converts human waste to biogas (drawing 2)



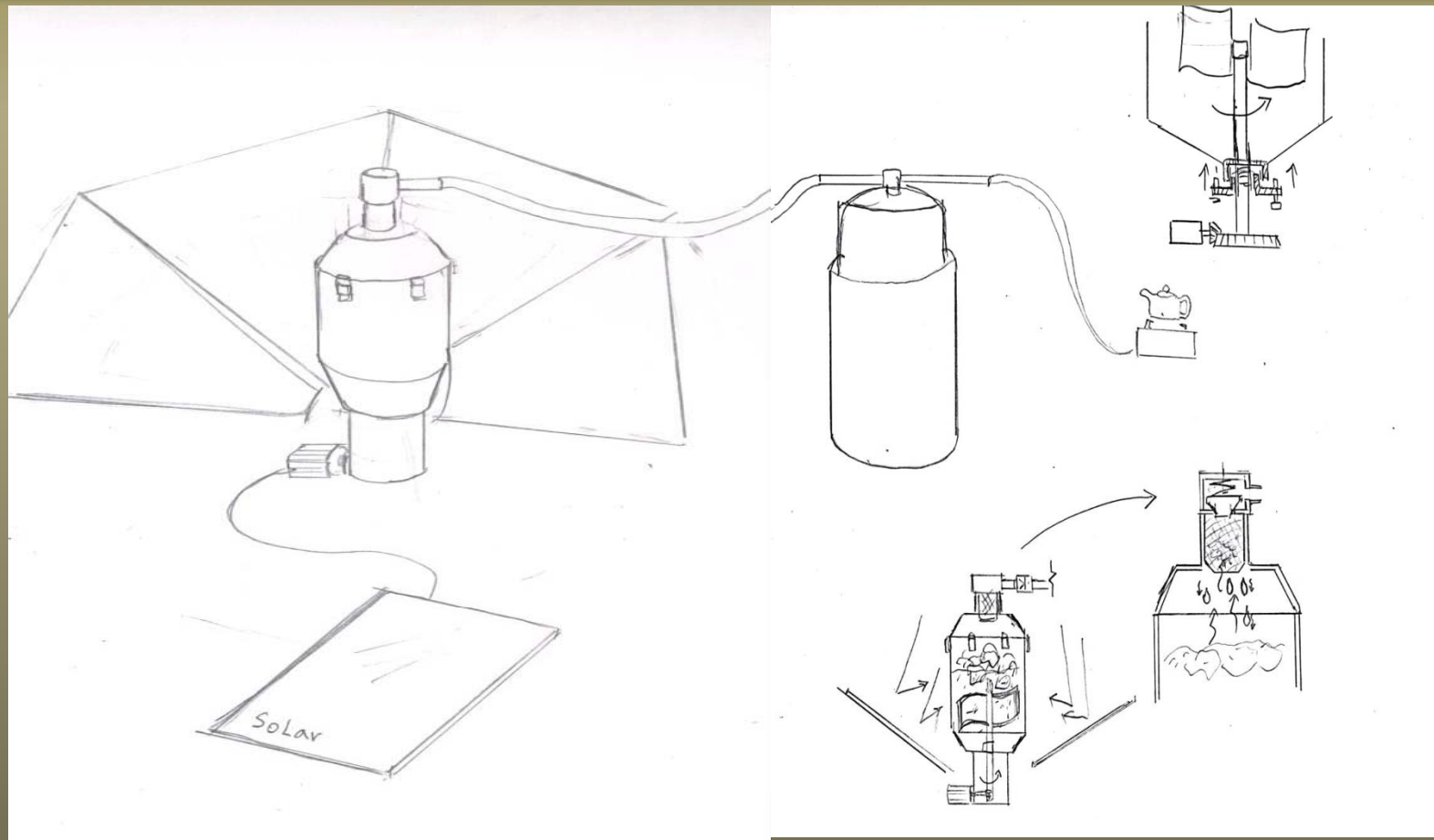
gas from plastic

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.

gas from plastic (drawing)



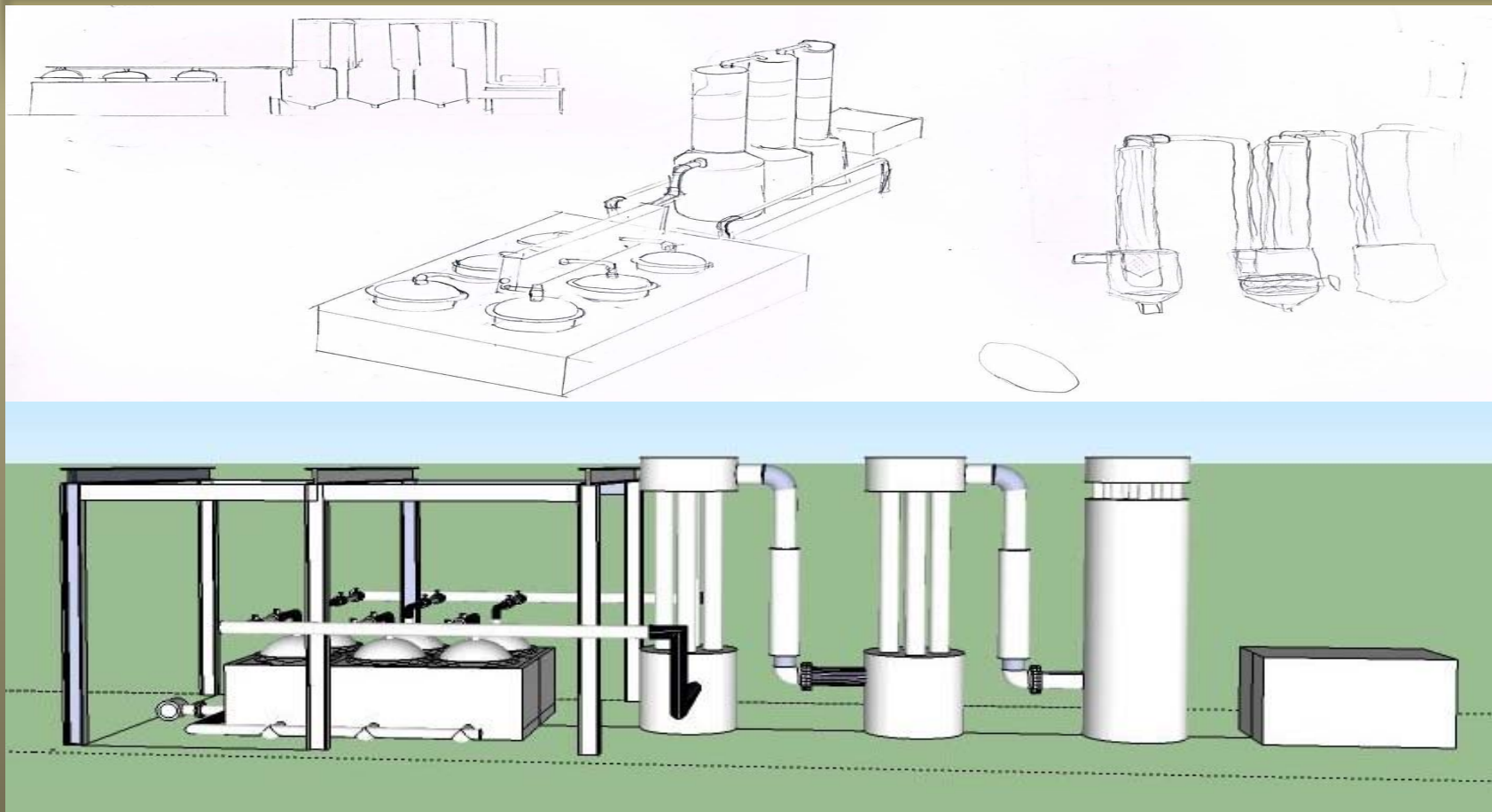
Pyrolysis: system to convert waste to energy

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.

Pyrolysis: system to convert waste to energy (drawing)



Plastic sheeting to prevent weeds

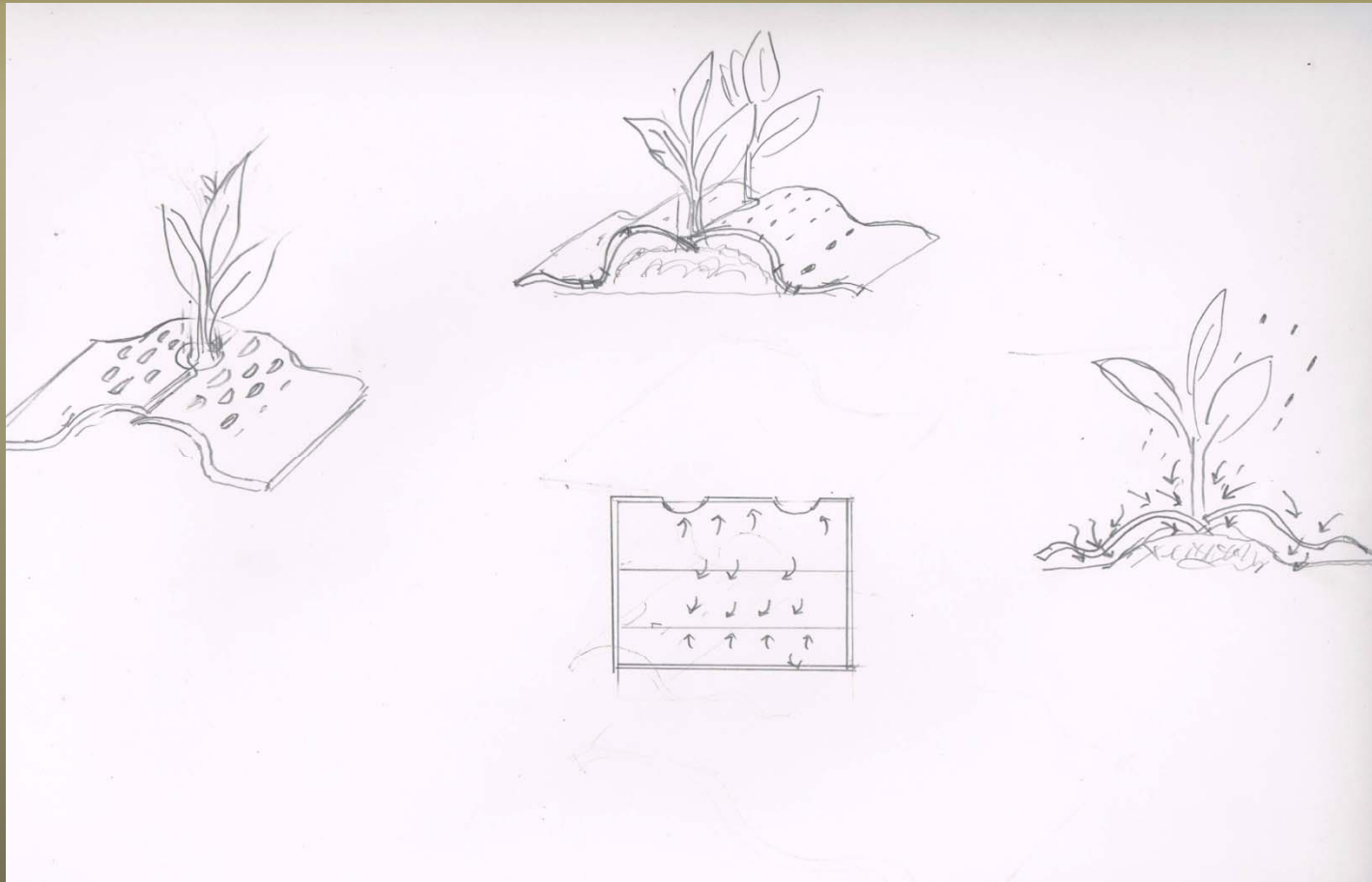
Current industrial agricultural practices rely heavily on fossil fuel based chemicals such as herbicides to control weeds and pests. These chemicals are very damaging to the environment polluting water and creating dead zones in the oceans.

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.

Plastic sheeting to prevent weeds (drawing)



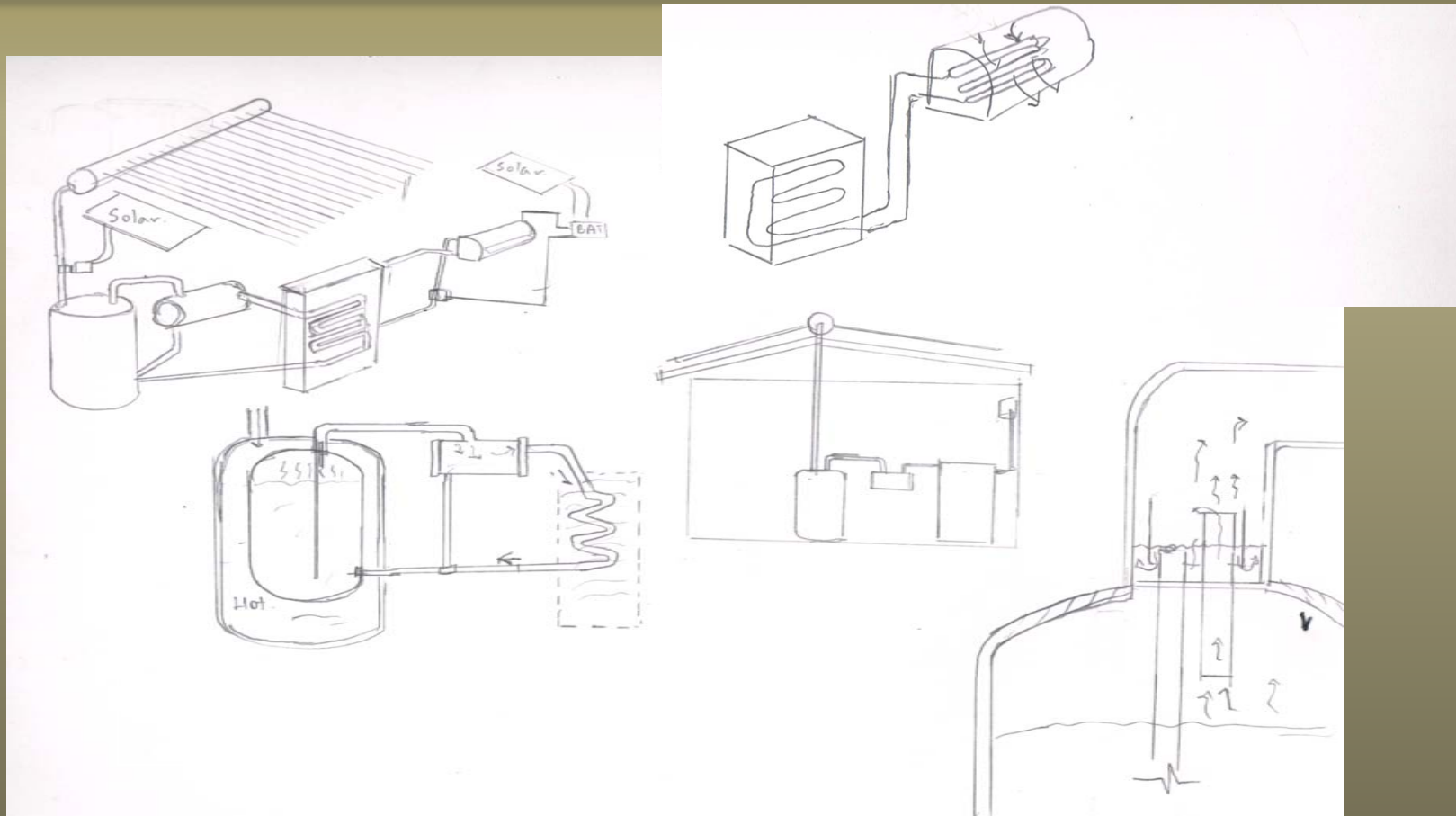
Converting heat generated by a roof to cool a home

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 heat via copper pipes on a roof a home converting water to steam to heat ammonia gas to run the refrigeration process.

This process is used to cool the home.

Converting heat generated by a roof to cool a home (drawing)



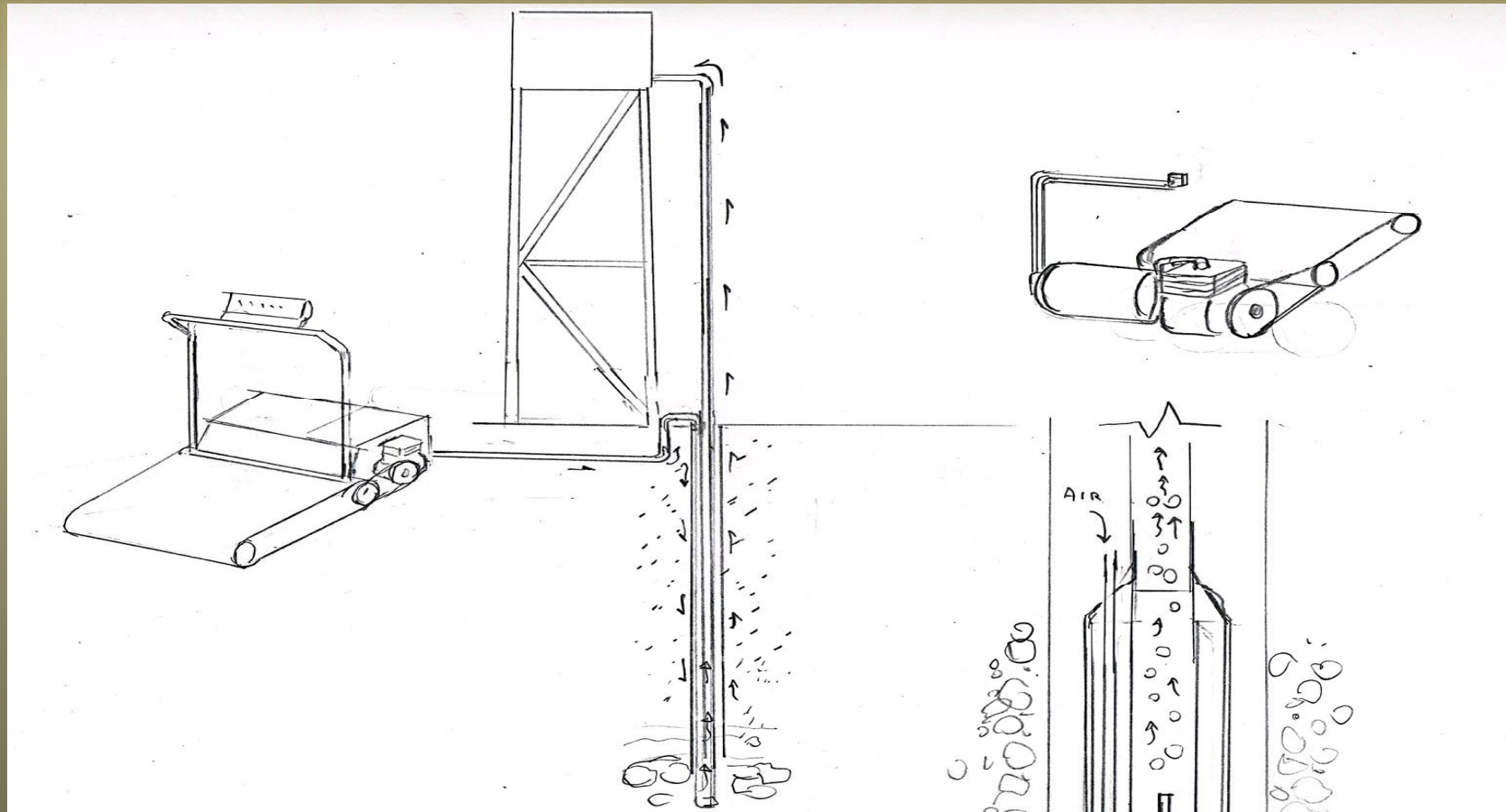
Treadmill water pump

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.

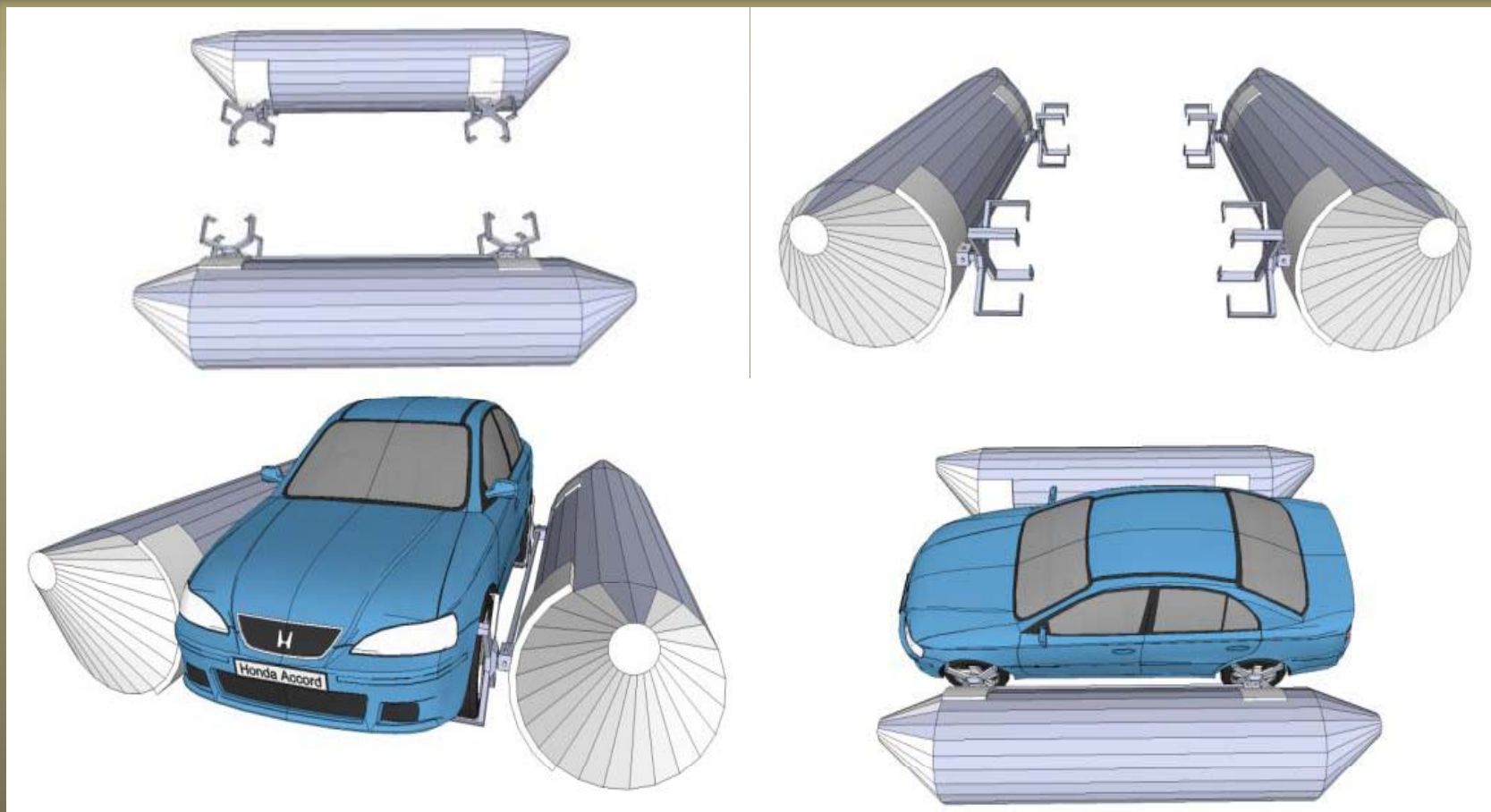
The use of this machine can cut resistance of the air pressure contained within the air tank thus pumping water to the surface and satisfying those who prefer to exercise and stay fit on a daily basis.

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

Treadmill water pump (drawing)



Catamaran float system to keep your car dry (drawing)



Thank you

