Green Living: Business Plan.

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Executive Summary: Green Living is a start up company that develops state of the art, all natural living and independent sustainability to new and expanding businesses and families in the local, regional, and state communities. The company is primarily owned by three students, Joi McBryer, Pedro Hernandez, and Nzubechi Uzuegbunam.

The rate of homeless and unemployed citizens in the local Austin area has nearly tripled since January of 2009 according to the city of Austin demographics. Green living offers knowledge,

experience, and skills that their clients cannot provide themselves. These skills include planning, strategy, advice, problem solving, decision making development, writing, creativity, accounting and finance assistance. With these skills at hand, Green Living is able to develop models homes that will be later developed from recycled dumpster bins.

Green Living will solicit clients and provide services through a traditional consultant delivery process of meetings, proposals, and contracts based on value pricing and budget. The firm will offer these managment and marketing services:

- Strategic planning
- business plans, marketing plans, and feasibility studies
- Market research
- Competitive analysis
- Focus groups and surveys
- Pricing
- Development plans

Green Living will primarily concentrate on recycling possible living conditions (i.e. the dumpster) and making life permitable to survive on the 1%. It will seek clients at the local, regional, and state levels. Green Living will aim marketing at these target markets:

- Known homeless shelters that are growing in numbers
- Independent living programs that have limited livable spaces
- Government funded natural disaster aid programs (i.e. Red Cross)

Existing competitors in Green Living's geographic area are not soliciting these target markets. The company's marketing plan is designed to develop a strong and consistent image of the owner's experience , relationships, and reputation. It will also locate information on prospects that are in the three target markets.

Green Living began as a three person consultancy staffed by the owners, Ms. McBryer, Mr. Hernandez, and Ms. Uzuegbunam. They bring a significant educational and employment background to the business, including several management positions in prominent local business. Green Living will contract with others as needed for professional services.

The purpose of this company is to renew doable communities. The legal structure of every project handled by the company will be patented.

Mission Values:

- Cost effectiveness
- Convenience
- Simplicity
- Accountability
- Profitable growth
- Reliability

Primary Location:

12700 Gregg Manor Road, Manor, Texas 78653

Room: D102 or Central Library

Company Members:

- Ckilar Atkins - Rainwater & Black Water
- Ebonie Henderson - Solar Energy
- Pedro Hernandez - Co- Owner & Finance
- Diego Hernandez Galarza - Finance
- Ainsley Joseph - Solar Energy
- Destinie Paine - Rainwater & Black Water
- Serena Quichocho - Internal Aesthetics
- Veronica Rivera Grey Water
- Jessica Rosas - Grey Water
- Exodus Tiah - Internal Aesthetics
- Nzubechi Uzuegbunam - Internal Aesthetics
- Joi McBrayer - Grey Water

Greywater System:

The pump controller is built around a PICAXE 8m PIC. The reason greywater chose this particular PIC is that it is programmed in BASIC and is cheap. There are 3 float sensor switches used in the project. Two of these float sensor switches detect high and low water levels of the tank. The third sensor detects when the water filter needs a clean. The controller also drives 3 LED's that are mounted on a remote indicator panel in the laundry that indicates pump running, filter clean required & fault condition.The transformer that is used in the project has a 24VAC tap that was going to be used to power some water solenoids. Any voltage from 12VAC to 18VAC can power the circuit.

The voltage regulator doesn't get hot as the PIC only draws a few milliamps. Also use a resistor to reduce the unregulated voltage to the pump relay which may need to be altered depending on the relay voltage. (Make your PCB.) Used the tried and tested toner transfer method. The attached schematic & PCB were done in Eagle. I placed vias on most of the pads to increase their size. I found I just couldn't get the DRC rules right so I found this method easier. The PICAXE-8M is programmed via the serial port of the PC. The PICAXE editor and data sheets can be obtained from the following URL:- http://www.rev-ed.co.uk The schematic & PCB could be used for other switching / sensor purposes with the required code changes made. The pump chosen was a submersible type designed for dirty water. Track the issue down to air in the impeller chamber. There was a small ball bearing that was suppose to let air escape and close the bleed hole when the pump was running. (However grey water has soap in it.) The pump will have lost its punch, it still delivers water but not like it use to. I suspect the pump being on it side has let water seep into the motor bearings (only a theory). The pump is mounted on a aluminum

frame. The frame is secured to the bin at the top of the frame. This was done so that the bin is watertight. Any mounting holes in the bin are above the high water line.

Also mounted on the aluminum frame is the 2 water level switches. These are sealed magnet & reed switch units and can be purchased at spa shops or here in Australia at Jaycar http://jaycar.com.au or Altronics http://www.altronics.com.au. To stop the pump from sliding around at the bottom of the bin it is cable tied to the aluminum frame. The following instructions show how to wire up the controller to the pump and remote indicator panel. For the power cord, use a power extension lead and chopped it in half. This method left a molded power socket for the lead that goes to the pump. That way the client doesn't need to butcher the existing power cord on the pump. Alternatively, they could mount a power socket on the case of the controller. Please ensure that the earth wire (green/yellow stripe) is connected from the power cord through to the lead going to the pump. To join the earth wires together, use a crimp lug that was then bolted to the transformer chassis (using star washer to ensure a good connection to the metal). The transformer used had flexible leads. So, crimp the 3 neutral wires (blue) together using an insulated joiner (then heatshrink was placed over it). To connect the 3 LED's on the remote indicator panel you need 4 wires. (You can use Cat5 or phone cable.) The client could also had a power LED that is mounted in the controller box itself (not remotely). The remote indicator panel is made from a hobby box that anyone can purchase from electronic stores like Jaycar, Altronics, Dick Smith, Radio Shack etc. The lettering used was Letraset rub on lettering. The weatherproof polycarbonate box was purchased from an electronic supply store. Ensure that it can be sealed to prevent rain from getting in. Since it will be having a pump that is submerged in water that must power the controller / pump from a safety switch protected power outlet. (Can

find cheap extension cords that have a safety switch built into the plug.) Install the Grey Water recycling bin up the side of the house that has all the plumbing. The recycler needs a sewage inlet that the overflow pipe can connect to.

It also needs a hose run from the outlet of the washing machine to the inlet (top) of the bin. Connect the shower or bath to the bin but this would require major plumbing alterations. Also here in Australia any permanent plumbing needs to be carried out by a licensed plumber. The outlet of the recycler is feed into the garden via 19mm (3/4" I think) garden poly tubing. Can't use sprinklers as the soap in the water will clog any small nozzles and also spraying the water could be a health hazard as any water left in the tubing will become stagnant. There is also the risk of inhaling water borne bacteria so don't use sprinklers. Also, be aware of a range of low pressure drip hoses designed for tank water / gravity feed irrigation systems. The hoses could also be used to deliver the water to the required locations in the garden.

Some similar projects:

- http://grey-is-green.com/
- http://www.instructables.com/id/Home-made-DIY-Grey-water-system-water-recycling/
- http://inhabitat.com/the-sloan-aqus-greywater-recycling-system/
- https://www.youtube.com/watch?v=gEeFa3sn5O0
- http://www.hometalk.com/2399224/diy-trash-can-compost-bin
- http://www.diyswank.com/diy-tilt-out-trash-bin/

Rainwater:

The platform (a wooden pallet or other platform of client's preference) for the water container needs to be located near the building you want to collect rainwater from, and it also needs to be elevated if you want it to work on gravity flow. (The roof is a fair amount of collection area.) The rainwater group decided to level off a 4'x4' area therefore the tank. This gives the container a solid base and gets it up just a little higher, making it easier to access the garden hose spigot we will add. The front of the pallet has a notch around the drain port, which will make it easier to access the garden hose spigot later. Next, it is important to modify the inlet of the tank so that the client can get the rainwater in, without letting in leaves or anything else.

The fill port in the top of the tank is a 6" screw-on cap which means if you just remove the cap, it leaves a nice big hole to let animals and foliage in. So, Rainwater decided to modify the cap to include a screen, make it self-cleaning, and keep out mosquitoes. First, notch out the edge of a 4" PVC pipe cap wide enough for a gutter downspout using a jigsaw. Next, center the 4" pipe cap on top of the 6" cover. Then drill holes around the inside edge so we could use pop rivets to connect the two. Then drill through both the pipe cap and cover with a 3" hole-saw. That kept a half-inch lip all the way around the inside of the pipe cap for the screws that held both parts together, and as a place for our "Coarse-Filter" to rest. To keep large items out of the storage tank,the client will need some sort of screen. Some aluminum "gutter-guard" was chosen to be the filter. Then add an aluminum circle that fit inside the pipe cap, and would rest on the ledge inside. The friction-fit in place just fine, but it's optional to add some sealant to make it more permanent if you wanted. Lastly, they decided that it is needed to cut some scrap fiberglass bug screen to a little bigger than the cap. Simply need to lay a screen over the 6" hole, and then

screwed the cap back on top right over it. That way, there is both the aluminum coarse filter to keep leaves out and screen to keep out mosquitoes. The 175 gallon IBC features a 2" drain port on the front bottom.

It has a cheap plastic ball shut-off valve, and a 2" plastic cap that gets screwed on to keep it from leaking. Rather than use a number of PVC pipe adapters to get down to a garden hose, the client can reuse the 2" cap and some spare plumbing parts we had kicking around. To start with, a brass spigot with 3/4" NPT (National Pipe Thread) male connection on it. Standard threaded pipe is tapered, so the farther you screw it in, the bigger it gets. This helps make solid, water-tight connections. Drilled a 3/4" hole through the center of the 2" drain cap. Next, stick the pipe end of the brass spigot through the cap, added some sealant at the joint, and then threaded on a nut from the back side. Since the hole was the right size to start with, the sealant and tightened nut made a solid connection on the cap. Using plumbers putty (you could also use teflon tape), thread the drain cover with spigot onto the drain. We decided to have the brass spigot rotated clockwise part-way, because the open big drain valve made it harder to grab the knob on the spigot.

Then connect a garden hose, run it down-hill, and tested our flow from the rainwater collection system. Modifying the gutters and routing them to the storage container, for the gutter closest to the rain container, it was pretty straight-forward. The downspout can be cut a few feet above the container and then set the cut-off piece to the side for later use. Rainwater also wanted to collect all the water from the other side of the roof as well. To do that, they added two elbows to snake the downspout around the back of the dumpster and then a long section of angled downspout sloping downward, towards the rain container. It is needed to figure out the best way

to connect both gutter downspouts together to combine the water going to the rain water container. Ckilar and Destinie decided that the best way to connect it was to use another short piece of gutter. Not only did they need to combine both downspouts, but they also needed to move the water sideways a couple of feet and then send it to the IBC. (A short piece of open gutter could accept both downspouts and extend to the IBC tank.) It would then have an elbow and short downspout going directly to the the fill port on top of the tank. Then attach the gutter to the wall of the barn with some long screws, and a slight slope towards the rain container.

Solar Energy

Monocrystalline is the better solar panel to use because of all of the positive outcomes it gives our products.Working on the renewable energy component is Ebonie Henderson, Serena Quichocho, and Diego Hernandez. We came to the conclusion that solar power is the most reliable source of renewable energy being that Texas gets a considerable amount sun throughout the year compared to wind and water using wind mills or hydroelectric systems. It's sunny out for at least of 60% of the year with the sun shining for 12 hours a day. Having these numbers, using solar power was the most energy and cost efficient source of power. With the fact that the dumpster isn't being used 24 hours a day, there is a way to store the energy in a battery pack so that when it becomes cloudy or rainy outside the dumpster can still be in use. When night falls and the light is required, he can tap into the solar power storage so it won't be dark. As an alternative source he could tap into the school's electricity source and use it when he truly needs to.(at night or when the battery runs out of energy.

There are two main types of solar panels: monocrystalline and polycrystalline. For the dumpster project, one of the challenges we face is figuring out what type of solar panel would fit best for the dumpster. Using the information that we have collected in regards to what system would work best for the dumpster, monocrystalline would be the best fit for the sustainable living system. Monocrystalline uses a single silicon crystal sheet making it more aesthetically

appealing as well as being more satially efficient than poly. Polycrystalline solar panels are typically 13-16% lower in energy and they aren't as effective as the monocrystalline panels we choose to use. Since they require more space to install, you won't be able to get as many panels and so the energy output would also be lower. By using monocrystalline the panel is able to work better in low light conditions. Polycrystalline does not work well when it is cloudy and/or raining outside. Monocrystalline gives us more power, enough to be able to have extra, it works well in low light areas, and although more expensive, it has a bigger pay back.

We looked into a company named Renogy, which is a company that is dedicated to creating quality solar panels that are energy efficient convenient for their customers. We choose to partner with this solar company because they have good prices on their panels. They also have a attractive look to them, and they are lightweight in comparison to many other companies. By using them, they can answer any questions or concerns you may have, they are also able to help with setting up a battery reserve for the extra or unused energy we are able to produce. With the different types of solar panels they sell, they have one that we are interested in which is able to bend its shape. Using one or two of these bendable ones could help in case of storms or windy days in which the panels might break.

Placement of the solar panels

In order to have the optimum solar energy, facing the solar panels north throughout all of the seasons will give you the amount of energy you need to power the dumpster (home) and enough extra energy to sell to electricity companies. Most electricity companies offer a way that if solar or wind energy is used, you can sell it back to the grid. Although expensive to start building, using solar energy over time can save money on your electricity bills, and can even make money. If faced to either east or west, it would barely operate at 85% of its rated output. Unable to put a steady price on how much you could make, by selling solar power to the grid, there is a possibility to make more or less around $3,000 yearly.

The formula below assumes that the earth is flat, so a factor was applied to account for the curvature of the earth. These factors, and the angle of the sun with respect to the panel, then determine the insulation on the panel. A different method then determines the angles that give the maximum total isolation during each season.

Intensity in $kw/m^2 = 1.35 * (1.00/1.35)^{\sec(\text{angle of sun from zenith})}$

With the dumpster in mind, we are looking into a way to have a crank on it so that the solar panels are able to be moved and turned, or so that the whole dumpster itself can be moved or turned. As far as angle placement goes, during the summer it is estimated around 3.3degrees, Spring/Autumn is around 27.1degrees and during winter it is around 50.7degrees. The reasoning behind this is because at 0 degrees the panels would be flat and placed so that the solar panel is

facing the sky. At 3.3degrees, it is slightly tilted so that it is being faced at the sun, which is higher in the sky for a longer period of time during the summer. Each season would have a different degree and direction to face to receive the optimum energy. The goal is to get as much solar energy as possible.