ENGINEERING INNOVATIONS FOR ENVIRONMENT AND ENERGY SUSTAINABILITY

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ABSTRACT

Sustainable development is the watchword of the day, which means that care must be taken to preserve existing environmental resources for the benefit of future generations. The technology already exists and, naturally, it can be improved for the sustainable use of non-conventional energy or renewable energy sources (RES). If the cost of electricity generated by non-conventional sources were higher than that generated by conventional sources, society should go ahead at full speed and start phasing out the latter. In this paper we have discussed two out of many engineering innovations towards environmental and energy sustainability.

Keywords: *RES, Environment and Energy Sustainability, Sustainable Development.*

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I. INTRODUCTION

Sustainable development is the watchword of the day, which means that care must be taken to preserve existing environmental resources for the benefit of future generations. According to Schneider Electric, "we can't save what we can't see". For many professionals, managing energy is like driving a car with no dashboard. So, we need to aware of various fields from where we can save our environment and also energy. In this paper we have discussed two out of many Engineering Innovations towards environmental and energy sustainability. Two innovations are HYmini and Bamboo phones which are being discussed in this paper.

II. SUSTAINABILITY ISSUES

According to World Commission on Environment and Development, 1987; Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. When it comes to sustainability issues, development means advancement in every domain viz. Economy, Social equity and Environment. We always want to have the cheapest resources at any cost either that contaminates our environment which means we always target the economic factor. But the other two factors of sustainable development are of extreme importance and by implementation of the new technologies particularly renewable energy, greater social and economic cohesion within the Community can be achieved [9]. The Three E's of Sustainability: Environment, Social Equity, and Economy is shown in figure 1.

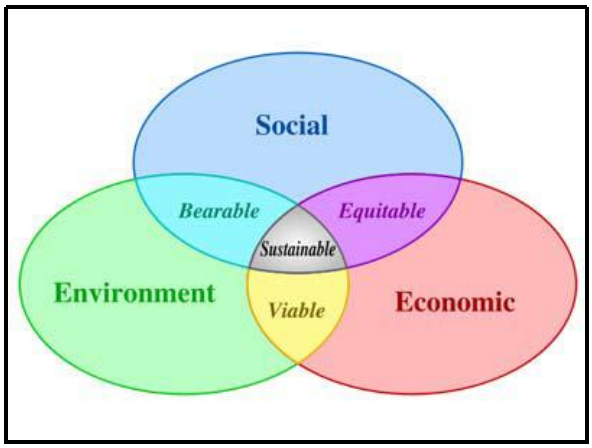

Fig.1: The Three E's of Sustainability: Environment, Social Equity, and Economy [10]

III. HYBRID GREEN PORTABLE CHARGER-HYMINI;

MINIWIZ has created a portable, alternative power source called the HYmini. The device harnesses the natural power of the wind to recharge an integrated battery, which at the same time can be used to charge other electronic devices. The user can simply plug it into a power outlet and charge it up like regular electronics [1, 2]. Figure 2 shows the picture of HYmini.

Fig.2: HYmini with Solar Panel

The HYmini also comes with five different connectors capable of charging just about every gadget found in your bag. Clip it to your bike or your armband to really maximize the wind power as shown in figure 3. HYmini wind unit itself, a solar panel that plugs into it, assorted adapters for different electronics, and a regular wall plug so you can charge the internal battery by regular power if necessary [3].

Fig.3: HYmini attached on arm

A. PROS OF HYmini:

- Universal ability for mobile devices (Nokia, Motorola, Sony Ericsson, Samsung and LG)
- Wireless charging with wind and sun
- No additional software required

- No need to carry extra power source 1200mAh lithium-ion polymer rechargeable battery
- Lightweight/handheld/compact green portable power bank

B. Working of HYmini:

It's a wind-powered electrical generator. First, it captures the kinetic energy (energy of movement) in wind -- this is the energy that spins the turbine blades. The energized blades spin a shaft inside the tower, and that shaft in turn spins an electrical generator. The generator takes the incoming kinetic energy and converts it to electrical energy.

Since a cell phone runs on electrical energy (in the form of a battery), a wind turbine can power it just like a wall outlet can. The components are just like those of a full-blown wind tower, but they're made of lightweight plastic instead of steel and fiberglass. The blades are measured in inches instead of feet. And instead of sending its electricity to the power grid, it sends it to your cell-phone battery.

Each powers up a mobile device -- cell phone, MP3 player, digital camera, you name it -- using clean energy and without access to the power grid.

It's made to fit in a backpack and then mount on top of a tent to capture wind. The turbine directly charges a battery located in the detachable control box, and then the battery charges your cell phone with a 0.5-watt output.

The HYmini has an internal 1200 mAh built-in lithium ion polymer rechargeable battery that can be powered by either wind or solar panels and has an optional hand-crank attachment. The battery has around 500 complete charge cycles and if the battery is fully charged every time, it should have at least of 1000mAh of stored capacity whereas a conventional mobile phone has around 0.4Ah to 0.7 Ah of battery capacity.

The removable wind turbine glows green when charging and the power stored exponentially increases with higher wind speed until 40 mph, but does not withstand higher wind speeds. The minimum wind speed is 9 mph but the wind generator is designed as a supplemental source and cannot fully charge the HYmini on its own.

No additional software is required to charge up the gadgets you already own. The manual says that an hour of sunlight should suffice to start charging. But after speaking with the company, I was told that the battery needed 24 hours of sunlight, equating to a couple of days near a windowsill, for the internal battery to be fully charged.

The HYmini device and its solar panel had more moving parts [4]. The HYmini itself looks like a bean-shaped contraption with a small fan. The wind blowing through the fan is

intended to power up the device. It can also be hooked up to solar panels, as many as four, to power up the battery. The company says the wind-power capability is more of a supplement, as the solar panels are more efficient [5, 6].

IV. Bamboo Phone: Biodegradable UE

This is a bio degradable cell phone concept designed as a nature-friendly phone. The casing is made of bio-plastic made of renewable natural resources like Corn and Bamboo, which, when harvested, grows back in due time as shown in figure 4.

Fig.4: Bamboo Phone

Mobile phone is made from bio-plastic derived from renewable materials such as corn and bamboo. Bamboo is endlessly renewable since, once harvested, new shoots will grow from the root system, unlike hardwood trees. It also grows very quickly, up to two feet per day. The phone is filled with bamboo seeds as well. This allows the user to simply throw the case onto a compost heap (after removing the battery, antenna and print board) when it is time for a new phone [7, 8]. Within weeks the case will decompose and the seeds will sprout and feed off it. Soon there will be a flourishing bamboo thicket to offset the impact of the manufacturing process. Even, after a year or so and you decide not to use the phone anymore, you can bury the print board, battery, and antenna in compost, which will then disintegrate, releasing bamboo seeds that would grow into new plants. The phone will also feature an energy-efficient monochrome display, and a hand-crack with which to re-charge the phone. A 3-minute cranking session could provide enough power for one phone call. Once the phone is no longer of use, the user removed the battery, antenna and print board and tosses throw the casing, which is filled with seedlings, in the compost. These new seedlings will eventually become bamboo trees, the thought behind it being that they will counteract the environmental impacts made by the manufacturing process. The phone was entered in the Greener Gadgets Design Competition by Gert-Jan van Breugel, a designer from the Netherlands.

V. CONCLUSION

Sustainable Development (SD) is a necessity to safeguard the interests of future generations. It is embodied in a need to protect and nurture the natural environment through sustainable consumption and production, avoidance of environmental pollution and degradation and preserving biodiversity. As society becomes more concerned with the natural environment, businesses have begun to modify their behaviour in an attempt to address societies "New" concerns. As consumers gain a heightened sense of responsibility for the environment, they're seeking out innovative energy alternatives to power their electronics

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