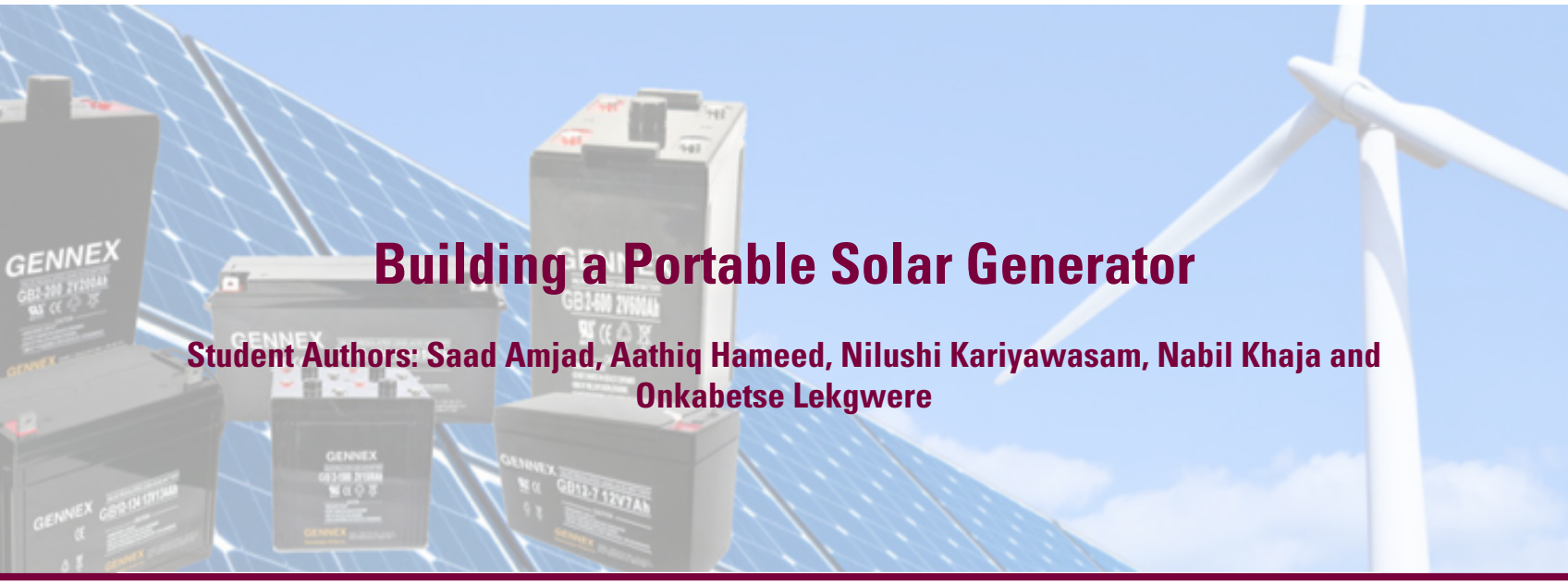

Building a Portable Solar Generator

Student Authors: Saad Amjad, Aathiq Hameed, Nilushi Kariyawasam, Nabil Khaja and Onkabetse Lekgwere

Overview

Solar power is a sustainable, renewable, and non-polluting source of energy. Although the creation of solar-powered systems is associated with a high fixed cost, the continued generation of solar energy is low-maintenance and more economical over the long term relative to traditional sources of energy. The focus of this project was to test the feasibility of constructing a "Do it Yourself" solar generator for use on Dr. Michael Mikulak's teaching farm, Common Ground. Our goal for the generator was to measurably reduce the amount of wasteful energy consumption on the farm while demonstrating the practicality and environmental benefit of solar power to students and members of the community. The generator is also designed to be an emergency backup power source that can sustain farm equipment and act as a reliable source of energy, in the case of a power outage.

Objectives

1. Consult local Canadian technology manufacturers to optimize cost, performance, and longevity
2. Construct a functioning 1600W portable solar generator for use at a local teaching farm
3. Perform a life cycle analysis to compare the environmental impact of the proposed generator to existing infrastructure on the farm

Reporting

Imagine your own 1600W rechargeable power system. We wanted to build a powerful, noiseless, pollution free, cost-effective and most of all portable solar generator. With the help of a local technology manufacturer, Gennex Technologies, we purchased the major components of the solar generator at a subsidized cost of $1300. These specialized parts cannot be ordered through local hardware stores, and can cost over $2500 if purchased at the existing market price from other vendors.

Team members working on the solar generator

The final build is compactly stored in a weather-resistant portable Stanley tool cart with dimensions approximately 1.5 ft by 2.5 ft. The construction process requires some technical expertise. The generator will be used at Dr. Mikulak's teaching farm. Should the farm lose power, the generator can output up to 1600W of power for up to 3 hours on a load of 100% or 12 hours on a moderate load of 50%. The generator will be used to power a freezer in the effort to keep produce cool while also powering a 0.75 horse power sump pump in the case of flooding. A peak power report was developed alongside the device to inform users how to angle the panel to maximize its power generation in Hamilton's climate. Our completed life cycle analysis indicates that the generator can last up to 15 years and the batteries up to 3 years.

The final product

Collaborators: We would like to thank Dr. Michael Mikulak for his instructional support and for funding this project, as well as Gennex Technologies for providing all the necessary hardware to make our project possible at a subsidized cost.

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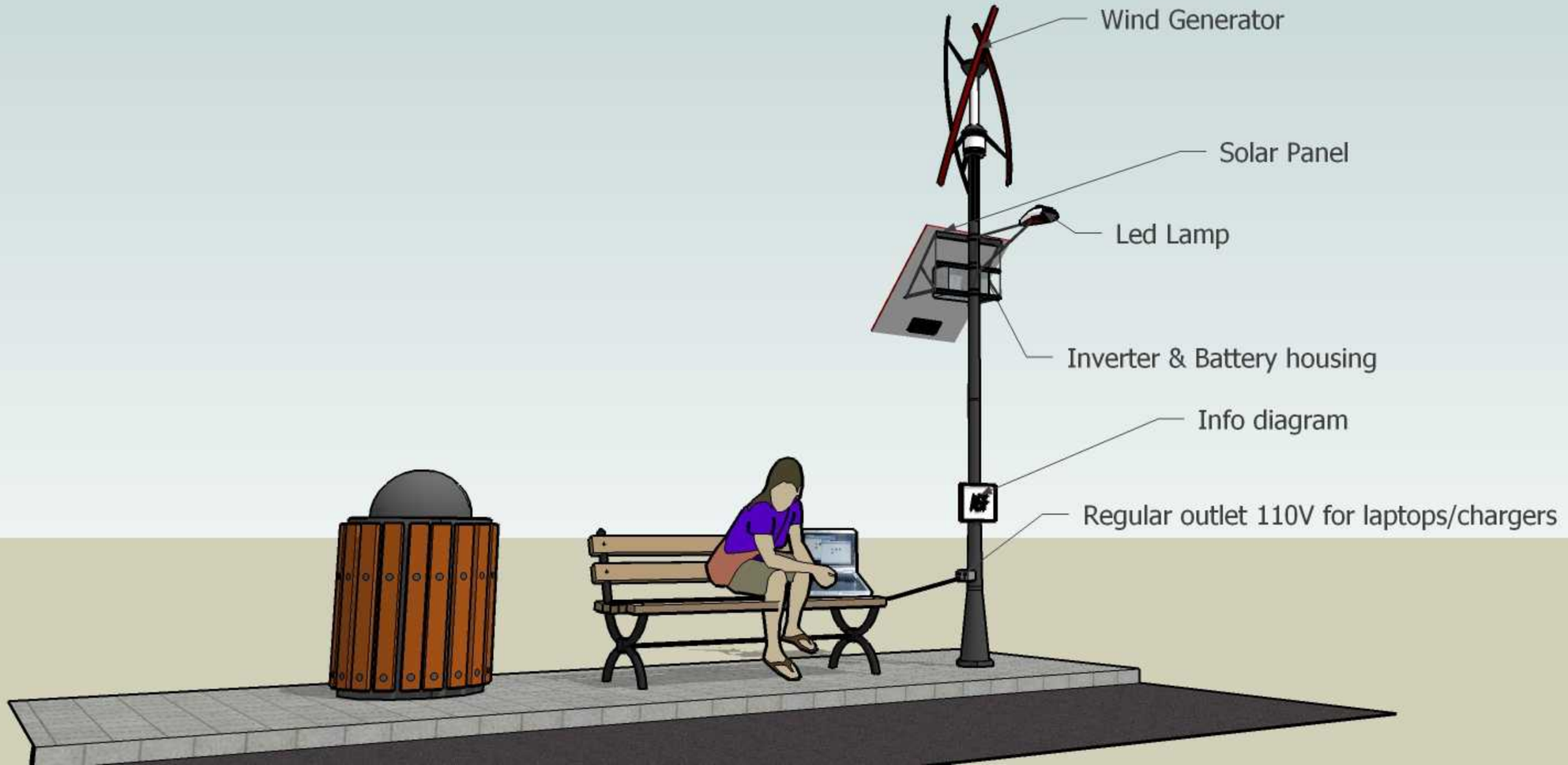
GENNEX TECHNOLOGIES

Appendix A

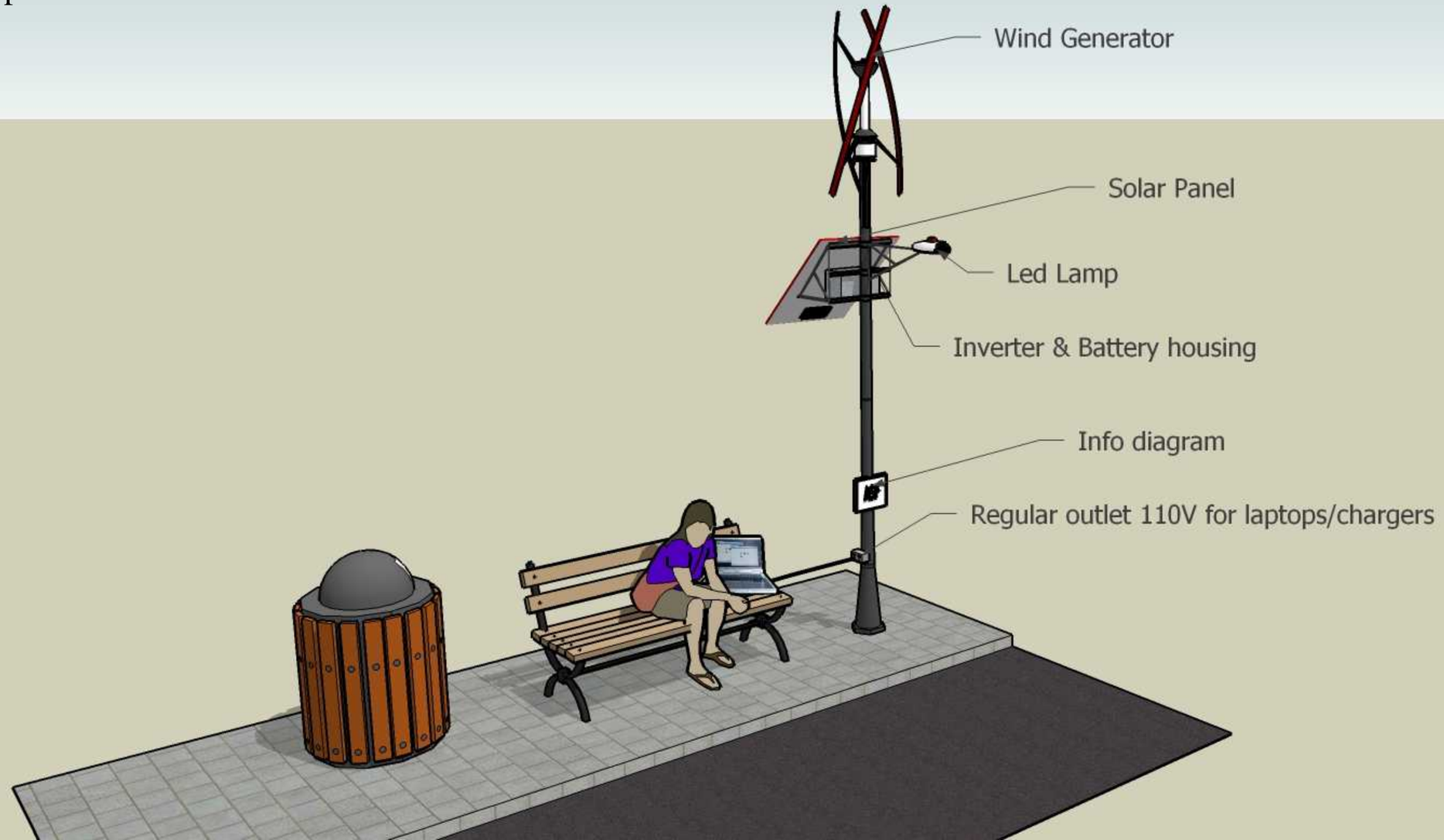
Academic Science Fund - Project Budget			
Required Resources	**Description**	**Funds Required**	**Fund Requested from the ASF**
Equipment Investment:			
800W Hybrid Inverter	Gennex KS 1KVA Inverter. Charge controller from Solar, Wind and Grid power. From www.gennexglobal.com. **Size:** 12 inches x 10 inches	$235.00	$235.00
250W Solar Panel	Canadian solar CS6-250P 250W, poly panel from www.Canadasolar.com	$175.00	$175.00
12V 100ah Deep Cycle Battery	Gennex Battery GB12-100Ah 12V 100Ah - **Size:** 11 inches x 7 inches	$285.00	$285.00
10A Circuit Breaker	10A Circuit Breaker from Gennex Technologies	$25.00	$25.00
1200W Step down transformer	A 1000 VA (750W-800W) step down transformer	$200.00	$200.00
10 ft of battery cable	10 ft of battery cable from Gennex Technologies	$20.00	$20.00
6 ft 10AWG solar cable & MC4 connector	Solar and Power Cable 10AWG (4-6 mmsq) with MC4 Connector 6 Ft	$20.00	$20.00
Junction Enclosure	Metallic Jct Box Encls, 14inHx12inW, from grainger.com	$283.00	$283.00
200W to 300W Windturbine	200-300W Vertical wind turbine/ spiral vertical wind generator from Alibaba.com	$800.00	$800.00
Connectors, Bolts & Misc Expenses	**Connectors, Bolts & Misc Expenses**	$500.00	$500.00
LED 50 W Street Light	Will be ordered through Gennex Technologies	$250.00	$250.00
Equipment Totals:		$2,793.00	$2,793.00
Installation Investment:			
Using Existing Infastructure	Estimated cost ~ waiting on McMaster faculty Services quote & Feasibility (What we plan on using) using existing pole and features		$1,000.00
New Installation	Estimated cost ~ waiting on McMaster faculty Services quote & Feasibility includes new pole and fixtures		$3,000.00
Estimated Project Cost			**$3,793.00**

Because of our success with building the generator we acquired $8000+ for a subsequent sustainability project: “The Eco-Streetlight”. Below are schematics of the final build that will be installed on McMaster University’s campus.

Appendix B


Wind Generator
Solar Panel
Led Lamp
Inverter & Battery housing
Info diagram
Regular outlet 110V for laptops/chargers

Appendix C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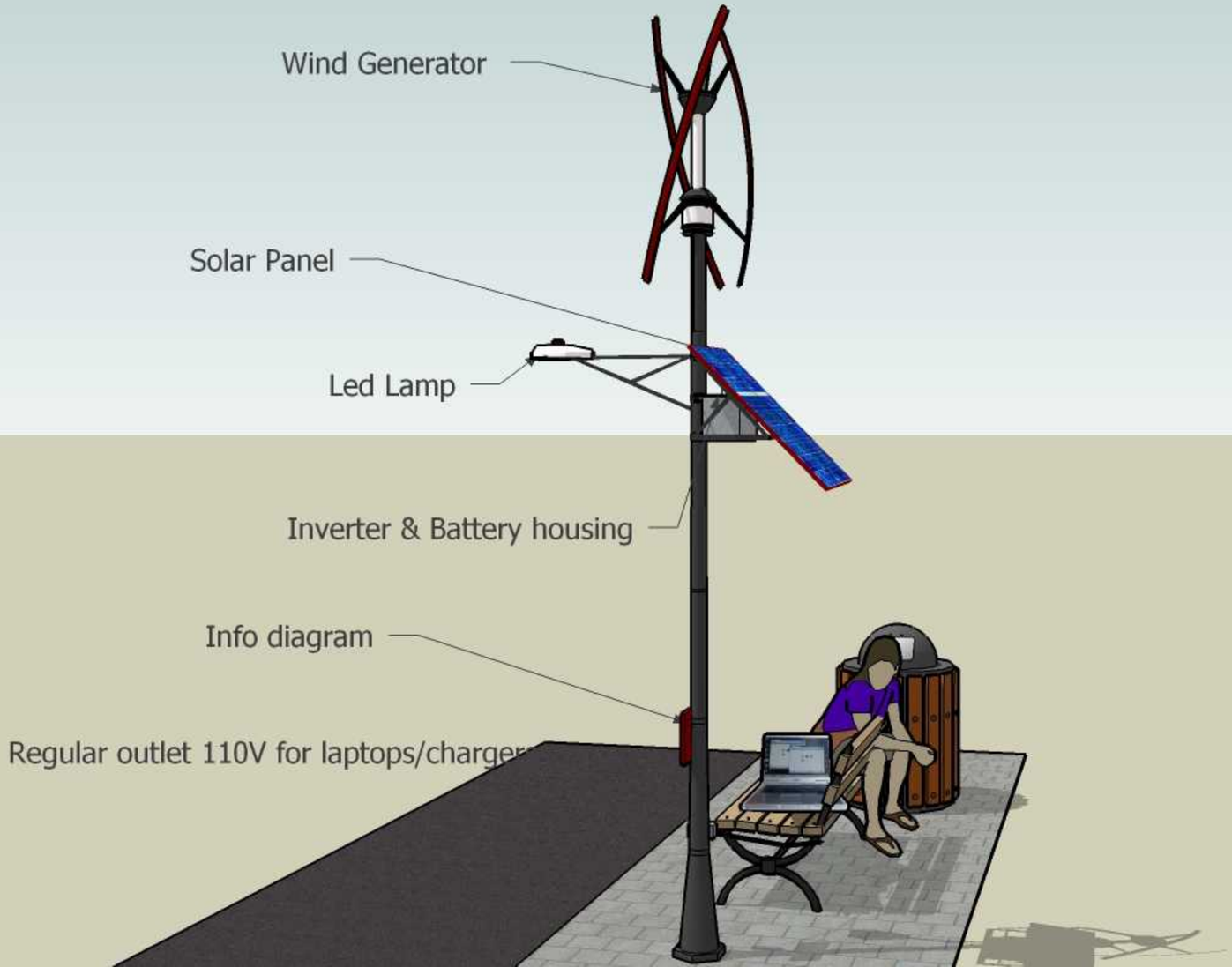
Appendix D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Appendix E