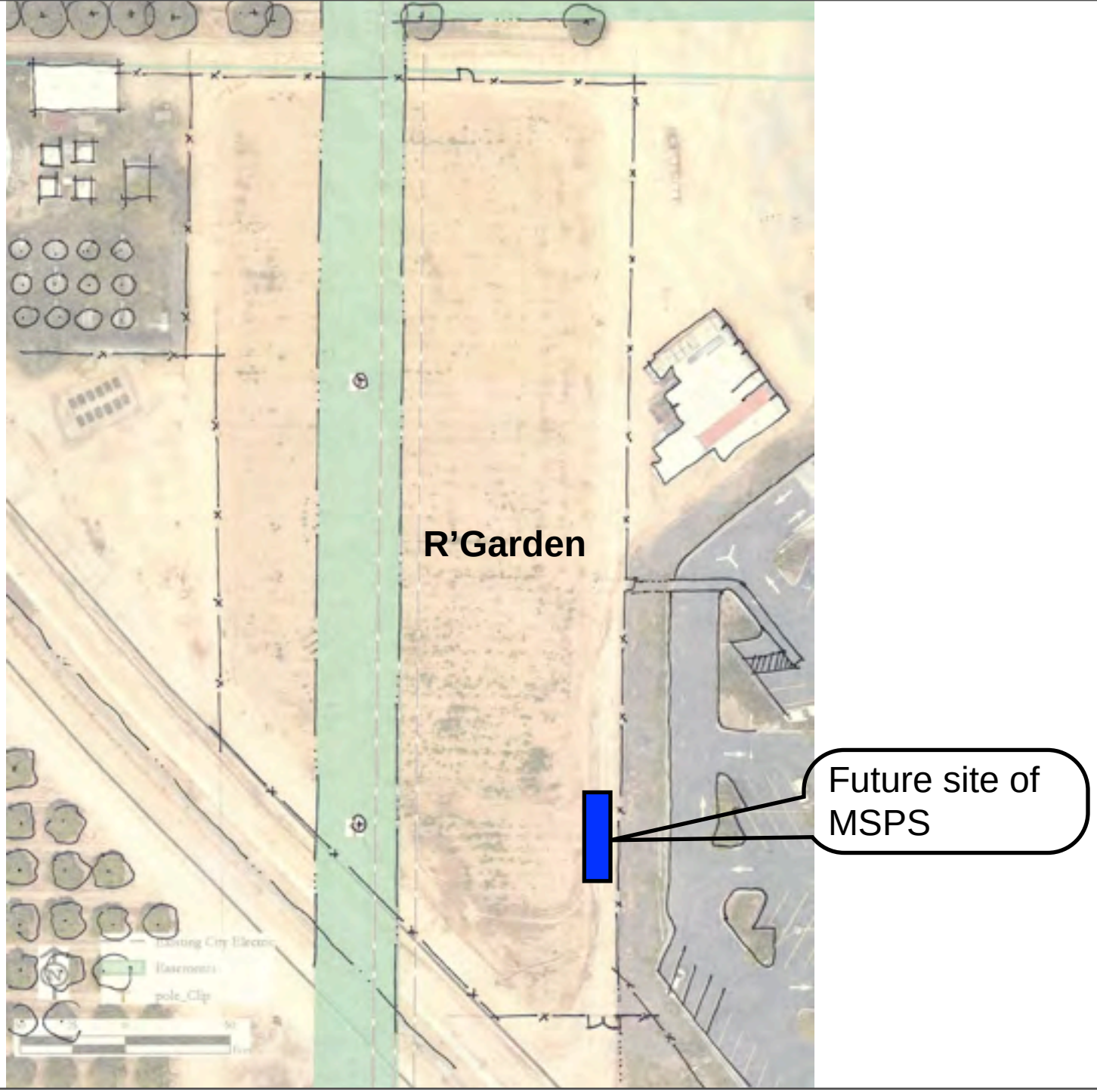
University of California, Riverside
John Cook, Director of Sustainability

Summary

- The Green Campus Action Plan sponsored the creation of a mobile solar power system that can be used on campus to power events and to promote green energy in the community.

- Students in the Electrical Engineering undergraduate program took on this project as a design build for their Senior Design Thesis. The students under faculty guidance chose every component, engineered and built the adjustable PV structures, completed a power generation and distribution system, and monitored and displayed the data on a website that can be accessed by anyone.

- The newly established R'Garden will provide a space to store the MSPS utilizing the electricity stored to power a water pump, work lights and laptop computers


R'Garden
Future site of MSPS


Mobile Solar Power System
160W wind turbine
Three positions of Solar Panels
Solar tracking panel
CAT

System

	Quantity	P_{max} (W)	Capacity (AH)	Output (W)	Area (sq. ft)	Weight (lbs)
Photovoltaic Cells	6	1410				251.4
Wind Turbine	1	160				13
Batteries	8		420			1256
Charger / Inverter	2			6000		244
Custom Trailer	1				140	2000

MSPS Final Overview

A trailer outfitted with a completely green power generation and distribution system.

- **Power generated through photovoltaic cells and a wind turbine.**
- **Power charges large DC batteries for storage through a MPPT charge controller.**
- **When a load is present, the DC power is sent to an inverter which outputs a stable 120 V 60 Hz AC signal.**
- **The Mobile Renewable Energy Generator serves not only as a green source of energy but also as a tool to educate the campus community about the renewable energy.**
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Technical Design Objectives

- Provide 6 kW of total power through two inverters wired in parallel (same voltage double current output)
- Designed to supply full 6 kW load for 3 hours (210 AH * 48 V) (2) = 20160 WH
- Acceptable battery recharge time is based on balancing the performance of the solar panels with the capacity of the batteries (235 W * 6 $h_{sunlight}$)(6_{panels}) = 8,460 Wh
- Display live data from each input component

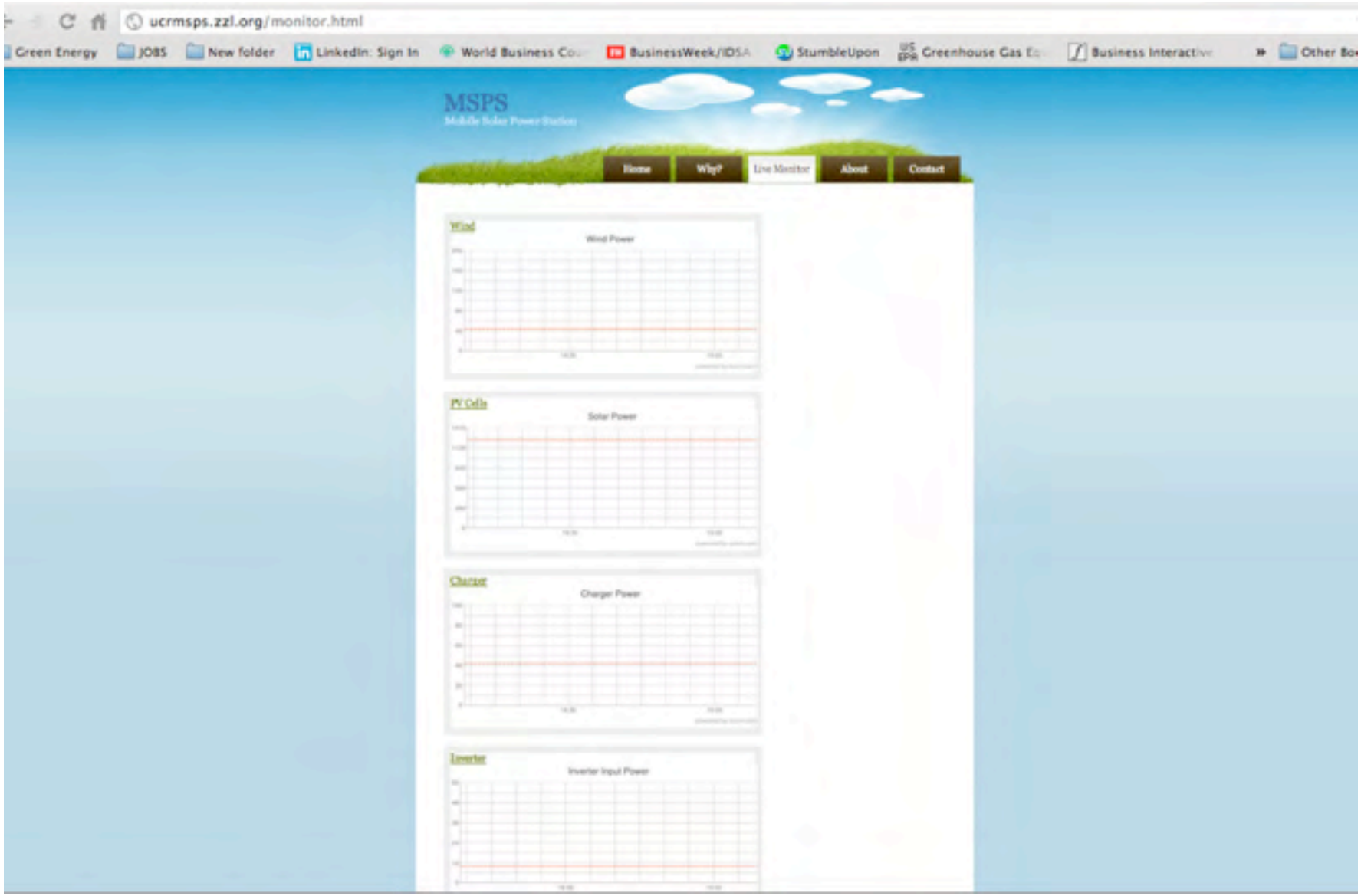
Project Diagrams

Design Considerations & Constraints

- **Due to the scale and scope of the project, time and physical safety was a constant constraint.**
- **Limited exposure to power electronics.**
- **Trailer size and weight limited the maximum quantity of components the project could feature.**
- **Ease of use for non-technical operation**
- **Budget constraints based on dollars available, no expectation of ROI**
- **Industry Standards Maintained: NEMA, NEC, DMV, UL 1703, 802.11bgn**


SOLAR

Online Dashboard



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