

Overview

The Department of Biology Greenhouse faces a critical challenge in sustaining its various plant species that depend on a limited reverse osmosis (RO) water reserve. Carnivorous plants cannot survive with the use of regular tap water. The current supply of RO water falls short of meeting the weekly water quantity necessary to support the unique needs of these plants.



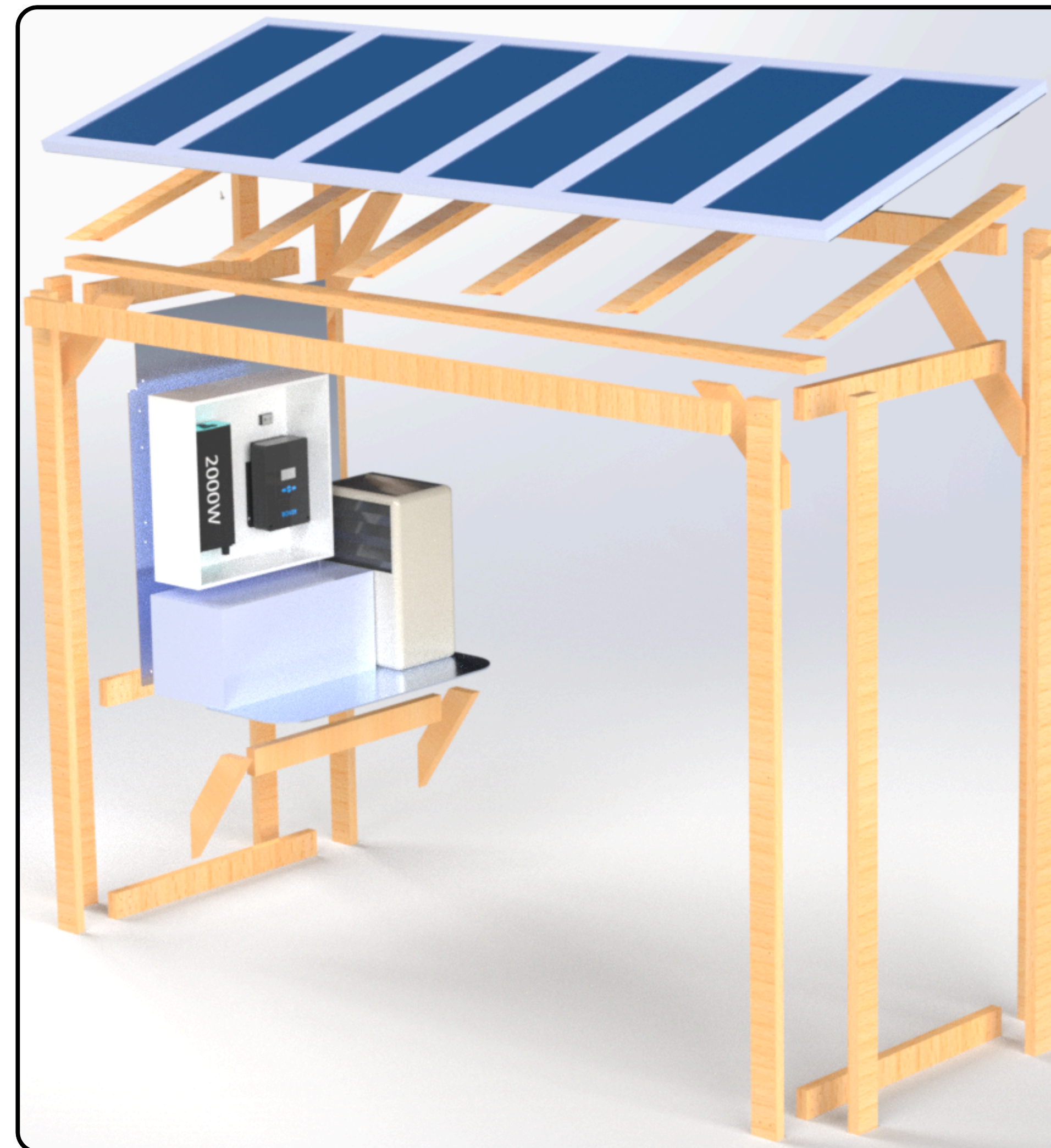
Project Goals

Verify, design, and develop an atmospheric water generation system that pulls usable, clean water from ambient air using solar panels. By obtaining clean, demineralized water from a virtually limitless source as the atmosphere, we can ensure that the carnivorous plants being cultivated at SDSU's greenhouse will always have a freshwater source.

Design Team



System Design

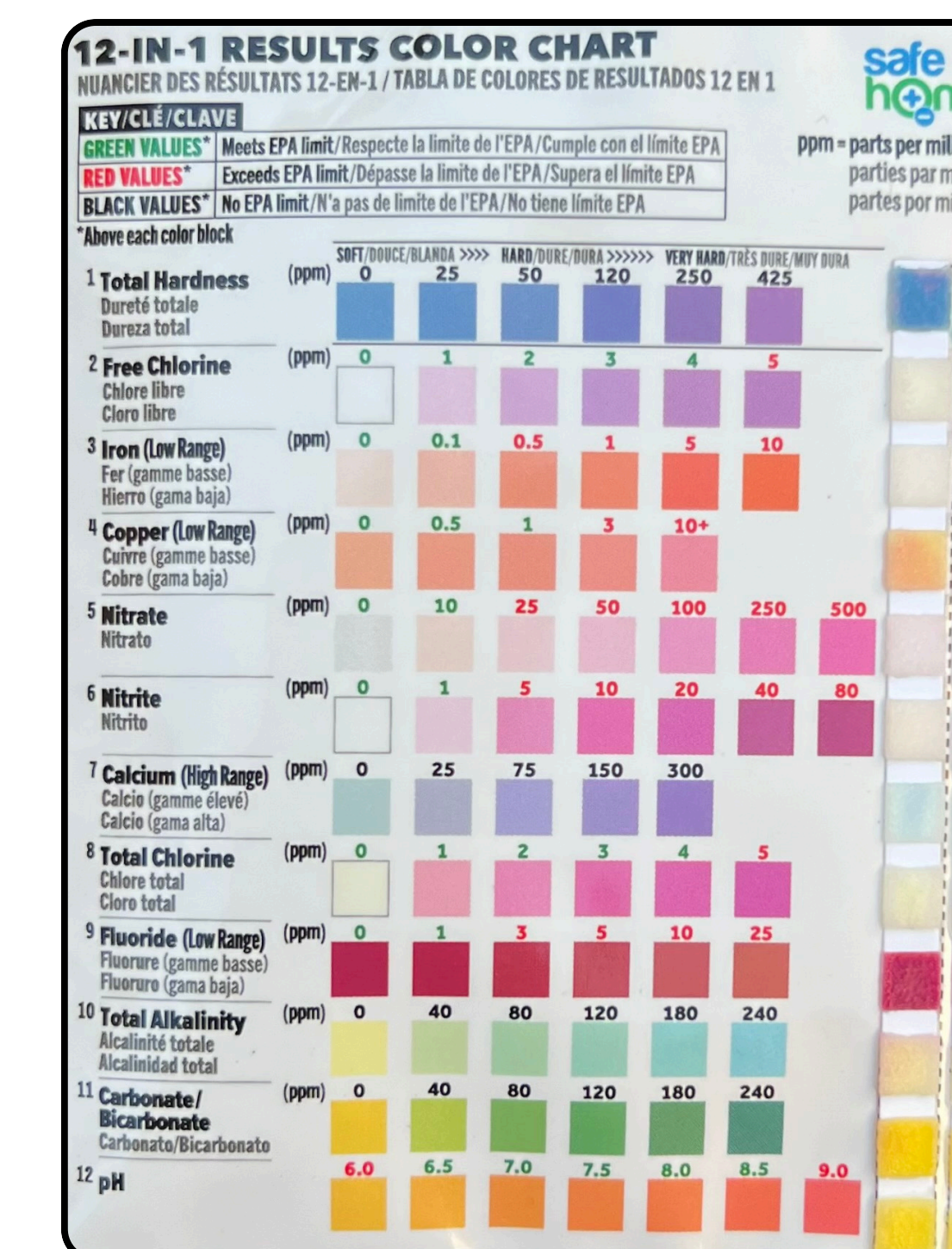
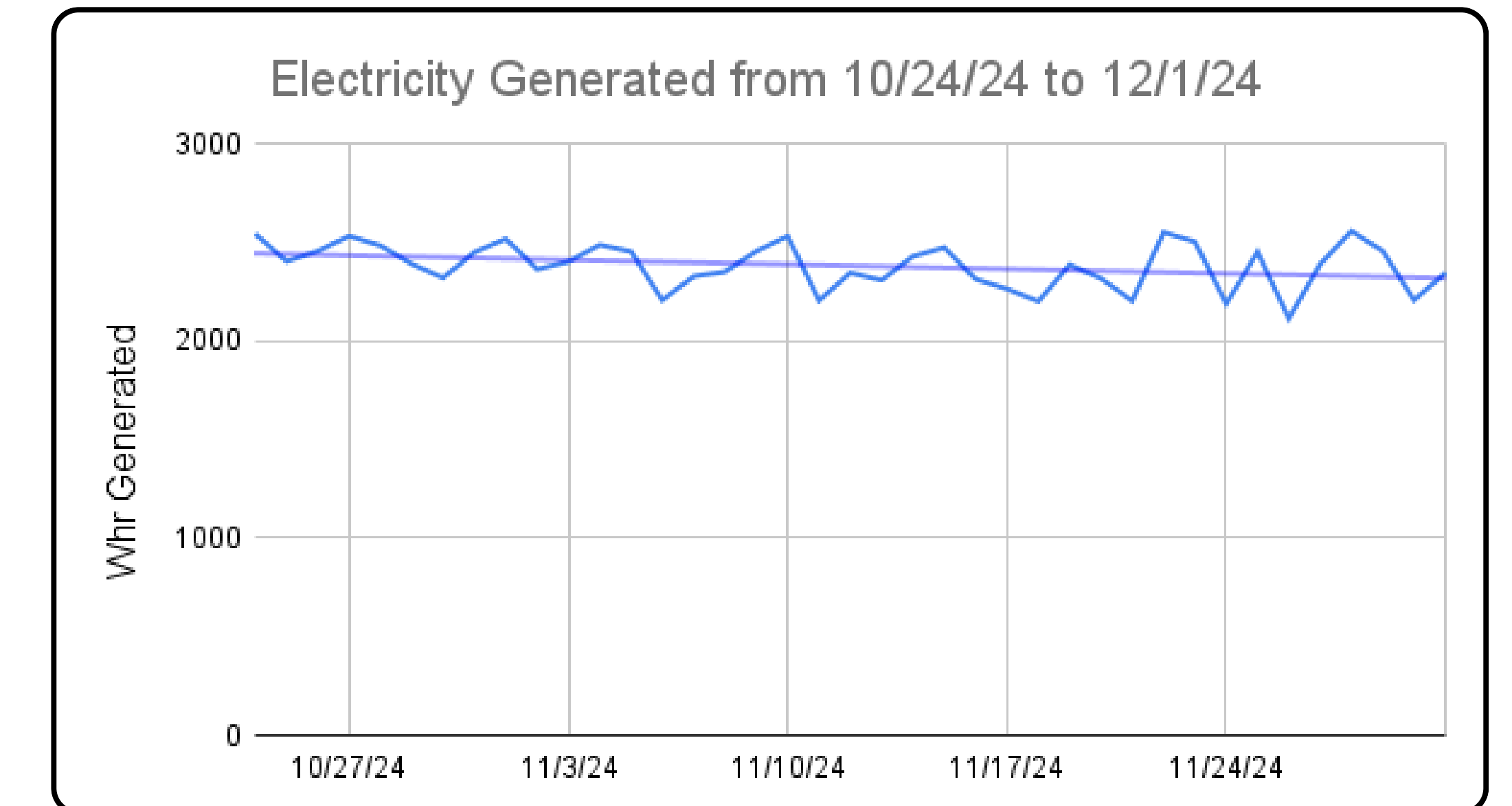


Under average San Diego weather conditions, preliminary calculations show that the SolSpring system can provide enough water for the carnivorous plant population at SDSU's greenhouse year-round. Solar panels will power the system, ensuring it runs off-grid, and the device will be placed in front of the greenhouse to maximize sunlight exposure. The solar panel frame is integrated with the greenhouse roof, made from cost-effective wood, and reinforced with diagonal bracing and 2x4 beams for strength. To ensure durability, we weatherproofed the frame with outdoor paint and used aluminum sheets for mounting key components like solar panels, large electrical components and the battery.



Water & Solar Generation Results

Our solar panel system tracks the quantity of electricity that is captured each day. Using a Bluetooth module, we are able to export the data. Below is the electricity generated since having the solar panels fully connected.



After producing the water, we conducted several tests to ensure its safety for use with greenhouse plants. The water generated by our system consistently appeared in the far-left column of each result, showing the lowest ppm (parts per million) of any substance. The purity of our water ensures that any plant that receives it does not succumb to salt burning, or other mineral damage.

After testing our water generation multiple times under different weather conditions, we yielded the results in the table below. We were able to capture approximately 1.04 Gal. of water each day of testing, which provides enough water to maintain the greenhouse plants.

Winter Water Generation Tests (Plant Dormant Period)		
Water Filled	1.09	Gal
Water Gen Time	4.00	hr
Total Time	4.00	hr
Water Gen Rate	0.27	Gal/hr
Total Energy Consumed	2205.00	Whr
Water Gen Energy	2205.00	Whr
Solar Energy Produced	2400.00	Whr
Energy Required to Run	500.00	W
Total Capable Run Time	4.80	hr
Water Required by Plants	1.04	Gal/day
Daily Water Generation	1.09	Gal
Weekly Water Generation	7.63	Gal