

# Solar Trailer



## Background

The OSU Solar Trailer was built in 2007 by a team of mechanical engineering students as their senior capstone project. \$30,000 was provided by the Student Sustainability Initiative and around \$20,000 of in-kind support came from companies including Abundant Solar, Freebird Body and Paint, MK Battery, Outback Power Systems, RJH Enterprises, Smith Glass and Wattsun. Today, the Trailer continues its mission of student engagement by continuing to be a senior capstone project to refine and update systems as needed.

## Main Components

- ✓ One 8 kilowatt Schneider grid interactive inverter
- ✓ Ten Sanyo 200 watt polycrystalline solar panels
- ✓ 80 amp Schneider charge controller
- ✓ 48 lithium iron phosphate battery cells, wired in groups of 3 to create 16 groups in two separate 24 volt packs (48 volt system), totaling 540 amp hours
- ✓ Wattsun dual axis sun tracker
- ✓ Level 2 electric vehicle charger
- ✓ AC and DC breaker panels
- ✓ Hydraulic lift system to move the array from travel to collection mode.



# Trailer FAQs

## What is the max power output of the Trailer?

The Trailer can output up to 8,000 watts at 240 volts. At a typical event load of 1,000 watts, the Trailer can provide power for up to 25 hours without any sun.

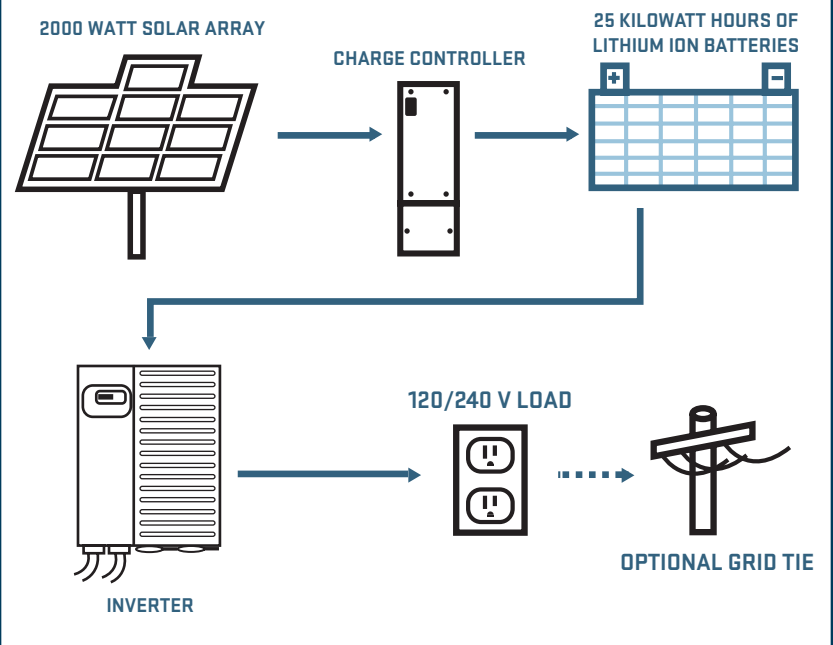
## How much does the trailer weigh?

About 5,000 lbs. (2,268 kg), and it is about 9 feet wide by 20 feet long.

## How is charge balanced between batteries/how are they maintained?

Lithium ion batteries are very sensitive to over and under charging. Shift Electric Vehicles of Albany, Oregon designed and installed the custom battery management system (BMS) which monitors multiple parameters of the battery pack, prevents over/under charging, and also provides balancing across cells.

# Diagram



## How do I reserve the Solar Trailer for an event?

You can power your event or activity from affordable, renewable power! Go to [sustainability.oregonstate.edu](http://sustainability.oregonstate.edu) or call us at 541-737-3307 to reserve. Rates are competitive with renting a gas generator and we can provide a cost estimate in advance.

## How long does it take to recharge?

The speed of recharging the batteries is weather and sun dependent. With ideal conditions, the Trailer can recharge at 2,000 watts, in about 15 hours of full sun.

**FAQs Continued Below** ↓

## **Is it DC or AC? How is power converted? What does the inverter do?**

Some parts of the Trailer are direct current (DC), while others are alternating current (AC). The solar panels provide DC power to the batteries and inverter. The inverter converts power from DC to AC. The AC power produced is just like any standard plug.

## **Do the panels track the sun? How?**

When in automatic tracking mode, the solar array tracks the sun using a photocell connected to a proportional, integral, derivative controller (PID) with two electric motors that rotate the array. The Solar Trailer's tracking system is a dual axis tracker from Wattsun.



## **Can it be used when it's not sunny?**

Yes, the Trailer's 25 kilowatt hours of battery storage can supply most events or activities at night or during the day. Even in cloudy weather the solar panels produce a meaningful amount of electricity.

## **How much would this cost to build?**

The value today of the solar array, batteries and other components to create useable power is in the \$25,000 range, and most of that is the batteries. A typical home solar electric system of this size without batteries would be under \$5,000. Other custom fabricated parts of the Trailer add about \$30,000.

## **Can it power a house?**

Yes! On battery power alone, it could power a traditional US home for a day, or an energy efficient home for multiple days.

**FAQs Continued Below** ↓



### **Do students do the maintenance and repairs?**

The student team in the OSU Sustainability Office operate and maintain the Trailer, and perform some upgrade tasks. Frequently, the Solar Trailer is used as a student project to provide hands on experience. Several upgrades have been implemented this way.

### **How long will the batteries last? How many batteries are there?**

The batteries are Lithium iron phosphate, a type of lithium ion battery, and are lighter and more “power dense” than older lead based batteries. If cared for properly, these batteries will last over 20 years.

There are 16 sets of three battery cells (8 on the “driver” or east side, 8 on the “passenger” or west side).



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