



Colorado Science and Engineering Fair

2025 Team Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: Water Tower Power - Storing Solar Energy With an Elevated Pumped Storage Hydropower System

Team Leader's Name: Carson Stone

Team Member 1: Chase Pollart

Team Member 2:

School and City: Brush High School

Sponsor's Name: Erik Stone

Category: Earth & Environmental Sciences

Division: Senior (grades 9 - 12)

Abstract (250 words or less):

Pumped storage hydropower (PSH) is a battery free, energy storage system that uses the potential energy of water to generate hydroelectric power. Our hypothesis was that we would be able to run basic functions, like lights and small electrical appliances, for a small solar powered home with a tower based PSH system. We designed a small scale tower based PSH system to establish how much electricity we could generate.

A 50 gallon reservoir with a 1/2" pipe outlet was suspended 15 feet. We attached a 12v/10 watt turbine to the bottom of the pipe. We placed a 12 volt water pump connected to a 50 watt solar panel in a lower reservoir to pump water into the upper reservoir. We measured the time it took to pump 1 gallon of water into the upper reservoir and the time it took for 1 gallon of water to pass through the turbine. A second turbine was added as well. A multimeter was used to establish the wattage ($w=va$) produced by the turbine.

It took 35 minutes for a 12 volt pump to pump into a 50 gallon water tank at 15 feet. Water released through the 12 volt turbine generated 6 watts of power for 35.7 minutes. Two turbines produced 10 watts of power. We would like to continue our research on 250-500w turbines and their feasibility in a similar system.

We hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. We also attest that the above properly reflects our own work.

Team Leader's Signature: _____

Date: _____

Team Member 1's Signature: _____

Date: _____

Team Member 2's Signature: _____

Date: _____

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with your Finalist Verification/Permission Form. **A signed copy of this form must be included in your notebook.**