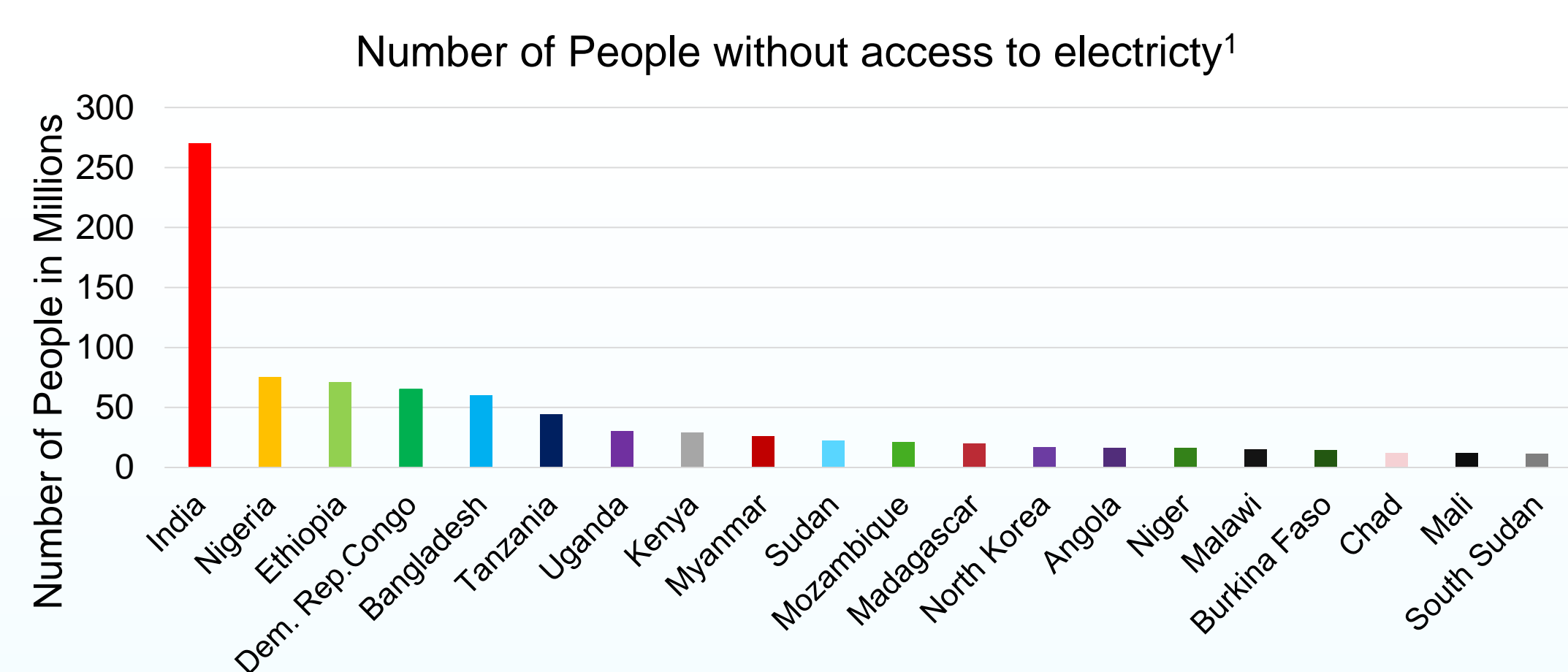


Introduction

- Goal is to design a low-cost system that could produce and store the maximum amount of energy generated from rainwater and an additional renewable energy source.



- Provide an alternative source of electricity for users located at countries with high annual rainfall.
- Supply a source of light alternative to kerosene.

Main Requirements

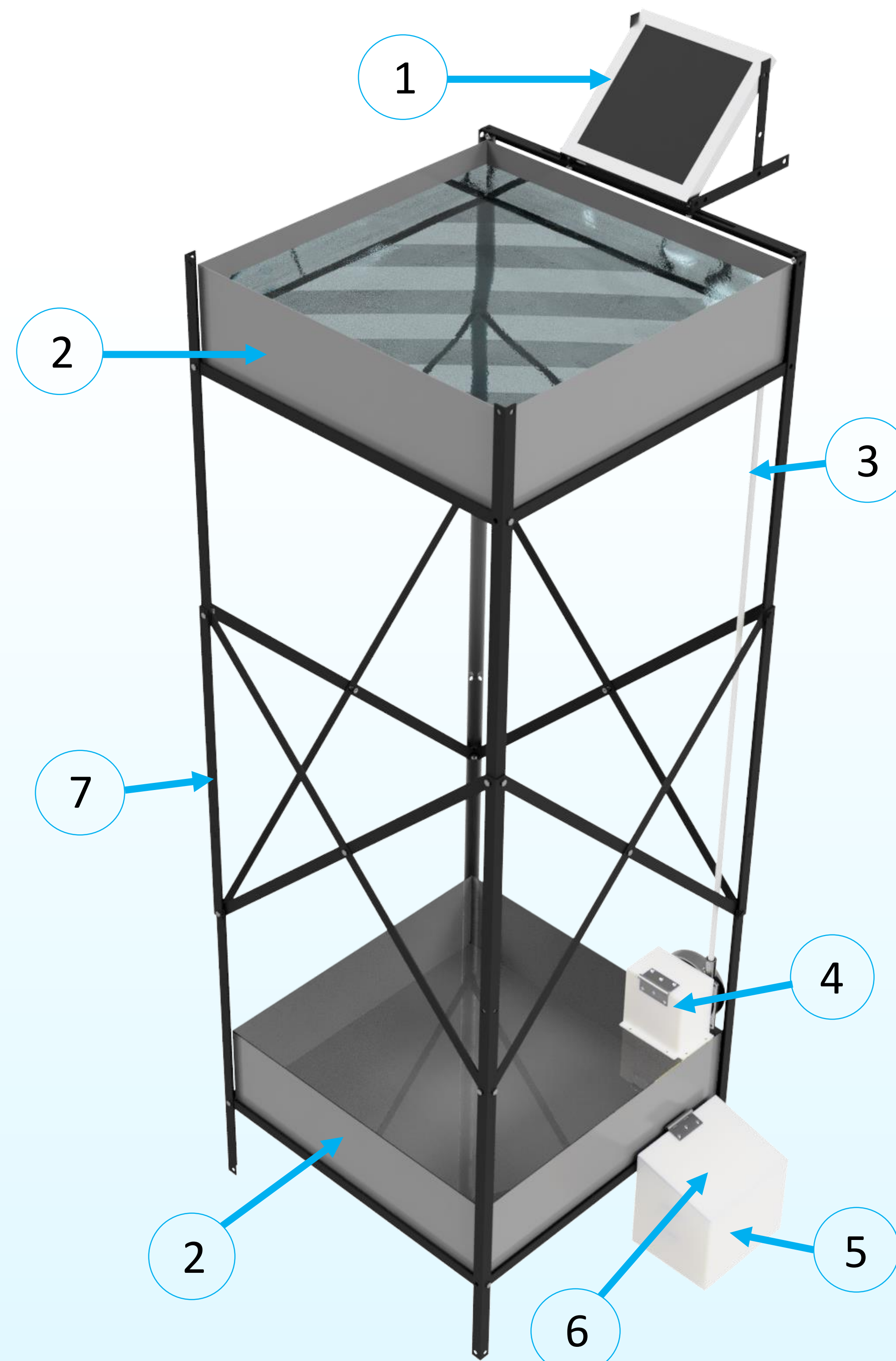
- Design must provide enough energy to **power one 7W** light bulb for **four hours** daily.
- Design **must use rainwater** to provide one source of energy.
- Design must output at least **4 lumens** (ie. Better than kerosene).



Design Process

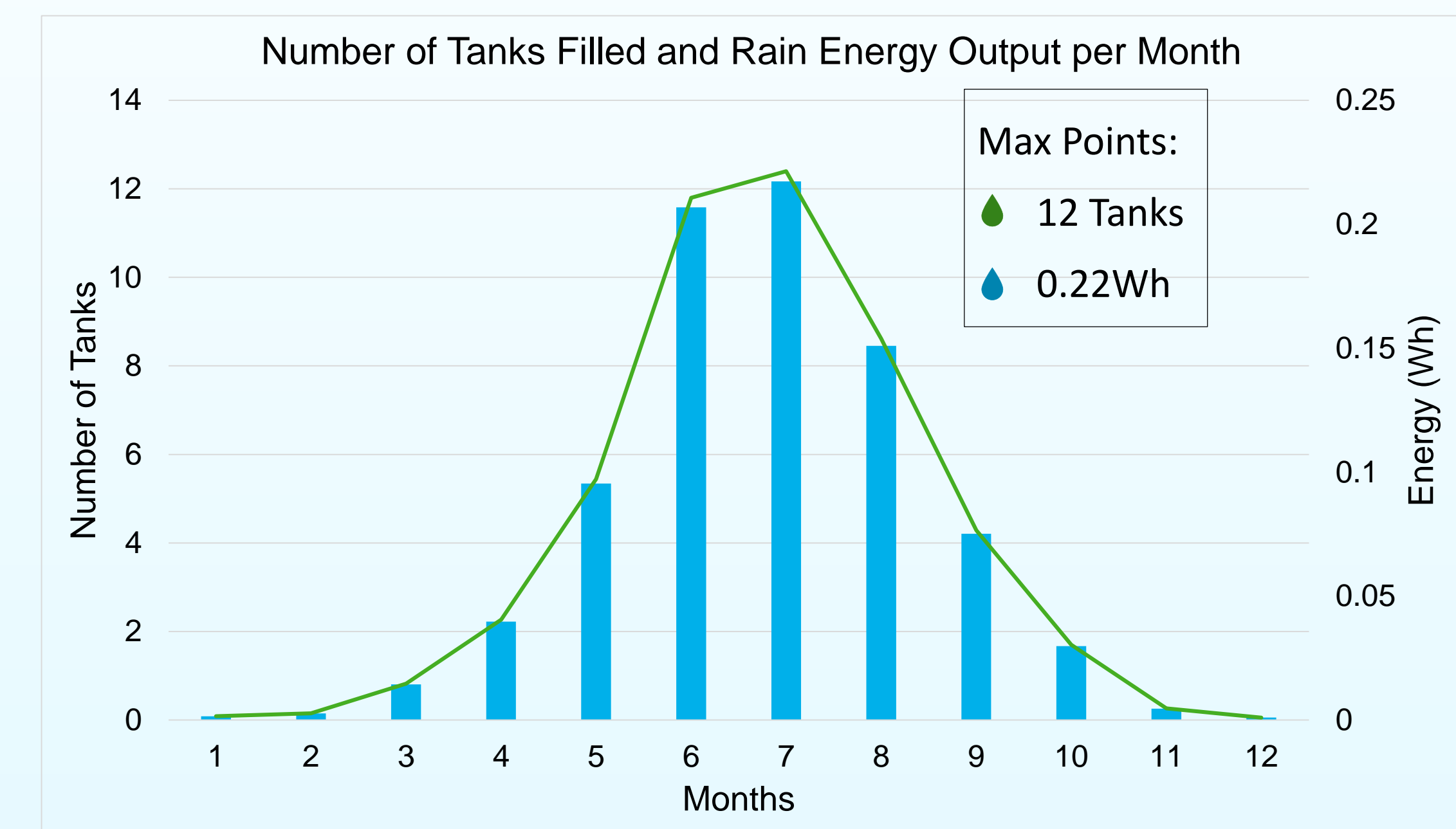
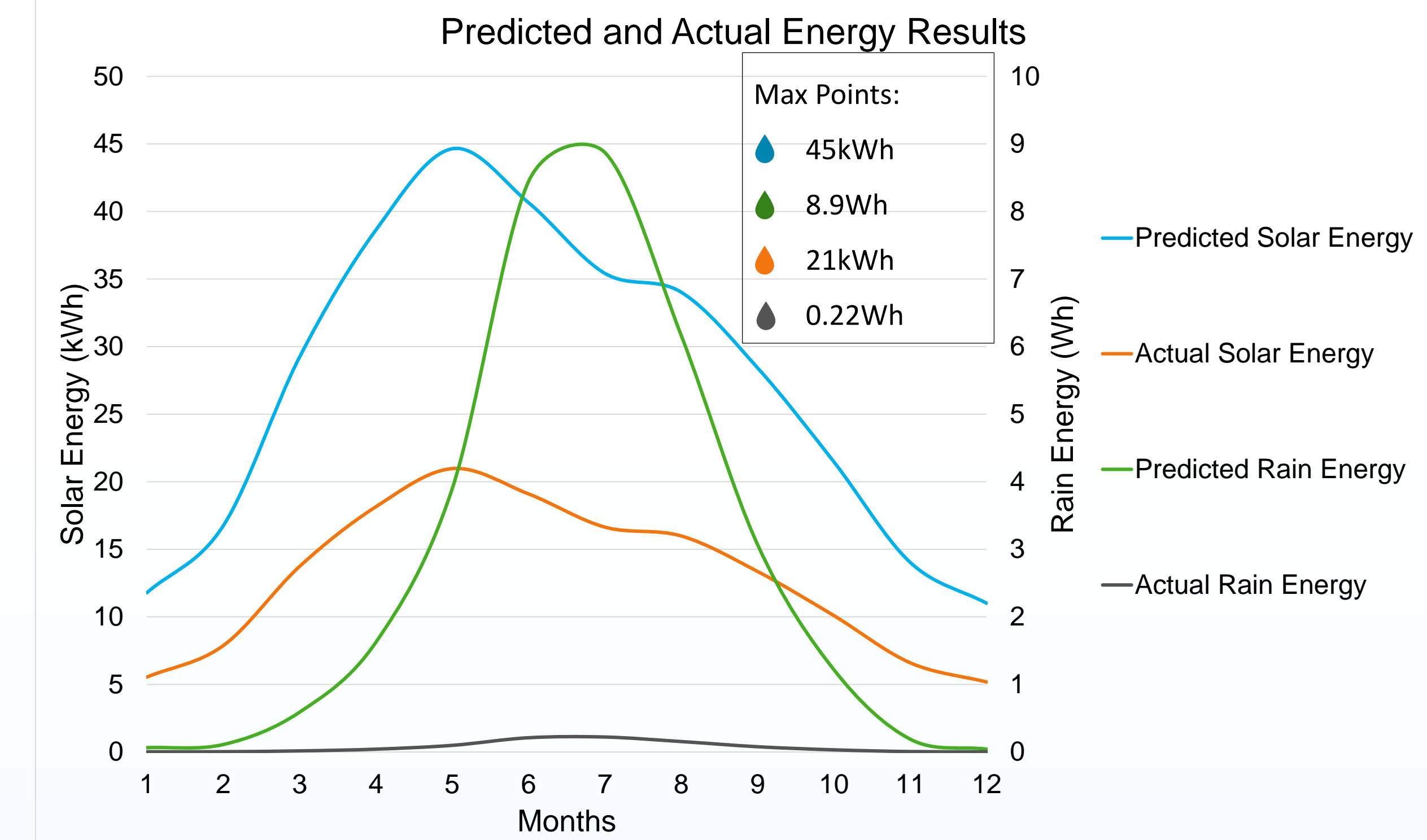
- Created a system that took water at a given height and transferred that energy into a battery.
- The amount of energy transferred was not enough to meet the requirement.
- Added a solar panel to the system to increase the overall energy generation.
- Power, $P = \rho gh\dot{Q}$** determines power from rainwater.

Final Design



- Solar panel collects and delivers current to the solar charge controller.
- Top and bottom tank collects and stores rain water.
- Rain water flows through piping due to gravity.
- Rainwater falls onto turbine causing it to spin.
- Generator is powered delivering current to the solar charge controller.
- Solar charge controller delivers the current to the battery.
- Main structure supporting entire system.

Results



- In the month of June, rain could power the LED for **2 minutes** and the sun could power the LED for **2,728 hours**.

Recommendations

- Collect water for other purposes such as drinking or irrigation.
- Use the turbine design for free flowing water such as a river or waterfall.

References

- Population without access to electricity. International Energy Agency. 2016. <https://www.iea.org/energyaccess/database/?fbclid=IwAR2Xl6BkysN224q5uf9r57XlE4FGSMI8t8fhmtiAF4TxC4BDRPiaQq61ZNI>
- <https://pvwatts.nrel.gov/pvwatts.php> *note this reference was used to calculate the predicted solar energy*

Final System

Pelton Wheel



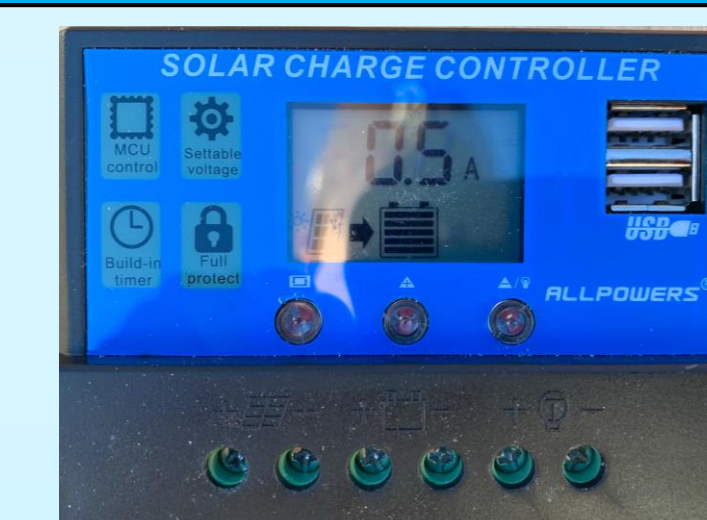
Generator Enclosure



Full Assembly



Solar Charge Controller



Solar Panel

