

Lane Tech College Prep

## Abstract

The purpose of this experiment is to create an efficient solar tracker, without the use of electricity. A standard solar tracker follows the sun throughout the day, generally requiring electricity to power the tilting mechanism. This passive tracker does not use any electrical energy to power itself, and instead relies on a phase change of liquid to gas to create the tilt. The results of this experiment may be passed on to third-world countries in order to help generate power in a more efficient manner, thus reducing global pollution.

Check the ambient temperature, if it is not 20°C, adjust room temperature accordingly. Take the designed model and place it in the lightless room while it is leaning 45° toward the floodlight. Place the flood lights at a 45° angle, at a 1.0m radius from the solar panel. Attach a multi-meter to the prongs on the side of the panel, and turn it on. Activate the lights and leave them to operate for 10 minutes. After the 10 minute period, record the cell's voltage and amperage displayed on the voltmeter. Using Joule's law,  $P=IV$ , calculate the power by multiplying voltage and amperage. Repeat the experiment with flood lights at an angle of 90° and 135°.

The average power output of the passive design was 27.11 watts per half hour with a standard deviation of 9.31 watts and the stationary solar panel's average power output was 19.39 watts per half hour with a standard deviation of 9.17 watts making the passive tracker 39.81% more efficient.

In summation, the hypothesis was proven to be correct. The proposed gas model produced significantly more power, as opposed to the stationary panel. Although this hypothesis was proven true, the experiment was not without errors. Such possible errors included in this experiment could have stemmed from a slight imbalance in the construction, resulting in a less than ideal tracking speed therefore skewing the results. In addition, the factor of weather was not taken into account, and therefore, the true in the field output is not yet accounted for. Nature could significantly decrease the output, unless further modifications are made. A possible solution to said problem is to use similar technology found in the seatbelts to prevent the panel's arc from being skewed due to the elements. As the nation strides towards the future and coal is left in the past, energy needs are constantly at the forefront of minds everywhere. Therefore it is hoped that the information gathered in this experiment will quell the worries of nations large and small, allowing them to focus on a brighter, cost – effective and cleaner future.