



Investigating the Effects of Temperature on Power Output

Objective: Students will use concepts learned in class to explore the many variables that effect the efficiency of solar panels in regards to power output.

Materials:

- PV Array or Solar Panel
- 2 Multimeter
- Frozen Ice Packs
- Low Power DC Bulb
- Halogen Lamp (500 Watts)
- 4 or 5 Alligator clip wires
- Timer

Investigative Question: How does the power output change as the temperature of the PV system changes.

Procedure:

- 1) Attach the Multimeter to the PV array wired in series with an electrical load.
- 2) For Room Temperature, arrange the Halogen lamp so that the solar panel is receiving direct light. Record data in room temperature chart.
- 3) For Cooled Array, place solar panel on ice packs, and allow cooling for a few minutes. While still on the ice packs, record data on Cooled Array table.
- 4) For Warm Array, warm the panel with the halogen light for 10 minutes before recording new data.

Hypothesis:

Justification/Explanation



Data:

Room Temperature PV Array

Time	Voltage (V)	Current (mA)	Power (W)
Initial			
1 minute			
2 minutes			
3 minutes			

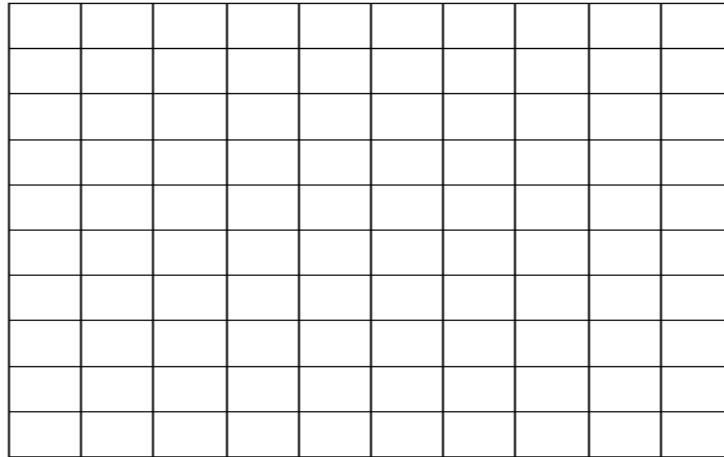
Cooled PV Array

Time	Voltage (V)	Current (mA)	Power (W)
Initial			
1 minute			
2 minutes			
3 minutes			

Warm PV Array

Time	Voltage (V)	Current (mA)	Power (W)
Initial			
1 minute			
2 minutes			
3 minutes			

Plot Power vs. Temperature below (use different colors for each temperature)



Check for understanding:

- 1) Based on the data you have collected, what is the effect of the temperature on energy production of a solar system?
- 2) When comparing two solar sites, such as Arizona and Oregon, what would be the positives and negatives of each potential site?
- 3) What measures could be taken to increase the power output of a solar system in a hot desert setting. Come up with three ideas and describe them.