# Mechanism Leveraging eWaste to Enhance Water Condensation through Effective Use of Solid State Magneto-Caloric Thermal Cooling

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Water scarcity affects upwards of a billion people worldwide. Big cities like Cape Town, Mexico City, Melbourne, and Jakarta are threatened by the water crisis today. Ironically, these very cities happen to have high humidity levels. Cape Town at 76 percent, Sao Paulo at 78 percent and Jakarta at 80 percent average humidity levels make these cities ideal candidates for harnessing the power of water condensation. My project aims to benefit from: 1. E-Waste - I plan to leverage the Peltier thermos-cooling modules and CPU cooling fans to build a solid sat refrigeration unit. 2. Free humidity from the atmosphere My goal is to build a high-efficiency water condensation device that is portable, environmentally- friendly, inexpensive, and scalable. My device has an adaptive design and would work with existing infrastructure. Solid state refrigeration in combination with perovskites or cobalt MOFs will enable me to build a highly optimal water condensation device. This portable environment-friendly device would use renewable energy (solar) for its need, will have zero emissions and collect water at the location most needed. My experiment testing led me to the following conclusions: 1. A Peltier module caused significant cooling and helped reach the dew point temperature(Td) 2. Condensation was observed when dew point temperature was reached 3. Relative humidity percent and the quantity of water collected had a positive correlation. 4. Exposed surface area and quantity of water collected showed a positive correlation. Based on the quantity of water collected during the actuals tests and using the principle of extrapolation, it can be deduced that my device would be able to collect more than 10 gallons in a 24-hour span.

**Awards Won:**