Using an Isolated Gain System to Heat a Traditional Home

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Rural communities across Native American reservations are held back by traditional heating sources like coal and wood. This project serves to provide an alternative heating source for these communities. The aim was to create a system that would be available to individuals in struggling communities by addressing major barriers like cost and availability. The passive system utilizes radiation from the sun to transfer heat energy. Antifreeze inside the system is circulated by thermal convection. Warmed antifreeze is displaced to force colder antifreeze back inside the system. This process continues as the day progresses, warming the traditional Navajo home or Hogan. Control testing was recorded for two days. Trial testing was recorded for three days. The hypothesis, if an isolated gain system is constructed with an aluminum backing, 3/8inch copper tubing, and sealed with a tempered glass sheet, then the system will produce the highest temperatures, was not supported. An Arduino microprocessor was programmed to document the temperatures from three sensors. Outdoor temperatures were documented from online weather services. Data collected demonstrated some correlation in heat rise during the coldest time periods however, optimal heat transfer was not evident in the data collected, therefore the hypothesis was not conclusive.

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