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Solar/Geothermal Saves Energy in Heating and Cooling of Greenhouses MATTHEW SANDERS, MARK THOMPSON, YURI SIKORSKI, Kettering University — The steady increase in world population and problems associated with conventional agricultural practices demand changes in food production methods and capabilities. Locally grown food minimizes the transportation costs and gas emissions responsible for Global Warming. Greenhouses have the potential to be extremely ecologically friendly by greatly increasing yields per year and facilitating reduced pesticide use. Globally, there are 2.5 million acres of greenhouse cover, including 30,640 acres in North America. In Europe, greenhouses consume 10% of the total energy in agriculture. Most of that energy is utilized for heating. Heating and cooling amount to 35% of greenhouse production costs. This high percentage value can be partially attributed to currently poor insulation values. In moderate-to-cold climate zones, it can take up to 2,500 gallons of propane, currently costing around $5,000, to keep a 2,000 sq. ft. greenhouse producing all winter. Around 350 tons of CO_2 per acre per year are released from these structures, contributing to global climate change. Reducing the energy needs of a greenhouse is the first step in saving money and the environment. Therefore, an efficient and environmentally friendly heating and cooling system selection is also crucial. After selecting appropriate energy sources, the next major concern in a greenhouse would be heat loss. Consequently, it is critically important to understand factors contributing to heat loss.

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