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**Title: Solar Powered Air Conditioning: Using Thermal Energy to Power an Absorption Refrigeration Cycle**

**Research Advisor: Dr. Dominic Groulx**

**Category: Alternative Energy & Sustainability**

Solar energy is *free* energy that can be harvested in a number of ways. This project focuses on thermal extraction from evacuated tube solar collectors. Conventionally, evacuated tube collectors are used to preheat domestic hot water (DHW). In the summer months, solar resources are abundant but the demand for domestic hot water is low, thus alternative applications were explored. To combat this high resource with low demand, the concept of using solar thermal resources to supply an air conditioning unit was investigated.

This project was part of a senior design project where a team of four mechanical engineering students designed and built an absorption refrigeration cycle to operate on solar thermal energy. The absorption refrigeration cycle uses a heat source to create cooling by varying concentrations ammonia, water and hydrogen in a closed loop; a technology that has existed for many years.

The refrigeration cycle was originally designed to be powered with either a propane flame or electrical-thermal element. After cycle modifications were made and a coil heat exchanger was installed, an innovative cycle was produced. Using forced air over the cooling element created indoor air conditioning. Cycle conditions as well as observations were reported. Finally, the whole unit was encased in sheet metal to mimic a window-style air conditioning unit and is intended for future residential applications.