

CORNELL SOLAR HEATING PROJECTS

Cornell has two solar heating systems in operation. These systems are among the latest in renewable energy on campus, and help highlight Cornell's interest in furthering its use.

Highlights of the projects

What have we built? 120,000 Btu/hr peak output on the roof of the Central Energy Plant building and 65,000 Btu/hr peak output on the Plantations Welcome Center. On-line in 2010.

Both the Central Energy Plant office and the Plantation Welcome Center/Central Energy Plant buildings use evacuated tube solar collectors. The Central Energy Plant solar system provides the majority of the offices yearly domestic hot water heating needs as well as approximately 15% of the yearly building comfort heating needs. The Plantations solar system provides approximately 10% of their yearly building comfort heating needs.

How does solar heating work?

Solar water heating systems include storage tanks and solar collectors. There are two types of solar water heating systems: active, which have circulating pumps and controls, and passive, which don't.

Most solar water heaters require a well-insulated storage tank. Solar storage tanks have an additional outlet and inlet connected to and from the collector. In two-tank systems, the solar water heater preheats water before it enters the conventional water heater. In one-tank systems, the back-up heater is combined with the solar storage in one tank.

Three types of solar collectors are used for solar heating applications:

Evacuated-tube solar collectors-(used at Cornell)

They feature parallel rows of transparent glass tubes. Each tube contains a glass outer and inner tube with an interior metal absorber tube attached to a fin. The inner tubes selective black surface coating absorbs solar energy and the evacuated space inhibits heat loss. These collectors are used more frequently for commercial and high temperature applications. According to the vendor of the Cornell collectors, over 75% of the solar energy is collected as heat.

Flat-plate collector

Glazed flat-plate collectors are insulated, weatherproofed boxes that contain a dark absorber plate under one or more glass or plastic (polymer) covers. Unglazed flat-plate collectors—typically used for solar pool heating—have a dark absorber plate, made of metal or polymer, without a cover or enclosure.

Integral collector-storage systems

Also known as ICS or *batch* systems, they feature one or more black tanks or tubes in an insulated, glazed box. Cold water first passes through the solar collector, which preheats the water. The water then continues on to the conventional backup water heater, providing a reliable source of hot water. They should be installed only in mild-freeze climates because the outdoor pipes could freeze in severe, cold weather.



The Central Energy Plant Office Building



The Plantation Welcome Center

Will Cornell have more solar heating?

Large quantities are not likely without generous help from our friends. Evacuated tube solar heat is still a significant cost premium over conventional methods. Unlike solar electric systems, solar heating is not incentivized for institutions like Cornell. Over time as the cost and efficiency of new solar collectors and systems improves, its use will grow.

More Information

energyandsustainability.fs.cornell.edu
portal.emcs.cornell.edu

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