

# Cornell University

With all decisions made by them, the Cornell students are proud of their independence and their ability to work together with students from various disciplines. A unique feature of the Cornell house is the "Light Canopy," a streamlined framework of steel trusses that support a PV system, evacuated tubes for water and space heating, and vegetated latticework panels called "greenscreens" that provide shade in summer. Honoring their commitment to raise public awareness, the team members worked with Ithaca city schools to introduce students to solar energy and energy efficiency.

## What's Different?

- All the various housing systems aim to emphasize flexibility and ease-of-use for the homeowner. The Light Canopy can be adapted to numerous uses; the raised-access floor makes it easier to get to wiring and ventilation; the touchscreen provides unprecedented levels of information about, and control over, the Light Canopy Home.
- The Light Canopy was designed to be built independently from the rest of the house. This not only means a possibility for mass production in the future, but also that it can be incorporated into any home.
- The fact that the canopy is its own entity also helps when doing work on the roof: the PV panels, evacuated tubes, and greenscreen will not be disrupted during roof work. This also works the other way around: if work needs to be done on any of the canopy's parts, the roof of the home will not be disturbed.
- Cornell's Light Canopy Home emphasizes the role of landscaping in sustainable living and homes. The team constructed a wetland for grey-water recycling and also planted a low-maintenance "screed garden" and various vegetables and herbs for cooking.
- The home includes a touchscreen—a 19-inch computer monitor from which the homeowner can keep track of the engineering systems. The homeowner can not only track how much energy is being used by each outlet, but can also create presets and schedules for lighting, security, and various other home technology features.
- The sunroom/porch extension and NanaWall system in the dining area allow for greater control over air temperature and can help reduce the loads of the photovoltaics and evacuated tubes by using outdoor air.

## Architecture, Interior Comfort

- The raised floor of the Light Canopy Home allows all ductwork and wires to be installed beneath the flooring. This allows for greater accessibility to these systems by the homeowner, as well as avoiding puncturing the structurally insulated panel walls and breaking the thermal seal of the house.
- The majority of materials used in the furniture, flooring, and countertop are more sustainable than those found in normal homes. For example, the flooring used everywhere but the sunroom and the bathroom is cork, which is made from the bark of the cork oak tree. This means that the tree is never cut down and can regenerate quickly.

## Heating and Cooling Systems

- By opening and closing the NanaWalls of the sunroom/porch extension, the homeowner can effectively use passive solar radiation to control the temperature of the home. If more heat is needed, it can be "retrieved" from the evacuated tubes.
- Vegetated screens attached to the canopy cool the house in the summer by providing shade and die back in the winter, letting more light and heat enter through the windows.

## Lighting (including Daylighting)

- The Light Canopy Home has daylight sensors that help control the lighting according to ambient and natural light.
- The home uses ultrasonic sensors (that turn off lights if a room is unoccupied) and CO<sub>2</sub> detectors.
- Presets and schedules will let the homeowner control when certain lights turn on, as well as set lighting levels for certain occasions; one example is "mood lighting."

### **PV and Solar Thermal**

- The PV system comprises 69 GE Energy 110-watt modules, for a rated system size of 7.6 kW. The Light Canopy on this house is as close as possible to the optimal angle for receiving sunlight without exceeding the maximum height limit set by the Solar Decathlon. The solar array covers 797 square feet—three square feet fewer than the maximum of 800 square feet allowed by the competition rules.
- The evacuated tubes used for water and space heating are 93% efficient. The vacuum created inside the tubes prevents heat from being lost to conduction or convection. Propylene glycol runs through a copper tube inside a glass tube, and the vacuum is created between them. The propylene glycol is used for its heat-transferring properties; it heats quickly to 200°F and just as rapidly transfers much of the heat to the water in the water tank.

### **Communications**

- The outreach effort of the Cornell University team includes traveling to local schools in Ithaca, New York, and educating students on solar power.
- Cornell team members also focused on getting the word out about the competition and sustainability through contacts with local news outlets.

### **Budget**

- The total estimated cost of Cornell's house is \$560,000.

### **Future Plans**

- The team sold the house at auction to a Cornell alumna for \$151,000. There is talk, however, of the house being donated back to the university.

### **Kid's Corner**

- A lot of the decorative trim on the outside and inside of this house was made out of an old silo!
- One of the architecture students at Cornell made up the color of the paint on that the outside of the house. She named it "Solar Storm."

### **Team Information**

Web site: <http://www.cusd.cornell.edu>

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