Energy Light Sculpture: Riverside Medical Clinic, Riverside, CA

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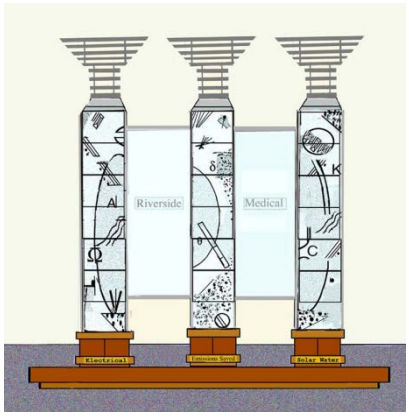
DESCRIPTION OF THE SYSTEM



Client Context

Riverside Medical Clinic (RMC) has invested in a building that uses 30% less energy than standard buildings. The owners purchased efficient lighting and cooling equipment. The sun provides a significant portion of the building's hot water needs.

The efficient use of energy translates into lower operating costs and reduced environmental emissions.

RMC wants to share their building's performance with their patients and families using a lobby display. The display has three columns, one for volume of water heated by the sun, one for emissions saved, and one for electric energy used.

Minute by minute, the six-foot high glass columns change color, showing the volume of hot water heated, an estimate of emissions saved, and the electric energy used. The lights in the cast glass columns are efficient light-emitting diodes (LED) from Philips Lighting's Color Kinetics division.

Column Definitions

Left Column: Emissions Saved

The Emissions Saved column shows an estimate of carbon dioxide emissions saved by the building's efficient design. The column shows savings of 20 pounds of carbon dioxide emissions when completely lit in green. The savings is equivalent to the carbon dioxide emissions in one gallon of gasoline.

Middle Column: Solar Hot Water Production

The Solar Hot Water column shows how much hot water is heated by the building's solar heating system. Each light step represents one gallon of heated water. The column represents 24 gallons of heated water when completely lit in light blue.

Right Column: Electricity Use

The Electricity Use column shows the electrical energy used by the building. Each light step represents 0.6 kilowatt-hours of electric energy, the electric energy used to light six 100-watt light bulbs for one hour. The column represents 14.4 kilowatt-hours of electric energy when completely lit in red. A typical residence in Riverside uses 600 kilowatt-hours a month, equal to a thousand steps.

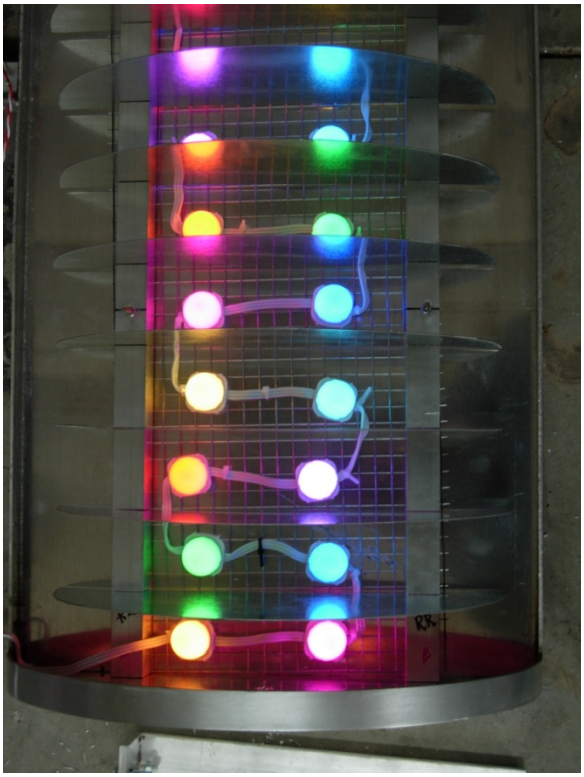
How the display works

A PC in L167 is connected to the building's electric meter and the hot water meter. The Trane building control system tells the PC when the solar hot water loop is open; the PC measures water volume only when the loop is open. Every five minutes, the PC uses a DMX protocol box to translate the electric energy use, an estimate of the emissions savings, and the hot water volume into DMX signals. Signals travel over a CAT5-e cable to power supplies in the base of the display. The power supplies communicate the signals to the lights in glass columns. At 15 seconds before each hour, the PC sends a special program with a variety of colors and the time—the display will flash the number of hours slowly. After the hour display is finished, the energy data display begins again.

Design history

System designed in fall 2006, fabricated in 2007, installed January 2008, System on line and functioning as of June 2010 when local maintenance was assumed by the client.

An Inside Look



Each display column contains a string of 50 ColorFlex LED lamps. The lights are configured so two LED lamps are wired to a frame to form a pair. The next two lights on the string are wired above, and so forth—like rungs on a ladder.

Here is a construction view of the way the lights are configured; the photo also shows the aluminum fins that divide the pairs of lights, to keep the light from one pair bleeding to the lights from the adjacent pairs.

When the display is translating meter data into light patterns, each pair of lights within a section of the column is lighted with the same color. When the next "step" signal is sent by DMX, the next higher pair of lights is lighted, according to the color pattern.