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NRDC Demonstrates Green is Good with LonWorks® Based Open Systems

For more than three decades, the Natural Resources Defense Council (NRDC) has been a leading voice for environmental advocacy in the US. When the group decided to open a regional office in Santa Monica, California, they knew it had to be environmentally friendly. The building, named for Robert Redford, actor and long-time environmentalist, would combine cutting-edge technologies and materials with energy-efficient architecture to create a showcase for green-building design and promote environmental activism.

The building, extensively remodeled by the NRDC and opened in November 2003, pushes the envelope for environmental design and construction techniques. It uses up to 60 percent less water than a standard building of its size by capturing and filtering rain, shower, and sink water to irrigate landscaping and operate toilets. It is forecast to reduce electricity consumption by 54 percent by maximizing natural light and using efficient fixtures and appliances, task lighting, dimmable electronic ballasts, occupancy sensors, high efficiency air-conditioning, and extra insulation. The building can also meet 20 percent of its electrical needs with rooftop photovoltaic cells. So environmentally friendly is the structure that the U.S. Green Building Council (USGBC) awarded it their LEED (Leadership in Energy and Environmental Design) Platinum rating, making it the "greenest" in the country.

The "Aha" Factor

To simply say that the building was environmentally friendly was all well and good, but the NRDC wanted to wow visitors with real-time, visual evidence of the building's extraordinary performance efficiency. The organization tapped Southern California Edison, the electric utility, to develop an energy model for the building plus a public exhibit located in the Environmental Action Center on the building's first floor displaying up-to-the-minute energy consumption.

Dubbed the "Green Building Exhibit," the kiosk consists of a monitor built into a larger wall exhibit with pictures of the building and text that explains what makes a building green. On the monitor are four panels depicting solar energy production, water efficiency, heating and cooling energy consumption, and lighting energy consumption. A touch-screen feature allows visitors to call up current energy statistics. "It's cool to read about what makes a building green," says Evelyne Slavin, Environmental Action Center Associate at the NRDC. "But to actually see that right now we are saving 45 percent on energy is what produces the wow reaction from people."

To obtain the input for this information, Southern California Edison (SCE) needed a network of sensors and an intelligent device to process the data for display. The utility turned to ASW Engineering Management Consultants, headquartered in Tustin, California, which specializes in helping clients identify and implement measures to increase energy efficiency, improve system operation, and reduce operating costs. The SCE team, including ASW, developed the high-level design for the energy-monitoring system including the points to be collected, the type of points (i.e., digital or analog), and the panels and instrumentation.

A key concern of the SCE team was how to process the data from the sensors. LEED certification requires facilities to comply with the long-term, continuous measurement of performance as stated in Option B: Methods by Technology of the US DOE's International Performance Measurement and Verification Protocol (IPMVP). A PC-based server would be the traditional solution, but that would add thousands of dollars of expense for the PC, Microsoft operating system, and the necessary "front-end" software to provide a Graphical User Interface. There would also be ongoing maintenance issues such as Windows security upgrades and service packs—a responsibility that the NRDC did not want to take on. "To eliminate the costs and inherent maintenance problems of a PC, we chose a LonWorks based network and the Echelon *i*.LON 100 Internet Server as an embedded firmware solution," says Dennis Rowan, senior project engineer with ASW. "The result was a solution more robust than the PC alternative, and one that could become a standard for all new commercial buildings," adds David Wylie, a principal and co-founder of ASW.

LonWorks is a low-cost, interoperable control system that allows intelligent devices to communicate peer-to-peer over simplified networks, resulting in an open architecture and economical installation that is easy to program, customize, operate, service, and expand. The *i*.LON 100 Internet Server acts as a Web server, eliminating the need for a separate PC server. The result is lower capital investment and, most importantly, no maintenance.

SCE provided funding to VaCom Technologies of La Verne, California, an Authorized Network Integrator for Echelon LonWorks, to furnish the LonWorks based monitoring network and *i*.LON 100 servers. Twenty-two separate sensors were installed and connected to several LonWorks LonPoint digital and analog input modules to collect data on electric, gas, and water usage as well as solar energy generation, weather conditions, etc. This information is fed to three *i*.LON 100s, which have the capacity to store up to five years of historical data, with one of the *i*.LONs acting as a web server that delivers the processed information to the monitor in a browser-based format for display. A separate LonWorks device, known as the analytics node, processes the raw data using a set of equations furnished by the SCE team to calculate how the building is doing compared to a "typical" building of the same size.

Efficient Install

LonWorks' reputation for ease of installation and reliability were put to the test on this project. Due to the last-minute scheduling of the grand opening of the building—complete with a host of celebrities including Robert Redford—VaCom was given just one day to install the system. "We had such a diverse range of sensors, I was certain there would be some issues with reading data," says Doug Scott, president of VaCom. "But we installed and commissioned the system all in one day, and everything worked as designed."

The Green Building Exhibit continues to perform as efficiently as the building. "The reason we created this exhibit was to publicize the availability and the efficiency of green technology," says Slavin. "It's very powerful for people to see in real time how much energy we are using, how much we are saving, and how easy it is to do that. This is a wonderful way to create awareness about what we can all do for the environment."

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