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Going Green: Retrofittable Energy Saving in Freiburg (2/11/2009)



By Jayani Das, Secyournit

The current financial crisis is affecting everyone, be it large corporate businesses or the individual home owner. It has prompted everybody to look for ways to save money, and this includes reducing costs incurred due to energy consumption. With the costs of all amenities rising, home owners in and around Freiburg, Germany, began exploring various methods of reducing energy consumption in their own homes, and thereby make financial savings. The city of Freiburg is striving to become one of the greenest cities in Europe, and eco-housing plays a key role in that concept.



An example of Freiburg's green housing credentials, the Heliotrop is a constant-temperature home that rotates towards the sun in the winter and away in the summer.

The challenges

In principle, there are many opportunities to use energy more efficiently in homes. However, these opportunities are hard, if not impossible, to implement in existing homes without extensive remodelling. What is required are easy-to-install retrofit solutions that can deal immediately with the most energy-consuming aspects of a home.

For example, new and old homes both waste large amounts of energy when hot water is supplied to the whole house. In order for the hot water to be readily available throughout the house, a circulation pump distributes hot water through pipes either continuously or on a timed basis (e.g. 14 hours a day). This results in a significant, and completely unnecessary, waste of energy. It is possible, however, to save about 30% of the hot water bill by starting the

circulation pump only on demand, i.e. at the moment hot water is needed at a certain tap.

Retrofitting houses is a costly business at the best of times, and finding a solution that can be applied to most homes, and not just the ones at the top end of the residential property range, has proven to be a major challenge. Often the installation of new technology requires specialist installers with specialist knowledge. What was needed in Freiburg was a system that could be installed by non-specialist installers and without too much disruption or the need for extensive and complex rewiring and remodelling work.

The solution

A solution was arrived at that uses a cost-effective LonWorks powerline communications system that takes advantage of the existing powerlines within the home. This means that existing houses can be retrofitted without rewiring and the disruption and reconstruction this entails. Secyurit Sienna sensors were installed at each tap and a corresponding actuator at the circulation pump, allowing 'hot water on demand' to be easily supplied in every house.



The Secyurit SM1L+R sensor.

The use of self-installation technology means that systems can be installed by people without specialist LonWorks platform knowledge. The highly-integrated and compact Echelon Smart transceiver was used to reach the required extremely small form factor and cost point. To implement the 'hot water on demand', typically 3-6 LonWorks platform nodes were installed per home, with no remodelling necessary.

A Secyurit SM1L+R sensor with one 230V input and actuator status display was installed at every hot water tap. This allowed the circulation pump to be started on demand, and when it is connected to a switch with a control lamp attached, it is also able to indicate the state of the pump. Also installed at the circulating pump was a Samilt Sensor/Actuator with a timer for delayed switching. This keeps the pump running for a predefined period of time, depending on the size of the house.

Of course, for more demanding customers, a browser-based display allows monitoring and control of all the elements. This way the system can gradually be upgraded from saving hot water energy to a full home automation system.



The Secyurit browser-based display for monitoring, control and ultimately, full home automation.

With this scalability, the ability to retrofit anywhere, and the simple method of installation, opportunities for installers to improve their customers' houses have greatly increased. For example, an installer based in Munich was able to automate the sun blinds of an old mansion in the south of Munich without any rewiring. The blinds now operate at specified times and weather conditions, increasing the comfort level and saving HVAC costs for his client. Once implemented, the customer was so impressed, that the installer was asked to install individual dimming to all of his client's garden lights, thus saving even more energy.

Conclusion

The Freiburg experience has shown that when energy-saving technology is made easy to install and operate, with no disruption to the property, and can be shown to provide tangible benefits and complete reliability, people will gladly embrace it. Just through energy savings alone, the system has proven to be very cost-effective, with a payback time of less than twelve months.

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