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Housing Project in Scotland Launches IoT Pilot Focused on Energy Use, Safety

A handful of technology providers teamed with a Scottish housing provider, River Clyde Homes, last month to launch a pilot project to evaluate the use of Internet of Things

technology to reduce energy consumption and improve safety at a social housing project comprising a small neighborhood called Broomhill.

Social-housing programs provide homes to residents with low income or disabilities, as well as to the elderly or other individuals who have difficulty finding affordable dwellings. It is similar, in some ways, to public housing in the United States. Generally, social-housing landlords are nonprofit organizations that funnel profits into maintaining existing homes and financing new ones. Social-housing complexes are financially regulated by housing authorities, such as England's Homes and Communities Agency (HCA) and the Scottish Housing Regulator (SHR), and are partially financially funded by their respective national governments.



A graphic shows the type of data River Clyde Homes will collect through its pilot.

Broomhill, which is made up of 666 units, including townhouses, multi-story apartment buildings and three high-rise buildings, is located in Greenock, a town of 45,000 residents, northwest of Glasgow. River Clyde Homes is hoping the Broomhill IoT pilot will provide a means for it to more easily monitor the community's energy usage and safety systems. If it does, the nonprofit may deploy the technology permanently and expand it to more of the 6,000 properties it manages.

Webthings, a U.K.-based IoT sensor module manufacturer, has provided approximately 300 multi-functional IoT devices that are being installed in both occupied and unoccupied dwellings at Broomhill to monitor a wide range of things.

Vibration, temperature and humidity sensors are being installed inside elevators with the goal of helping River Clyde Homes to better understand their usage patterns and improve their maintenance in order to avoid breakdowns, since both residents and contractors (who regularly perform work on unoccupied apartments or communal areas) rely on the elevators. Elevator maintenance is a major cost issue for the landlord.

Temperature sensors are being added to communal water tanks in order to ensure that the water is stored at safe temperatures. This is being done in an effort to prevent the growth of *Legionella* bacteria in the water, says Sharon Fleming, a lead associate consultant for business intelligence software provider HouseMark and the architect of the pilot project. Older people and those with respiratory disorders are especially vulnerable to contracting Legionnaires' disease, so landlords such as River Clyde Homes are concerned about outbreaks.

Positional sensors on communal fire doors will alert personnel if the doors have been left ajar for long periods of time.

Inside an unoccupied building, the sensors are being evaluated for public-safety uses. "Unoccupied apartments, particularly in the low-rise dwellings are hot-spots for break-ins, [and they are sometimes used] as a route in to other dwellings," Fleming says. The empty units are sometimes vandalized as well. Motion sensors and ambient noise sensors are being placed strategically in an unoccupied building at Broomhill, she adds, and will be combined with video surveillance.

Sensors tracking temperature and humidity inside living units

could help River Clyde Homes to ensure that residents do not keep their homes too cool or warm, and that they remain at a safe humidity level. Fleming says this information could be used to make sure not only that residents are not wasting energy but also that those with disabilities or respiratory illnesses, and the aged, are in a comfortable and healthy living environment.

As a safety measure, high-rise social-housing dwellings have restrictors on windows that prevent them from being opened fully. In the past, children have died after falling out of windows with broken or compromised restrictors. Sensors will be placed on select windows at Broomhill to alert staff members if a window is opened farther than a functioning restrictor would allow.

Carbon monoxide sensors with integrated cellular modems will also be tested during the pilot. If they detect dangerous CO levels, River Clyde Homes' maintenance staff will receive SMS text alerts on their mobile phones. Each detector also runs diagnostic tests each week and triggers alerts via SMS if the device is not functioning properly or if its battery is low.

With the exception of the CO sensor, all of the sensor modules are made by Webthings and contain Sigfox radios. Sigfox is a networking provider that has developed a protocol for transmitting small packets of data via sub-GHz frequencies, on ISM bands (868 MHz in Europe and 902 MHz in the US) using ultra-narrow band (UNB) modulation. The data from the sensors is transmitted to a Sigfox base station, which has been installed on the roof of one of the high-rise blocks in the Broomhill neighborhood. The radios have a range of around 2.5 miles in urban environments. From the base station, the data will be transmitted across the Sigfox network in Greenock, which was deployed through a partnership with British telecommunications firm Arqiva.

IoT platform provider Flexeye is working with HouseMark to

deliver the analytics, dashboards, visualization and reporting tools being used to collect and manage the sensor data.

Flexeye is also the leader of a consortium of companies developing Hypercat, a specification designed to support interoperability between Internet of Things services and applications. Hypercat has established a common language for resources—using a format called uniform resource identifiers (URI)—that are referenced in multiple systems that may have dissimilar data structures, but which all use the hypertext transfer protocol (HTTP). Hypercat employs the JavaScript Object Notation (JSON) data interchange format and RESTful application programming interfaces (APIs). The data collected through this pilot will be shared among the stakeholders using the Hypercat format.

All 300 sensors should be installed by the end of this month, Fleming says, and the pilot will then run for six months, after which River Clyde Homes will decide whether to keep the sensor network deployed or remove it. If River Clyde Homes decides to keep the network in place or expand its use to other properties, she adds, it will need to work with the technology vendors to establish some sort of payment arrangement, such as a subscription service.

Aside from monitoring the reliability and safety of different physical assets, such as elevators, doors and windows, River Clyde Homes hopes the IoT project will enable it “to identify opportunities to improve services for its tenants,” Fleming says, “as well as to reduce costs through proactive maintenance of buildings and equipment.” The data may eventually be shared with insurance providers as well, and may be used to negotiate premiums.

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