

# Smart controllers cushion against power price shocks



A NZ-developed meter reading and demand control system helps hoteliers, commercial landlords, apartment body corporates and retirement village operators to monitor and control their energy use. ▶

**COMFORTABLE CONDITIONS:** GOOD ENERGY PRACTICE AT RETIREMENT VILLAGES **KEEPS COSTS DOWN** FOR PEOPLE ON A **FIXED INCOME**.

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## Mayfair Retirement Village

Mayfair Retirement Village in Riccarton, Christchurch, has Utility Technology equipment and an ongoing monitoring arrangement with Christchurch electrical contractor Arnold Jensen Ltd. For a fee of around \$100 a month, the contractor receives the electricity retailer's invoice and consumption data from the retirement village accounts staff and compares it with data read from the meter remotely and emailed in a spreadsheet from Utility Technology.

The retailer's data compares consumption and average peak demand with the same month from the previous year. Utility Technology's spreadsheet contains more detailed information that can be displayed as a graph to highlight any anomalies, such as excessive heating that might suggest a failed thermostat.

The close monitoring is worthwhile. Within 18 months of installing a demand controller for underfloor heating in 1998, Mayfair had lowered the monthly demand charges from accounting for 50% of the power bill to contributing only 38% of it.

The following year Mayfair added 23 serviced units, a lounge, dining room and theatre. This increased the floor area by 80% but added only 60% to the energy consumption, while total demand stayed below the previous year's levels.

By keeping the total demand down, Mayfair avoided paying \$20,000 for a power line upgrade.

At midnight at the end of every month a computer gives the instruction for hundreds of electricity meters to be read, all around New Zealand.

In less than 30 seconds the job is done, and the information is packaged into a handy format for producing invoices and graphs.

The system is the brainchild of Hamilton electrical distribution engineer Ross Brown, who solved the challenge of what to do at retirement by not actually retiring but using the knowledge gleaned during 42 years' power distribution engineering in Central Otago and the Waikato to craft a brilliant new career.

Operating as Utility Technology Ltd, Brown's company has installed energy efficiency, meter-reading and demand management systems in retirement villages, apartments, shopping malls and other sites that "sub-let" electricity and other utilities to tenants and individuals within their area of responsibility.

The systems help various types of landlords manage their electricity and other utilities.

The ability to aggregate the tenants' electricity requirements, combined with being able to measure accurately the amount and time of use, is a powerful tool in the hands of the operators.

Says Brown, referring to a 100-unit retirement village: "Each villa uses around 8000 units [a year], totalling around a million units." Setting up an "embedded network" allows them to negotiate favourable contracts with electricity retailers and

pass the financial benefits on to their tenants as part of the overall package.

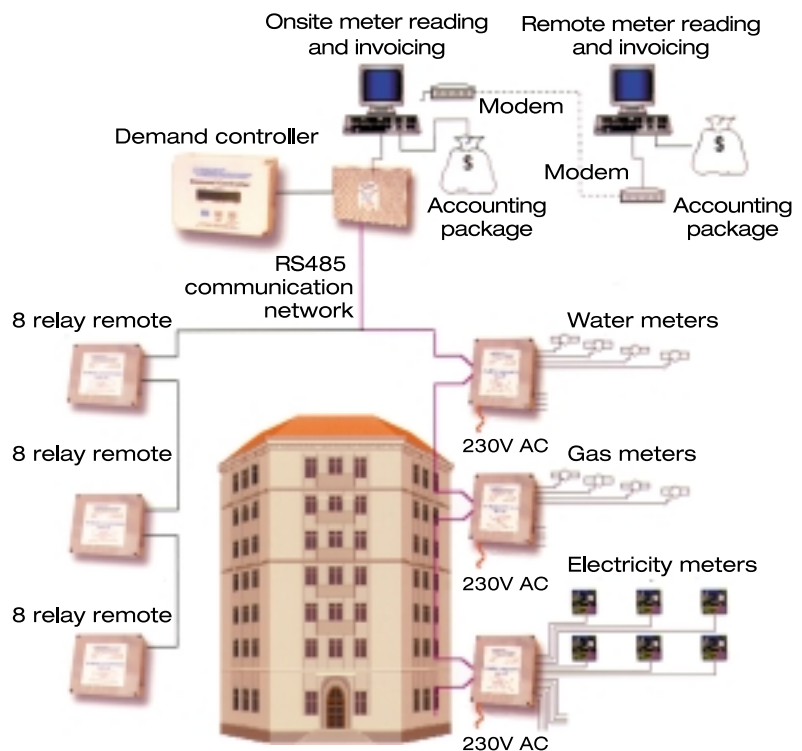
Electricity is bulk-metered at the gate and the owner pays the account. In turn, the Utility Technology system reads meters within the network and prepares bills for the individual tenants.

An important aspect is the ability to control the

electricity demand to keep network demand charges down. For example, in a retirement village the system switches off controllable load such as underfloor heating and water heating in a cascade around the units to keep demand down at times of constraints on the network.

It can switch off all controllable load during

### Combined meter reading and demand control



THE DIAGRAM SHOWS A UTILITY TECHNOLOGY LTD SYSTEM THAT **AUTOMATICALLY READS METERS FOR WATER, GAS AND ELECTRICITY** AND SENDS THE DATA TO AN **ACCOUNTING PACKAGE**.

THE SYSTEM PROGRESSIVELY **SWITCHES OFF EQUIPMENT** SUCH AS WATER HEATING TO **AVOID THE PEAKS IN ELECTRICITY DEMAND** THAT INCUR **CHARGES** FROM THE NETWORK COMPANY.

## What Utility Technology offers retirement villages



- Sets up an “embedded network” so controllable load such as water heating and underfloor heating can be switched off temporarily to lower the site’s overall electrical demand
- Electricity bulk buying enables the owner to offer occupants an attractive rate for their electricity
- Provides reports and the ability to operate the electrical demand by remote control
- Sets up an automatic meter reading service for electricity, water and hot water, to prepare invoices for residents and summary files for the financial controller
- Advises on energy efficient appliances and equipment
- Determines electricity losses
- Offers an energy advisory service to village residents

“charge demand periods” in locations such as Christchurch, Dunedin, Queenstown and Central Otago where the local electricity network companies charge a penalty for electricity used during peak periods.

Customers include The George hotel in

Christchurch, Edgewater Resort, an office tower in Wellington and several coolstores.

Says Brown: “The software will take time-of-use data and show it to them in forms they can recognise and do things with. You can send a demand graph for the month with the highest

point highlighted, you can overlay days and find peaks. We’re pulling in hedging, so we can follow the hedging markets.”

A complex site such as a retirement village with 100 villas and 40 apartments would use a system based on a computer combined with the demand

### Summerset retirement villages



Summerset Retirement Villages owns seven retirement villages between Taupo and the Hutt Valley, with three more under construction.

All the sites use Utility Technology’s services for a total of 653 dwellings, comprising a mixture of independent villas and apartments. The electricity retailer for most of the villages is Genesis.

Summerset owners John and Rose O’Sullivan set up the first village in Levin in 1994 with Utilities Technology and have worked with the company ever since, placing it in charge of the installation of the electricity control infrastructure as each new village is built. Each new site buys a software licence and pays for the metering equipment and installation. Brown charges an ongoing fee for managing power use.

Says chief financial controller Peter Huse: “The system works well. They [utility Technology] put in all the metering and monitoring gear. We basically leave it to them to manage the power.”

Says Brown: “We have a huge amount of controllable load, made up of a 2 kW water heater and 6 kW of underfloor heating in each of say 100 villas in a village. We monitor the off-time each day, and that tells us how to set the targets.” The villas can be pre-heated at off-peak periods during the night, when the tariff is cheaper.

The architect has designed the villages so the dwellings face the sun and are well insulated. They are typically clad in brick. Brown says the occupants, who often come from large draughty homes where they only heated one room, initially find their new homes so welcomingly toasty they keep the heating turned up throughout. But as soon as they get their first power bill they realise they might have to ratchet back a bit, even if the cost per kilowatt-hour is less than before.

“People are moving in at 55 or 60,” says Brown. “They’ve sold their homes and have cash but that might have to last 30 years, so we encourage them to use compact fluorescent lamps that save \$100 per lamp during the lamp’s lifetime.” Huse says the reasonable electricity cost for occupants is “a nice little selling point. We buy in bulk and get a better price.”

Chris Stones of Stones Electrical in Paraparaumu began installing the systems for Summerset seven years ago. “We were looking for an energy management system, scouted round the country and someone recommended Ross. We find it’s an excellent product because it incorporates meter reading. It saves a huge amount of money and keeps peaks down. The system has grown along with the villages.”

Stones has also used it in collaboration with Otis as part of an office building management system for a Wellington high-rise.

## Utility Technology's demand controller

At the heart of Utility Technology's system is a small box that helps the customer minimise the "demand" component of an electricity network company's charges.

The controller predicts the demand and either sounds an alarm or automatically turns off selected loads if it detects that a peak is about to occur.

The controller can use either existing power cables running around the building, or specific communications cable.

It can take information from up to four meters, and has 8 or 32 control relays for switching loads.

The target demand is set so comfort is not compromised. It can be set at a different level for each month to allow for seasonal changes.

Demand control can be manual. Says Brown: "You can program in an alarm sound with the target – say at more than 60 kW, it chimes and at more than 65 kW there's a chord."

The Loadman II system replaces the demand controller with software run on a PC. A demand controller is installed as a back-up in case the PC fails. A PC can control more channels.

Utility Technology also has a range of data logging equipment for sampling of electricity, gas and water usage down to 15 minute intervals.

Adding a data logger converts an existing electricity meter into a time-of-use meter.

Equipment to monitor power quality includes the Voltman that records voltage levels and exports the data to spreadsheets rather than printing it.



### METER-READING AND DEMAND MANAGEMENT SYSTEMS SUIT APARTMENTS, SHOPPING MALLS AND OTHER SITES THAT PROVIDE UTILITIES TO TENANTS.

► controller to read meters, control the load and invoice tenants; while an apartment block such as The Landings in Auckland might specify a system to just read meters.

Utility Technology's services, which include demand control, automatic and remote meter reading, bill checking, billing and tariff negotiation, go hand in hand with energy efficiency advice and upgrades such as installing energy-saving light bulbs, double glazing and better insulation, that are all part of reducing overall electricity demand.

A laconic Kiwi not given to self-promotion, Brown relies on word of mouth rather than advertising for new customers. But the ones he has are mighty pleased with what Utility Technology can do for them. It doesn't cost the earth either – around \$500 for a basic software package.

"After deregulation I saw there was a hole in the market," says Brown. "The business has now swung around to include automatic meter reading." Brown has a team to make up the electronic equipment he designs, develop the software and take care of various aspects of the business. He has begun exporting to Australia.

The technology also lends itself to dealing with water and gas. "Water's easier than electricity," says Brown.

## Nugget Point Lodge

Nugget Point Lodge, a 40-room luxury resort near Coronet Peak, has a Utility Technology system but owner Barry Walters confesses he doesn't get the most out of it because he doesn't have an ongoing contract with Brown.

"When I purchased the hotel two years ago Ross came in and upgraded the existing

system, put a new computer in and put limits on the kilowatts and amps we could use. Then it would switch off certain appliances. He put energy monitoring in and control at the peak period – because even if you have a high demand for only half an hour in the month you pay that line charge for the whole month. It half-works – it would be more successful if it was more closely monitored. But it's working to the parameters I laid down."

The heating loads that can be switched off include two swimming pools, two squash courts and a gym. Walters says the lodge has been upgraded with double insulation in the ceilings and walls and new door seals. Night-store heaters using a cheaper night tariff have been installed in hallways.

With rising electricity prices, sometimes a monitoring and control system can only slow down the rate the bills increase rather than cut the total cost. "My electricity bill has gone up from \$4000 to \$6000 a month, despite the monitoring," says Walters. But without the monitoring it would be even higher.



## CREDITS

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