Experts in Energy Saving Lighting and Heating

Southern House eTRV+ with PAIR

Through an energy reduction campaign implemented and managed by Telereal Trillium, the Department for Work and Pensions have exceeded their Greening Government target of a 25% reduction in CO_2 emissions by 2015, achieving a 29% reduction.

As part of the campaign a range of 'spend to save' energy conservation measures were applied across the whole estate of 750+ office buildings over several years. In recent times the challenge was to identify further cost effective measures to meet latest targets for reduction.

One such technology reviewed was the use of Electronic Thermostatic Radiator Valves (ETRV's) to add to savings already accrued. In preparation for a pilot study, a range of suitable buildings was identified where energy performance measured by 'Best practice guide 19' or 'DEC' score was not excessively poor or good, so if savings were made here, they had scope for a national roll out, with confidence of similar results.

From the short list, the site 'Leeds, Southern House' was selected. This is a three storey office block with Job centre on the ground floor, which is generally operating 5 days/week from 08.00 to 17.00 with some staff present until 19.00.

Fabric is brick cavity wall with glazing to all sides and standard ceiling height. There is a mixture of open plan office areas, individual Manager's offices and intermittently used training and conference areas. Heating is by a typical commercial gas fired LTHW system with east/west variable temperature circuits and optimum start, centrally controlled by a modern BEMS. Space heating is by perimeter radiators, all of which had conventional TRV's to allow staff to achieve local comfort adjustments. Staff on site were quite 'Energy Aware' having actively supported various campaigns to reduce preventable waste of heat and power. The integrated Energy Management programme had improved the 'DEC' score from a high 'D' in 2008, to a low 'C' in 2014.

A business case was approved by DWP and works were completed within a few weeks of instruction in late February 2014. Chalmor worked closely with Telereal Trillium and the service provider, Cofely to assess individual room use and determine heating needs. The eTRV+ system was retrofitted to radiators throughout the building without the need of a drain down. Public areas were worked on ahead of opening hours to minimise business disruption. As a precaution the original TRV heads were retained, and stowed on site, so that if necessary the system could be returned to its original state.

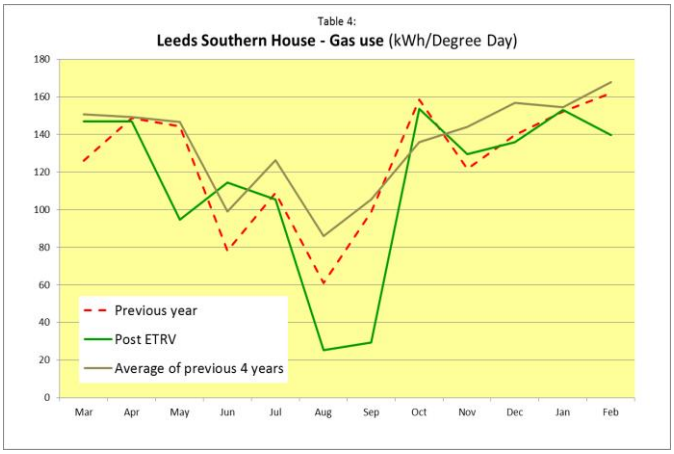
The works involved installing eTRV+ including PAIR (Passive Active Infra-Red) and Security Kits to the heating systems in the offices, meeting rooms and customer facing areas. Corridors were set to 18°c, offices to 21°c, with a one hour boost facility to 23°c. The boost facility was set high to avoid dramatic changes and allow staff to make a temporary heating adjustment. PAIRs were fitted to provide occupancy based control in cellular offices and meeting rooms, with a setback to 16°c when not in use, rising to 21°c when occupied. The eTRV+'s were locked to prevent building users adjusting the programme or removing them, protecting the investment and the energy savings.

Solar gain is now harvested to enhance energy saving. eTRV+'s dual temperature sensors quickly switch the heating off when the sun warms the room above the 21°c setting. If a window is opened as a result of the room feeling too warm, eTRV+ reacts rapidly to the sudden temperature change, switching off the heating locally to prevent heat waste.

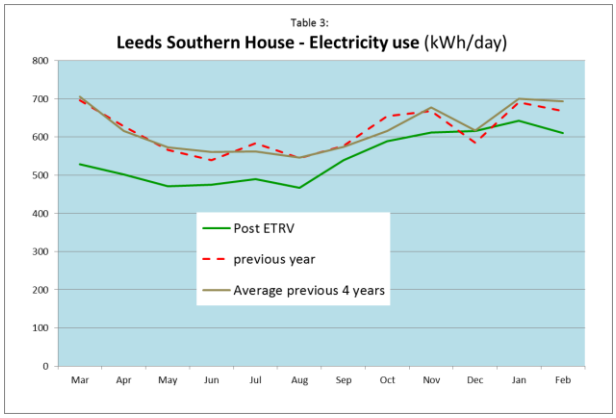
eTRV+ provides greater uniformity and reduced load across the system. Staff working in offices at the end of the radiator circuit reported:

- More consistent heating and greater comfort
- Heating no longer needed to be adjusted
- Reduced requirement for supplementary heating and cooling fans.

Each month after installation weather corrected gas consumption was assessed and compared expected savings in the Business case.



It was apparent quite quickly that gas savings were lower than expected and in some months consumption actually increased. However, when total site energy use was reviewed it was clear that there was a sustained and valuable reduction in electricity use from the outset.



It was then realised that the power saving was from staff no longer using portable electric heaters to enhance individual local comfort, with these no longer in use, the gas fired heating filled the gap. With electricity being up to 4 times the cost of the gas, the power financial savings boosted overall project performance to actually exceed expectations by 18%.

Annual Savings of 8% were made on gas use, plus the unexpected additional 12% in electricity, giving a simple financial payback for the project of just over 2.5 years, versus 3 years expected in the Business case.

Table 1: Summary of eTRV Performance at Leeds Southern House

		Original Business Case	Actual from Pilot				
				Elec		Gas	
Ref	Detail	12 Months	12 Months	Kwh/yr	Tonnes/yr	Kwh/yr	Tonnes/yr
12	Estimated Annual Utility Consumption Saving	93,201	58,783	27383		31,400	
13	Annual Carbon Dioxide Savings (tonnes)	17	30		14		6
14	Estimated consumption Cost Savings (At DECC average tariff inclusive of CCL & VAT)	£4509	£5333	£3814		£1519	
15	Value of carbon	£277	£326		£233		£93
	Net annual cost benefit to DWP	£4786	£5659				
	Performance versus business case	£873	18%	Better than expected			

Part way through the 2014/15 heating season a review of comfort levels was carried out by the DWP Energy & Environmental team. From this, Mike Parry, Cofely 'Spend to save' Manager, was able to report "Staff have reported greater comfort and we have far greater control. We are continuing to work with Chalmor to commission the system and make sure we gain maximum energy savings"

On the strength of the positive feedback the 'top up' business case was prepared to complete the top floor of the property – this had been left with standard TRVs for the pilot period and gave a useful reference point to the effective comfort enhancements achieved on the other floors. With the top floor completed, the first month's performance data shows additional energy savings have been achieved.