

A Burning Issue

As winter approaches and the prices of utilities continues to rise, Frank Booty looks at an intelligent way of reducing fuel consumption in the boiler room while maintaining room temperature

FINDING WAYS OF REDUCING ENERGY consumption and the associated cost in a volatile commercial utility market is high on the agenda of every organisation. "Options open to achieving this range from switching gas supplier, capital replacement programmes or the implementation of peripheral energy efficiency measures in the workspace," said Alan O'Brien, MD of Sabien Technology.

Sabien markets the M2G system, which is already helping public and private sector organisations reduce their fuel bills and carbon emissions. Among those to benefit so far are Down Lisburn Health and Social Services Trust, and a major high street and international bank group. The system comprises an intelligent load compensating sequence controller that optimises the efficiency of each individual boiler. A unit attached to each boiler monitors the temperature of the water in the flow and return every 10 seconds and the information is recorded with heat transfer rates at the first and second stage firings.

When a loading demand is made the system automatically checks the latest data it has stored and decides whether it is more economical to retain first stage firing or to introduce a second stage firing. The result is a substantial fuel reduction during less demanding situations while ensuring maximum capacity during heavy load periods. A UK patent has been applied for, O'Brien indicated.

The M2G System monitors flow and return water temperature as individual and totally separate software conditions to each boiler at 10 second intervals. This is a continuous process that provides ongoing system intelligence and picks up changing patterns in water temperatures indicating such things as modulating zone valves opening or closing or radiator thermostat valves opening and closing. Immediately on the termination of each burner fire, the M2G System software captures flow and return water temperatures in memory and uses this as a template for the next burner call. Using this memory template guide in conjunction with the ongoing 10 second interval readings from the flow and return temperature values, the unit software is able to build a 'current picture' of system demand. With this detailed intelligence about current system demand, the unit software applies its advanced logic to effectively control burner firing.

Being able to accurately evaluate the current demand, and any sudden changes in demand pattern, the M2G System is able to take accurate decisions on how to deal with current demands. By monitoring flow and return water

temperatures every 10 seconds, the M2G System can establish how effective a burner is at raising water temperature during its first stage fire or at any given time during the firing cycle.

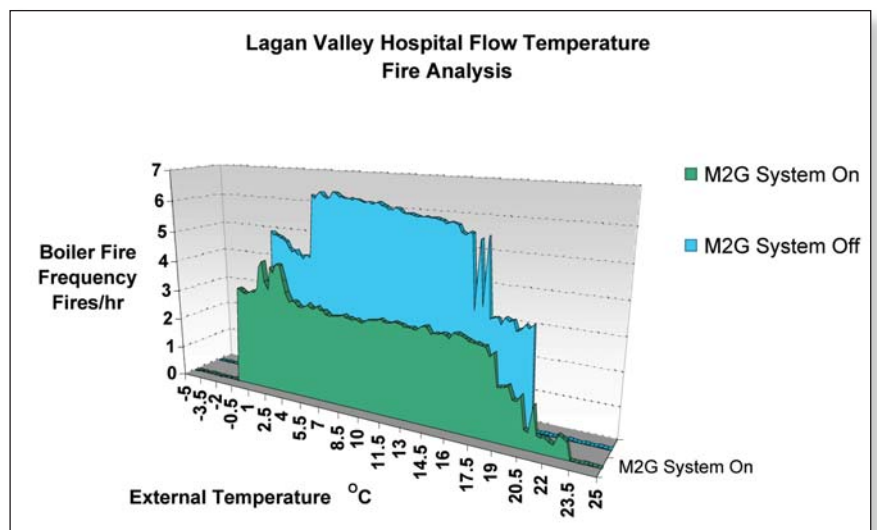
This is not to be mistaken with a time delay unit – M2G uses self-learning intelligence when deciding if and when a boiler should fire and for how long it should fire for.

The system can be used in many commercial applications that consume natural gas, LP gas or oil. Although designed for multiple boilers, it can be used singly and be fitted to many types of boiler, including forced draught and atmospheric systems. Average installation time is 90 minutes per boiler – with no disruption to the heating system. Increased boiler life can practically be guaranteed through reduced firing and more effective control. The system also significantly reduces carbon emissions.

M2G integrates with other BEMS (building energy management system) and is approved by the Carbon Trust for single and multi-boiler applications. Return on investment is achievable in 6-24 months. To further indicate government approval, O'Brien indicates the Inland Revenue allows private sector companies that install the M2G system in single and multi-boiler applications, 100 per cent capital allowance in the first year. Documented installations have shown reductions in energy consumptions of 15-35 per cent, and both single and multi-boiler applications qualify for the Energy Technology List.

The Down Lisburn Health and Social Services Trust, as part of the NHS, has a clearly defined energy and environmental policy with two key objectives:

Over 4 months, boiler frequency firing per hour at varying ambient temperatures confirmed the M2G System is a load compensating device that reduces the number of fires per hour as the load decreases



Before and after consumption rates weather corrected

NATURAL GAS	Year 2000 mWh	Year 2002 mWh	Percentage Saving	Payback in Years	CO ₂ Tonnes reduced
Laurelhill House	557.30	412.99	25.9%	0.99	27.4
Seymour House	854.70	750.22	12.2%	1.36	19.9
Lindsay House	182.50	145.59	20.2%	3.86	7.0
Lisburn ATC	613.50	446.10	27.3%	0.85	31.8

CLASS D OIL	Year 2000 Litres	Year 2002 Litres	Percentage Saving	Payback in Years	CO ₂ Tonnes reduced
Finniston House	197621	162788	17.7%	0.30	94.1
Nurses Residence	70895	65667	7.4%	1.86	14.1
Maternity Block	172503	160145	7.2%	0.78	33.4
Hillsborough Health Centre	13005	8472	34.9%	2.14	12.2

When controlled by the M2G System a reduction in energy consumption was produced under very heavy load demanding buildings of 17% and up to 34% under less demanding conditions

- To reduce overheads in order to improve quality patient care through more effective management of funds
- To reduce harmful carbon dioxide emissions in line with the Government's commitment to the Kyoto Protocol Agreement

Boiler controls, boiler optimising units, sequence controls and load compensating controls fall under the same general category heading.

"In our opinion the M2G System appeared the most advanced boiler control we could find," said Robert Spence, energy and environmental manager at the Trust. "The engineering logic has been obviously well thought out. From short term and long term trials the Trust proved the M2G System logic was effective at reducing energy consumption while maintaining room temperature."

Now, having the benefit of the M2G system installed on some buildings over six years, the Trust can favourably report that on these buildings there has never been a single heating or hot water complaint. Similar experiences are reported on other buildings where units have been installed since. Room temperatures at all the buildings have also been maintained, and in some cases have been slightly higher, so the reduction in energy has not been at the expense of comfort. All the Trust's buildings have a BEMS and installation of the M2G system has proved to be an additional and complementary control to the BEMS.

"The reduction in energy is certainly a major benefit with the M2G system but less energy consumption means less boiler activity which in turn has a number of other benefits," said Spence. "A reduction in electricity due to the fact there is less burner motor activity and more importantly, if the burner functions less, both it and the boiler should last longer which delays capital investment for boiler replacement. A reduction in energy means boiler servicing

Laurelhill House

Patient care centre, 24/7 day (gas)

Seymour House

Patient care centre 24/7 (gas)

Lindsay House

Residential disability centre 24/7 (gas)

Lisburn Adult Training Centre

Adult training centre, weekdays (gas)

Hillsborough Health Centre

GP Practice with extended facilities, daytime (oil)

Finniston House

Hospital catering for mental illness 24/7 (oil)

Nurses Residence

24/7 (oil)

Downshire Maternity

Maternity hospital 24/7 (oil)

intervals can be extended."

"In conclusion, the Down Lisburn HSS Trust findings clearly illustrate the M2G System significantly reduced energy consumption, maintained room temperature, had no side effects and offered an attractive pay back on investment," said Spence.

"Even in the buildings where very high levels of saving were achieved, up to 34 per cent, room temperature was still maintained. This clearly illustrates that uncontrolled boilers do consume more fuel than they should compared to effective control by intelligence and self learning logic." said Spence.

Bank pilot

Targets to achieve cost savings and reduce carbon dioxide emissions while improving boiler efficiency were also the key driving forces behind a major High Street and international bank's quest. Following extensive trials at pilot sites, where energy savings in excess of 25 per cent were seen, a major installation programme was commissioned to install the burner management units throughout the UK at over 140 sites.

The trials the bank undertook demonstrated significant energy savings could be achieved without any detrimental effect on space temperature. Minimum guaranteed savings to the bank are £240,000 per annum (10 per cent with a payback of 2 years) but based on experiences so far it could be some £590,000 (25 per cent with a payback of 8 months). The budget was £495,000.

It appears this system is adept at reducing energy consumption while simultaneously maintaining room temperature – and bringing those carbon emissions down. The users and figures appear to back this up.

- Frank Booty is a freelance writer. www.sabien-tech.co.uk

