



Energy management

Lighting, heating controls and insulation upgrade make large savings at Mabbett & Associates Ltd, Glasgow

The business case

Mabbett & Associates Ltd (M&A), Environmental Consultants and Engineers, is part of the Mabbett Group and has offices in Glasgow and Dunfermline in the UK, and Boston and Washington DC in the USA.

M&A is a 'one-stop shop' for all environmental, energy, health and safety needs of industry, commercial enterprise and public agencies. The company's focus is to help their clients increase profitability and sustainability, while improving their compliance status.

Introduction

The need for additional office space provided M&A with the opportunity to purchase an 1850's Georgian townhouse in Glasgow City Centre to become the company's new UK headquarters.

The building was in need of extensive modernisation and restoration. This gave the company's in-house energy engineers and their architect, Fiona Sinclair, the ideal opportunity to dramatically reduce the building's carbon footprint and consequent future running costs.

As consultants on the Carbon Trust's Low Carbon Building Design Advice Scheme, M&A knows the benefit of considering energy and environment at the earliest opportunity in the design process.



Achievements

The total capital cost for the project was around £300,000. Most of the works were undertaken to provide a building fit for purpose as a modern office. In most areas no additional outlay was required to incorporate low carbon techniques.

The only areas which needed additional investment were lighting, heating controls and insulation, costing £5,000.

The projected annual saving is £2,700. In comparison to the obligatory investment, the payback is around two years.

By including low carbon design, M&A has been able to reduce running costs while providing a modern, comfortable office with little additional capital investment.

Savings

- 40% reduction in building heat loss.
- 50% reduction in heating and hot water costs.
- Reduction in lighting electrical load by over 50%.
- Emission savings of approximately 13 tonnes CO₂/annum.

The technical case

Building fabric

The roof of the building was un-insulated; 10% of the building fabric loss was through the roof and the installation of rigid insulation between the rafters and rock wool between the joists reduced this by 75%. All floors were also insulated.

The original single glazed sash and case windows were in poor repair and had to be replaced. Double glazing was selected as it has many benefits, most notably noise reduction and improved occupant comfort. The design of the energy efficient replacement windows was matched to the original windows to maintain the external character of the building.

The total heat loss of the building was reduced by 40%, which resulted in a smaller, lower cost boiler and radiators being installed.



Heating

The building had previously been divided into four separate lettable units, with each floor having its own heating system, including an individual gas meter and boiler.

One new, commercial condensing boiler was installed and new commercial grade mild steel pipe work installed throughout, serving new radiators positioned under the windows. Positioning radiators under windows releases wall space, reduces cold draughts and reduces radiant cooling, thus improving occupant comfort.

The heating flow temperature is set at a maximum of 60°C, ensuring that the boiler condenses for the majority of its working life.

The system has two heating zones which were chosen based on occupancy patterns and are each controlled by a multi-event programmable thermostat. These modern devices can manage the heating system's operating hours for each day of the week and can provide a much lower out-of-hours minimum temperature to protect the building fabric during very cold weather. The accurate temperature control of these devices with a narrow 'dead band' allow the controls to be set a couple of degrees lower and still maintain comfort conditions.

The programmable thermostat controls the maximum temperature of the building to rise excessively. In addition, thermostatic radiator valves (TRVs) are fitted to individual radiators. These allow occupants to adjust the temperature of each room, which increases personal comfort. This arrangement provides an energy efficient heating system.

Lighting

The existing installation, with halophosphate fluorescents and tungsten lamps, was inefficient and unsuitable for use in a modern office. Computer modelling was used to assess accurately the number of fittings required. New high frequency luminaires with triphosphor fluorescent lamps were installed, reducing the electricity load demand of the lighting by over 50%. The majority of the additional cost for advanced luminaires was offset by a reduction in the number of fittings that were required.

Lights are wired so that those nearest windows can be switched off when there is sufficient daylight. Neon indicator lamps are included on light switches external to rooms such as toilets and cupboards, indicating if lights have been left on.

Ventilation and cooling

All of the main office areas are naturally ventilated using trickle vents, operable windows and by utilising redundant chimney flues. The windows have openings at the top and bottom to encourage a natural cooling effect during warmer months.

Ventilation fans for toilet and utility areas are linked to light switches with run on timers and relative humidity controls.

To ensure that the offices maintain an acceptable temperature during summer months, a number of measures were taken to reduce internal heat gains:

- blinds were installed at windows throughout to reduce solar insolation
- energy efficient lighting was used
- high power CRT monitors were replaced with flat screens
- advanced power saving was introduced on all PCs.

Sustainability

Other measures, not directly related to the operational costs of the building, were taken to minimise the carbon impact, for example:

- Refurbishment of an existing building means lower imbedded carbon.
- The location was chosen as it has a rail station, underground station and bus stop within a five minute walk to encourage staff to use low carbon transport.
- Bike racks, showers, changing facilities and transport information boards were installed, again to encourage staff not to use personal vehicles for their daily commute.

Financial facts

Good quality design and specification can mean lower energy bills with little or no additional cost. The additional costs were:

■ lighting	£1,000
■ insulation	£1,700
■ heating controls	£2,350

The total annual savings are projected at £2,700 giving a simple payback of less than two years.

Due to their approach, M&A qualified for an interest free loan from Loan Action Scotland, and benefited from enhanced capital allowances.

The Carbon Trust works with business and the public sector to develop clean technologies and help organisations reduce their carbon emissions.

The Carbon Trust is grant funded by the Department for Environment, Food and Rural Affairs, the Department for Business, Enterprise and Regulatory Reform, the Scottish Government, the Welsh Assembly Government and Invest Northern Ireland.

www.carbontrust.co.uk



Expert advice The Carbon Trust provides free expert energy efficiency advice.

Energy surveys Your company may qualify for a free energy efficiency survey from one of the Carbon Trust's accredited consultants.

Energy efficiency loans The Carbon Trust can provide an interest free loan to SMEs up to £100,000, repayable over up to five years for investment in energy efficiency measures. In Scotland, the Scottish Government offers a similar scheme called 'Loan Action Scotland'.

Free publications

CTG002 – Heating control technology guide

CTV021 – Lighting technology overview

CTV007 – Office based companies sector overview

LNS350 – Energy Efficiency Loans - Customer pack

ECA272 – Enhanced Capital Allowances (ECA) brochure

For details of any of these services or free publications, contact the Energy Helpline on 0800 085 2005 and select the Energy option, or visit the Carbon Trust website at www.thecarbontrust.co.uk/energy/.

For Loan Action Scotland contact:

www.energysavingstrust.org.uk/scotland/.

Tax incentives The whole capital value of energy efficient technologies, which qualify under the Enhanced Capital Allowances scheme, may be written down in the year of purchase. For further information go to www.eca.gov.uk.

Further information

The Chartered Institution of Building Services

www.cibse.org

Heating and Ventilation Contractors Association

www.hvca.org.uk

The Lighting Association

www.lightingassociation.com

The Carbon Trust is a company limited by guarantee and registered in England and Wales under Company number 4190230 with its Registered Office at: 8th Floor, 3 Clement's Inn, London WC2A 2AZ.

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