Cork County Energy Agency

Energy Audit

Youghal Area Office

December 2009

Table of Contents

1. Introduction

Youghal area office and Youghal town council are located in the Mall House, Youghal town, County Cork. The offices are used for administrative purposes by Youghal town council and Youghal area engineers. The offices are in continuous use and are open to the public from Monday to Friday from 9am to 5pm.

The purpose of this energy audit is to provide accurate information on energy use in the Mall House building. This will be achieved by an analysis of the building fabric and the end use of heat and electricity in the building. This information can then be used to improve energy awareness among the management, employees and patrons. In conclusion the audit will suggest measures that may be undertaken to improve the energy efficiency of the building including low cost and medium cost measures.

2. Site description

Mall House is occupied by Youghal Town Council (figure 2.1). It houses the administrative offices of Youghal Town Council and a theatre that is used by the court service and local theatre groups. The town council administrative offices and chambers are located on the ground floor and the theatre is located on the first floor.

Figure 2.1 Mall House Youghal

The offices are open five days a week during regular business hours from 9am to 5pm. Hours of occupancy for the office do not vary throughout the year. The theatre (figure 2.2) is used by the court service approximately one day per month and is used infrequently by local theatre groups.

Figure 2.2 Theatre Mall House Youghal

The building footprint is approximately 819.6sq/meters. The construction is of single leaf masonry wall measuring approximately 600mm. All internal walls are solid block with no dry lining. The building has a pitched roof and an un-insulated attic space.

From 2002-2004 the building underwent renovations which included the addition of a glass Atrium on the south side of the building which now serves as a reception area (figure 2.3).

Figure 2.3 Glass Atrium at rear of building

The main entrance is on the north side of the building. All windows are wooden framed with single glazing except for the glass used in the Atrium.

3. On site energy use

3.1 Energy management

The town clerks foreman looks after the day to day running of the building including energy management. He is aware of all the major energy users on the site and is proficient in their operation and control. There is a good level of energy awareness among the staff. Heating is controlled by the foreman while electrical loads such as lights and appliances are all manually controlled by staff. Private contractors provide technical and breakdown support for all building services.

3.2 Breakdown of energy use

Figure 3.1 and 3.2 shows the break down of energy cost and consumption in Mall House, Youghal.

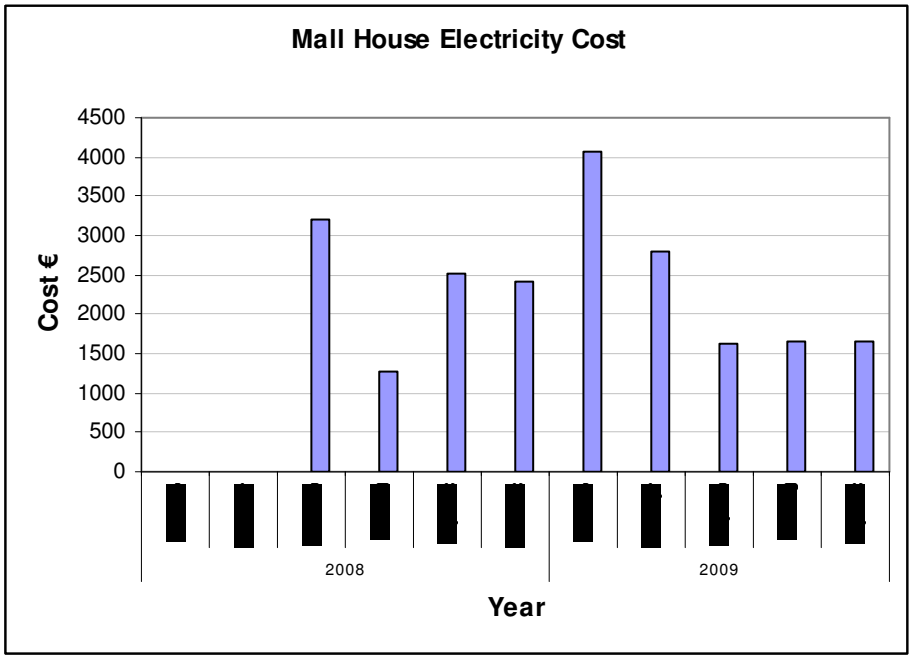

Figure 3.1 Electricity cost in Mall House

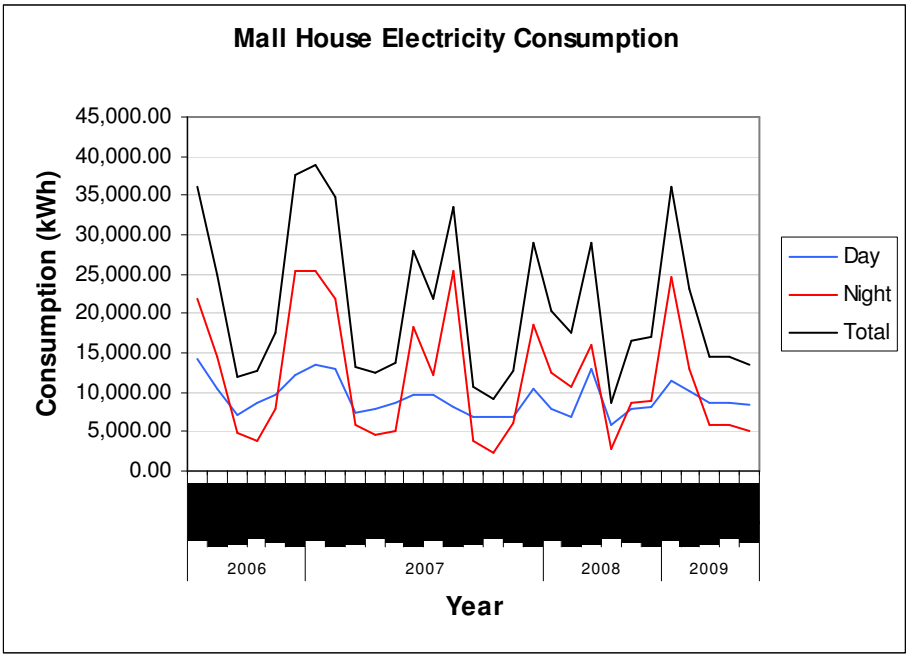

Figure 3.2 Electricity consumption in Mall Housex

3.3 Thermal energy use on site

Electricity is used as the main heating fuel on site. The main heat sources are storage heaters (figure 3.3) apart from the Town Clerks office which has an air conditioning unit (figure 3.4). There are a total of 39 storage heaters in the building. These are programmed to come on by night heating electricity meter. Almost half of these storage heaters are in unoccupied spaces and are normally switched off.

Figure 3.3 Storage heater in office area

Figure 3.4 Air conditioning unit in Youghal area office

The Atrium is heated by under floor heating which is supplied by a vertical bore well geothermal heat pump. The output of the heat pump is controlled by a programmable thermostat on a south facing wall of the Atrium. The heat pump and the storage heater are left on at weekends.

Hot water for sinks and the canteen is provided by two separate electric immersion heaters in the attic. Both are controlled by a time clock (see figure 3.5), the programming of this time clock could not be determined at the time of the site visit.

Figure 3.5 Timers on immersion heaters

There is no mechanical ventilation on the ground floor. During performances mechanical ventilation is provided to the theatre by extraction fans in the theatre ceiling.

3.4 Electrical energy use on site

3.4.1 Electrical loads

There is one electricity account for the whole building. The area engineers office are charged a proportion of the total bill. Both accounts are on general purpose night saver tariff. The electricity is supplied by ESB.

The major electricity use excluding heating is lighting and ICT services. The majority of the lighting in the building is compact fluorescent. Indoor lighting is controlled by switches in the offices. All compact fluorescent lighting in the offices have modern luminaires. There are some old luminaires in the council chambers which use T12 lamps with magnetic ballasts (see figure 3.6).

The large window area to the south side of the building allows for good use of natural daylight in the theatre and the south facing offices.

Figure 3.6 Old T12 fluorescent lighting in the council chambers

3.5 Performance indicators

Performance indicators are used to compare the energy performance of similar buildings. They are calculated by comparing the energy used in a building over a one year period against another common metric. This can be floor area, hours of opening or number of users. The performance indicator for Mall House was calculated using total floor area. This energy performance indicator was calculated using SEI's Display Energy Certificate tool. The office received a D2 rating. A copy of the DEC can be seen in Appendix A .

4. Analysis

4.1 Energy management on site

The building manager has a good level of energy awareness but this could be improved. A number of steps can be taken to improve energy awareness among management and staff including

- All the office heating is done by storage heaters. It is important to educate staff about the proper use of storage heaters. Laminated sheets explaining the operation of storage heaters should be placed close to the heaters.
- Set up of an energy-team led by a designated 'energy champion' to take responsibility for the energy management of the building.
- The Display Energy Certificate should be displayed in a prominent place.

4.2 Thermal energy use on site

- The building has a better than average DEC rating. It is an old building with poor thermal performance which would suggest poor a poor rating. Much of the building (1^{st}floor) is not heated throughout the year which improves the energy rating.
- All of the storage heaters in unoccupied spaces of the building such as the threate, dressing rooms, green room and entrance hall are switched off when not in use. This shows a good level of energy awareness and good energy management.
- The storage heaters in the town council offices and area engineers offices are heating the building at weekends when the offices are unoccupied. Time clocks can be fitted to the night storage heating circuits to turn off storage heaters off on Friday and Saturday night. This can save 28% on the cost of heating the offices. The measure has been carried out in four other council offices to good effect.
- The control of the hot water heating is not well understood. An electrician should be consulted in to clarify how the timers are programmed and instruct the town foreman on how to change the time scheduling of the immersion heaters.
- Given the age of the building there is little that can be done to reduce heat loss though the walls and windows.
- The Atrium in the building makes excellent use of passive solar gain. In the summer months the passive solar gain is sufficient to heat the building which means large energy savings.

4.3 Electrical energy use on site

- At present Mall House is on the correct electricity tariff and this cannot be changed.
- The electricity account should be switched to an alternative supplier such as Energia. This will save 10% on the cost of electricity.

- Most of the lighting and luminaries in the offices are modern and not in need of replacement with the exception of those in the council chambers.
- The lighting in the council chambers is old and inefficient. The T12 fluorescent tubes should be replaced with modern T8 fluorescent tubes. This will not yield significant savings as the council camber is occupied infrequently. The more cost effective solution would be to replace the old lamps upon failure with more modern alternatives.
- The toilets are an ideal place to install occupancy sensors as they are occupied infrequently.

5 Recommendations

There is good scope to reduce energy use at Mall House, Youghal at minimal cost. The opportunities for energy and cost savings can be seen in the table below divided into low cost and medium cost measures. Low cost measures are inexpensive and will not require professional trades or labour. It is recommended that they are carried out immediately. Medium cost measures require some capital expenditure and professional trades to install.

Low Cost Measures				
		Capital Cost (€)	**Savings**	**Payback**
1	Energy awareness aimed at staff	None	Not calculated	n/a
2	Switch electricity supplier to Energia	None	10% on electricity bill	n/a
3	Investigate timing of immersion heaters	None	Not calculated	n/a

Medium Cost Measures				
		Capital Cost (€)	**Savings/anum**	**Payback**
1	Place seven day timers on storage heating circuit for offices	€600	€1,435[1]	3 months
2	Replace T12 twin fluorescent lights in council chambers with T8 energy efficient alternatives upon failure	€5/lamp	8% savings[2]	n/a
3	Occupancy sensors in the toilets	€400	Not Calculated	n/a

[1] Assuming storage heater are switched off on Friday and Saturday night
[2] SEI Building Energy Managers Resource Guide

Appendix A – DEC Mall House