Cork County Energy Agency

Energy Audit

Midleton Library

December 2009

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1. Introduction

The purpose of this energy audit is to provide accurate information on energy use in Midleton Library. 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 and medium cost measures.

2. Site description

Midleton library is located on the main street of Midleton town. The library is located in a heritage building that was formerly a market house which was built in 1798. Later it was used as a town hall before its current use as the town library.

The public library and staff offices are housed on the ground floor of the building. The first floor is currently vacant. The library is open to the public six days a week between the hours of 9:30am to 5pm.

Figure 2.1 Midleton library building

The building footprint is approximately 324m^2. The façade is constructed of cut limestone and the perimeter walls are single leaf masonry of unknown width. All internal walls are timber frame partition walls with no insulation.

The main entrance and façade of the building is north east facing. There are five bays on the façade of the building which have single glazed windows.

3. On site energy use

3.1 Energy management

The head librarian looks after the day to day running of the building including energy management. She is aware of all the major energy users on site and understands how they are controlled.

Heating is controlled by the head librarian 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 Thermal energy use on site

Electricity is the main heating source on site. The building is heated by three fan assisted storage heaters each with a rated heat output 10kW (figure 3.1). The heat output of each storage heater can be regulated on the control panel of the storage heater. The storage heaters are not under the control of a seven day time clock. One of the storage heaters has thermostatic control. A smaller storage heater provides heat for the store room. Heating for the canteen is done by electric element convection heater.

Figure 3.1 Storage heating unit

Hot water for sinks in the canteen and the wash room is provided by electric under sink heaters.

Fans in the skylights provide mechanical ventilation for the library (figure 3.2). These are controlled by switches on a control panel but are not in regular use.

Figure 3.2 Ventilation fans in ceiling

3.3 Electrical energy use on site

The main electrical load on site apart from the storage and hot water heaters is the lighting.

The majority of the lighting in the building is 5' T8 compact fluorescent tubes with modern luminaires. All indoor lighting is controlled by switches in the main library building. The estimated total load of the lighting is 5.76kW.

The account is on general purpose night saver tariff. The town council electricity is supplied by Energia. Electricity cost and consumption can be seen in figure 3.2 and 3.3.

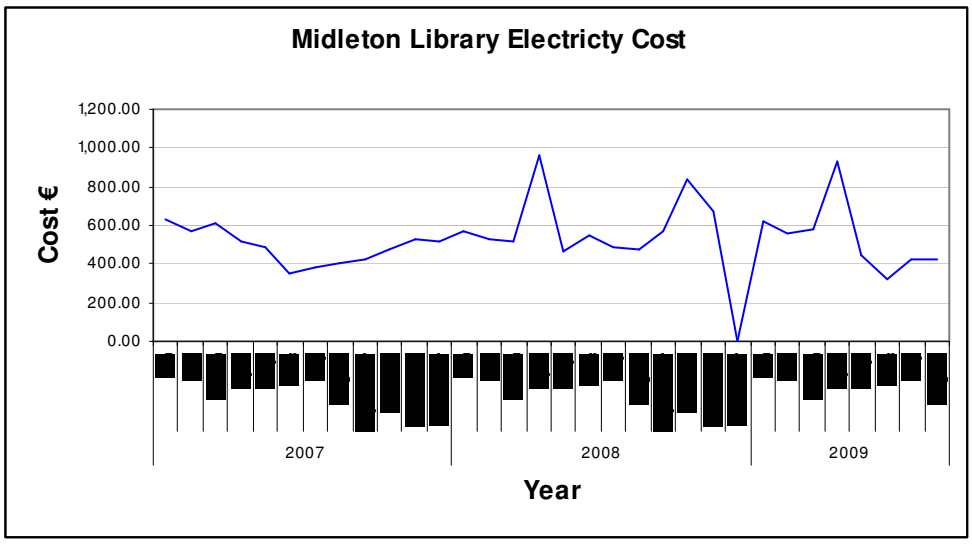

Figure 3.2 Midleton Electricity Cost

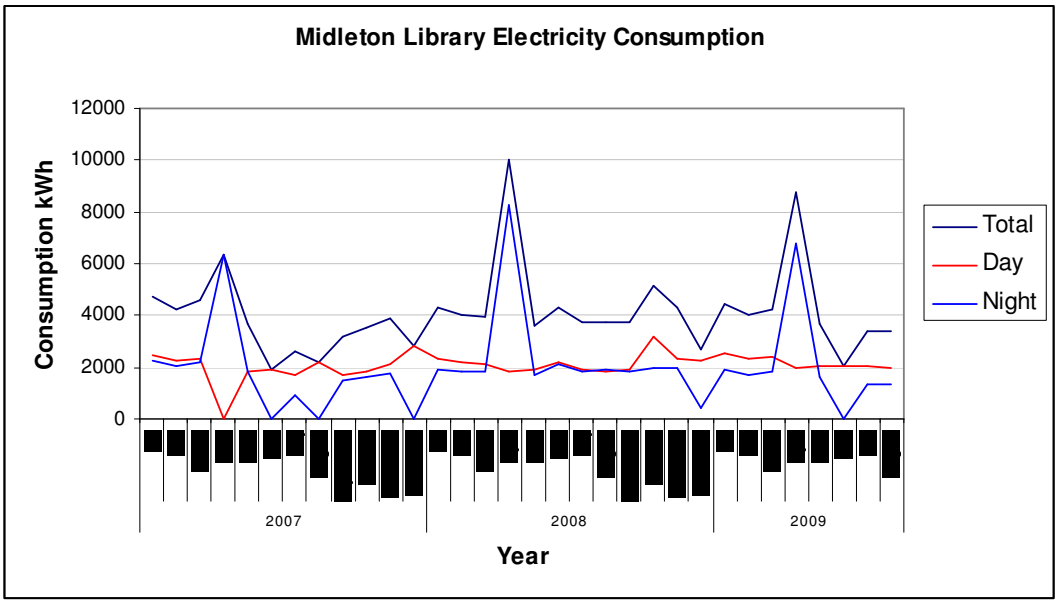

Figure 3.3 Midleton Electricity Consumption

Due to the inaccessibility of the electrical supply panel it was not possible to sub meter different circuits within the building to determine the breakdown of electricity use on site.

3.4 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 Midleton library office was calculated using total floor area. This energy performance indicator was calculated using SEI's Display Energy Certificate tool. The library received a E1 rating. A copy of the DEC can be seen in Appendix A.

4. Analysis

4.1 Energy management on site

The staff have a reasonable 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

- Display the Display Energy Certificate (DEC) in a prominent place.
- Inform the staff of good housekeeping, turning off the under sink heaters at night and at weekends, turning off the convector heater in the staff room when not required.

4.2 Thermal energy use on site

- While the electric storage heaters provide an effective heating system they are not required when the library is closed on Sunday. Switching them off would require a seven day timer to be fitted to the heating circuit.
- The manager should be aware of the use of under sink heaters for hot water heating. If left on overnight and at weekends these heaters are being used excessively. The ideal solution is to fit an electronic timer to the heating circuit.
- Given the age of the building there is little that can be done to reduce heat loss though the building fabric that would not involve major building refurbishment.
- The windows on the façade of the building are a big source of heat loss in the building. The only option would be to replace the existing windows and frames with new frames and double glazed glass panels. Given the cost and disruption to the building this is impractical.

4.3 Electrical energy use on site

- At present the library is on the correct electricity tariff and this cannot be changed.
- The electricity is supplied by Energia as part of Cork County Councils group account which means a discount of 10% on the standard ESB tariff.
- The lighting and luminaries in the library are modern and do not need replacement. There are more energy efficient lights and luminaries now available could potentially reduce lighting costs by 50%. The most cost effective way to approach this changeover is to replace the old lights and luminaries upon failure with new T5 fluorescent lamps and more effective luminaires.
- There are a number twin fluorescent lights at the front of the building with magnetic ballasts. These should be replaced with high frequency electronic ballasts upon failure.
- Some consideration was given to the use of occupancy sensors. This is most cost effective when a switch controls a bank of lights in an infrequently occupied room.

This situation does not present itself in the Midleton library as the store room and office only have a small number of lights giving a longer payback period.

5. Recommendations

There is some scope to reduce energy use at Midleton library. These 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	None	n/a

Medium Cost Measures				
		Capital Cost (€)	**Savings/anum**	**Payback**
1	Place a seven day timers on the under sink heater	€150	€91.98[1]	1.5 years
2	Replace all twin fluorescent lights with energy efficient alternatives upon failure	€100/fitting	€5.76.anum/luminaire[2]	n/a
3	Place seven day timer on night storage heating circuit	€300	€274.43[3]	1 year

[1] Assuming (0.1kW*8750hrs)*70% = 3066kWh @ 15c/kWh = €91.98
[2] Replacing 74W T8 twin fluorescent with 58W T5 twin fluorescent over 48hr week for 1 year @0.15c/kWh
[3] Assuming timer reduced night units by 14% @ 0.0844c/kWh

Appendix A – Display Energy Certificate