# Cork County Energy Agency



# **Energy Audit**

Youghal Library

December 2009

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# 1. Introduction

The purpose of this energy audit is to provide accurate information on energy use in Youghal 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

Youghal library is located is located in Rivergate shopping centre in the centre of Youghal town. The library premises consists of a public library, staff room, wash rooms and upstairs book store. The library is open to the public five days a week from Tuesday to Saturday between the hours of 9:30am to 5pm.



Figure 2.1 The façade and interior of Youghal library

The building footprint is approximately 259.01 sq/meters. The façade is a wooden framed shop front (figure 2.1). All internal walls are solid block. The premises has one section of exterior wall on the south east side of the building. The book store is located above the main library.

## 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.

The 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 used as the main heating source on site. The building is heated by two fan assisted storage heaters each with a rated heat output of 10kW (figure 3.1). The heat output is regulated by a control panel on each heating unit. The three storage heaters are controlled by a seven day time clock.



Figure 3.1 Storage heating unit

Smaller electric element heaters are used to provide heat to the bath rooms and canteen (figure 3.2). These heaters have built in time-clock that can be programmed.



Figure 3.2 Electric heaters in bathroom

Hot water for sinks in the canteen and the wash rooms is provided by electric under sink heaters (figure 3.3). The heaters in the male toilets are turned off as there are no male staff.



Figure 3.3 under sink heater in bath room

An air conditioning unit (figure 3.4) provides ventilation for the main library building. This is controlled by a control panel on the wall. The unit is not in regular use.



Figure 3.4 Air conditioning unit

#### 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 main building and store room is compact fluorescent. These are controlled by switches on the walls. Most of the lighting used in the building twin T8 compact fluorescent tubes with modern luminaires. Some of the lighting at the entrance of the building uses energy efficient T5 compact fluorescent. The estimated total load of the lighting is 4kW.

Youghal Library Electricity Cost 1200.00 1000.

The account is on general purpose night saver tariff. The electricity supplier is Energia. Electricity cost and consumption can be seen in figure 3.5 and 3.6.



2007

Youghal Electricity Cost

2008

Year

2009



Figure 3.6 Youghal library electricity consumption

At the time of the site visit it was not possible to locate the control panel and hence 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 Youghal library was calculated using total floor area. This energy performance indicator was calculated using SEI's Display Energy Certificate tool. The library received an E1 rating. A copy of the DEC can be seen in Appendix A.

## 4. Analysis

#### 4.1 Energy management on site

The staff has some 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, turning off the electric heaters in the staff room and canteen.
- Placing laminated instructions on the side of the electric storage heaters.
- Teach staff how to program the time clocks for the storage heaters.

#### 4.2 Thermal energy use on site

- While the electric storage heaters provide an effective heating system their use could be controlled better to reduce energy costs. The storage heaters are the largest energy users on site as can be seen from the night units in figure 3.5. There is a seven day timer fitted to the heating circuit. The heaters should be programmed to switch off for the two days that the building is unoccupied. This would save 28% in the cost of heating. At the time of the visit it was not possible to determine how the storage heaters were programmed.
- This model of storage heater can be fitted with an external thermostat. This varies the speed of the fan according to room temperature. This would make the units more efficient by preventing overheating.
- The staff should be made aware of the use of under sink heaters for hot water heating. If left on overnight, at weekends and holidays these heaters are being used excessively. The ideal solution is to fit an electronic timer to the circuit to switch them on during office hours.
- There is little that can be done to reduce heat loss in through the walls and the windows and given that this is a rented property it is unlikely that any building upgrades will take place.

#### 4.3 Electrical energy use on site

- At present the area office is on the correct electricity tariff and this cannot be changed.
- The lighting and luminaries in the library are modern and are not in need of replacement. There are more energy efficient lights and luminaries now available that could potentially reduce lighting costs by 20%. 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 luminaries. The library already has a number of these lamps near the entrance.

- The store room is an infrequently occupied room where one switch controls a number of lights. This presents an ideal opportunity for the use of presence detectors. This would give a good payback due to the large number of light fittings on this circuit.
- Presence detectors would also be suitable for the toilets and canteen area however the payback period would not be as favourable as the store room due to the number of lights in the toilets.

## 5. Recommendations

There is some scope to reduce energy use at Youghal 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	Not calculated	n/a			
2	Program timer on storage heaters to switch off two days per week	None	€826 <sup>1</sup>	n/a			
3	Place laminated instructions of how to use storage heaters on unit	None	Not calculated	n/a			

Medium Cost Measures							
		Capital Cost (€)	Savings/anum	Payback			
1	Place (2) seven day timers on all under sink heaters	€250 <sup>3</sup>	€183.75 <sup>2</sup>	< 1 year			
2	Presence detectors in store room	€200 <sup>3</sup>	€0.28/hr unoccupied <sup>4</sup>	< 2 years			
3	Presence detector in canteen and toilets	€300 <sup>3</sup>	Not calculated	< 2 years			
4	Replace all twin fluorescent lights with energy efficient alternatives upon failure	€100/unit	€2.56/fitting <sup>5</sup>	1.4			
5	Replace lights in canteen with energy efficient alternatives	€250	€20.16 <sup>6</sup>	< 2 years			
6	Place thermostats on each storage heating unit	€400 <sup>3</sup>	Not calculated	n/a			

<sup>&</sup>lt;sup>1</sup> Assuming timer reduced night units by 28% @ 0.0844c/kWh

<sup>&</sup>lt;sup>2</sup> Assuming (0.2kW\*8750hrs)\*70% = 1225kWh @ 0.154c/kWh = €183.75

<sup>&</sup>lt;sup>3</sup> Estimate

Store room lights 16 T8 X 120W @ 0.154c/kWh = 0.28c/hr

<sup>&</sup>lt;sup>5</sup> Based on running T8 36W twin fluorescent VS T5 28W twin fluorescent over a 35hr week

<sup>&</sup>lt;sup>6</sup> Based on replacing T8 26W twin fluorescent with T5 14W single flourescent

# Appendix A – Display Energy Certificate

