CARBON FOOTPRINTING AND ENERGY EFFICIENCY AUDIT

Conwy Golf Club

Produced on Behalf of The R&A, EGU and GUW

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1.0 INTRODUCTION

The STRI Ecology and Environment Unit have been commissioned by The R&A, The English Golf Union and The Golf Union of Wales to undertake a carbon footprinting and energy efficiency audit of three golf clubs in England and Wales: Alresford Golf Club in Hampshire; Conwy (Caernarvanshire) Golf Club in North Wales and Woodhall Spa Golf Club in Lincolnshire.

These three clubs were chosen to represent elements of Heathland, Parkland, Downland and Links golf courses, with buildings built between 1905 and 1998, to ensure that a wide range of golf club set ups were covered. The clubs are also at different stages in their energy management.

The energy efficiency and waste management advice given during the project should help the clubs to save energy, reduce waste and greatly reduce their overheads. In doing so, the carbon emissions from the clubs should also decrease, reducing their contribution to climate change. The reports are available for other golf clubs to look at on The R&A, EGU and GUW websites, alongside a 'Carbon Calculator' which will allow clubs to enter simple utility and energy data and gain an estimate of their own carbon footprint.

2.0 CONWY GOLF CLUB

Conwy Golf Club was established in 1890. The club supports an 18 hole links golf course situated along the Caernarvanshire coastline. The Club has a membership of 620 playing members plus a further 400 'social' (non-golfing) members with an estimated annual footfall of 9000.

The original clubhouse was demolished and replaced with a new construction in 1996. As a result, the building is reasonably efficient, being fitted with cavity wall insulation, a good depth of roof insulation and double glazed windows throughout. The building is also however fitted with energy demanding devices including air conditioning, an elevator and automatic entrance doors.

The Clubhouse is fed by mains water and central heating is fuelled by natural gas. Paper and glass waste is recycled by external contractor.

There are a series of maintenance buildings at Conwy, constructed between approximately 1975 and 1995. These are fairly basic constructions with little in the way of insulation however the office and canteen areas are fitted with double glazed windows. Bottled gas cylinders fuel blow heaters within the maintenance facility. The water supply for the maintenance facility is sourced from the mains whereas golf course irrigation water is drawn from a borehole.

Oil filters, aerosol cans, chemical containers and batteries are all recycled and some on-course waste is composted.

3.0 METHODOLOGY

There are two elements to the carbon and energy audit: i) a high level carbon audit which allowed considerations of all energy use and waste produced by the golf club and ii) a more detailed assessment of equipment and energy use across each area of the clubhouse and golf course management.

3.1 CARBON FOOTPRINTING

The carbon footprint of the golf clubs estimates the total set of greenhouse gas emissions caused directly and indirectly by the golf club in one year. These emissions come from electricity use, central heating, fuel for course maintenance equipment and the treatment of waste and wastewater.

3.1.1 Scope of the carbon footprint

An important stage at the start of any audit is to determine the scope of the project, i.e. what data are ideally required and what can be achieved given time, cost and quality constraints. A golf club is a complex business with multiple energy sources and operations occurring across the golf course and within the various elements of the clubhouse.

The golf club audits follow the recognised methodology set out in *The Greenhouse Gas Protocol*, produced by the World Business Council for Sustainable Development and the World Resources Institute, which uses 'control' (either financial or operational control over operations) as a means of defining a boundary for the scope of an audit. This assumes that the aim of the audit is to reduce emissions where the golf club has direct control and not to undertake a complete life cycle assessment (LCA) of all the operations relating to the golf club. Under this remit, the audit will consider lighting, heating, general energy use and waste produced from the following areas of the golf club operations: bar/restaurant, offices, changing rooms, toilets/showers, the pro shop, the maintenance compound, and maintenance of the golf course. However, operations and travel outside of the golf clubs direct control but necessary for the golf club to function (e.g. the extraction of raw materials, the production of machinery, processing of foodstuffs, chemicals, sand, etc. and travel undertaken by delivery vehicles and staff and member travel) will be excluded from the audit. The audit will not consider the carbon sequestration potential of the golf course land.

3.1.2 Data collection

Data for the carbon footprint was obtained from several sources:

1. Observations and quantitative measurements by STRI during visits to the golf clubs in April 2009.
2. Questionnaires responses from selected golf club staff.
3. Utility bills and fuel receipts held by the golf clubs
4. Published 'conversion factors' used to estimate the CO_2e emissions arising from energy use, water use and waste disposal

3.1.3 Carbon conversion

The energy used and waste produced by each golf club was converted to metric tonnes of carbon dioxide (t CO_2e) using *The 2009 Guidelines to Defra/DECC's GHG Conversion Factors for Company Reporting* (Defra and DECC, 2009). Metric tonnes of carbon dioxide were used as a cross-disciplinary unit, which allows direct comparisons between different operations and allows different operations to be aggregated to provide an overall footprint for the selected operations.

3.2 ENERGY ASSESSMENTS

An energy assessment of each individual area of the club's operations, across the clubhouse and greenkeeping facilities was made during the site visit. This involved measuring the energy used by electrical appliances and lighting, checking the fabric of each building and observing operational practices.

Within each area, the energy consumption of each piece of electrical equipment was considered in terms of the likely electricity use and monetary cost across one year. Usage times for equipment in each area was calculated based on the assumptions described in Table 1. The annual cost of running each item of equipment was calculated by multiplying the annual kWh energy consumption by an average electricity cost for electricity in 2008 of £0.083 (based on the electricity rate from electricity bills in December 2008).

Table 1 Assumptions used to estimate usage times for equipment in each area of the club's operations.

Description of annual usage	Assumed hours
Equipment in constant use, e.g. fridges and freezers	24 hours per day, 365.25 days a year = 8766 hours per year
Equipment within main frequently used clubhouse areas (e.g. bar, lounge, locker rooms, hallways, etc.) and in constant use during opening hours	15 hours per day, 365.25 days a year = 5479 hours per year
Equipment within kitchen areas and in constant use during staff hours	10 hours per day, 365.25 days a year = 3653 hours per year
Equipment within the secretary's office and in constant use during staff working hours	8 hours per day, 260 days a year = 2080 hours per year
Equipment within greenkeeping areas and the pro shop and in constant use during staff working hours	8 hours per day, 365.25 days per year = 2922 hours per year
Equipment not in constant use	Estimated on an individual basis, e.g. electric showers assumed 3 hours per day, 365.25 days a year = 1096 hours per year

4.0 THE CLUBS CARBON FOOTPRINT

The carbon emissions produced by Conwy Golf Club in 2008 totalled 221.2 metric tonnes of CO_2e[1]. This roughly equates to the CO_2 emissions generated by 41 company cars over one year, to the methane emissions generated by 73 cows over one year or the average CO_2 emissions generated in 13 minutes and 55 seconds by a conventional coal-fired power station[2].

[1] Expressing greenhouse gas emissions as CO_2e or 'carbon dioxide equivalent' allows greenhouse gases other than carbon dioxide to be considered, e.g. methane and nitrous oxide. Each of the various greenhouse gases have a different Global Warming Potential (GWP) per kg (a measure of their effect on global warming) and for comparison purposes the quantity of these gases released during a process are generally expressed as their carbon equivalent. For example, 1 kg of methane gas has the same global warming impact as 21 kg of carbon dioxide.

[2] Data on equivalent emissions was obtained from UNEP (2008) and Carbon Footprint (2009).

Table 2 below provides a breakdown of the elements contributing to this figure. The negative value within the commercial clubhouse waste column is a result of Conwy's current recycling initiatives. These recycling initiatives have resulted in 10.12 tonnes of carbon dioxide emissions from other sources at the club being offset.

Table 2 Carbon footprint of Conwy Golf Club for 2008 (based on the methodology described in section 3.1

Footprint element	Quantity	Conversion factor	kg CO_2e	% contribution
Gas (kWh)	284708.0	0.18396	52266.7	23.6
Electricity (kWh)	247717.1	0.504418	124953.0	56.5
Petrol (litres)	1263.4	2.6694	3372.5	1.5
Diesel (litres)	11701.8	3.0289	35443.6	16.0
Water supply mains (m^3)	1675.4	0.276	462.4	0.2
Waste water treatment (m^3)	1591.6	0.693	1103.0	0.5
Borehole water (m^3)	4680.2	0	0	0
General waste (tonnes)	45.0	305	13712.3	6.2
Card/paper recycling (tonnes)	5.4		-3832.6	-1.7
Glass recycling (tonnes)	13.3	0	0	0
Can recycling	0.7	-713	-6297.2	-2.8
Total			221183.7	

Total carbon footprint in 2008 = 221.2 tonnes

The figures in Table 2 represent Conwy Golf Clubs overall carbon dioxide emissions as determined from the club's utility bills for 2008. The next stage of the carbon audit is to provide an area by area evaluation of the clubhouse, pro shop and maintenance facility to identify the main contributors to Conwy's figure of 221.2 tonnes of carbon dioxide produced per year.

5.0 THE CLUBHOUSE – ROOM BY ROOM OBSERVATIONS AND RECOMMENDATIONS

Naturally, the clubhouse is a major contributor to Conwy Golf Club's carbon footprint. As this building is the sole area for administration, member socialising and formal events, the demands on resources are inevitably wide ranging and frequent.

For the purposes of this study, the clubhouse at Conwy has been divided into the following sections:

Kitchen
Bar plus beer cellar
Dining area
Offices
Committee room
Snooker room
Changing rooms

The following text comments on energy-demanding equipment within these areas, along with recommendations for their use or replacement. Day-to-day operational practices are also reviewed with recommendations made on how these can become more efficient.

5.1 KITCHEN

The kitchen contains a range of high energy equipment necessary for the storage and preparation of food.

The fridges and freezers are the main high energy pieces of equipment which must be constantly switched on. There is no scope to reduce the usage of these freezers though savings could be made be replacing inefficient equipment. Older equipment is considerably less efficient than new equipment and the cost balance is often such that new appliances will pay for themselves through electricity savings in a relatively short space of time. For example, freezers that are more than 10 years old will use electricity constantly, even when inactive, whereby newer models will only use energy when actively cooling.

Fridges and freezers aside, the majority of equipment within the kitchens at Conwy Golf Club can be switched off when not in use. It was noted during STRI's site visit that the club's spider burners were left on constantly throughout opening hours. Switching off microwave ovens at the mains when not in use would also result in a small energy saving.

Heating is not required in the kitchen due to the waste heat from kitchen appliances.

The following table summarises the findings and potential solutions for issues arising in the kitchen and associated areas:

Issue	Solution
Equipment left on or on-standby when not in use	Turn equipment off when not in use. Employ "switch me off" stickers as reminders
Some appliances are dated and consume large amounts of power	Replace ageing appliances with new energy efficient models.

5.2 BAR AND BEER CELLAR

The main bar at Conwy Golf Club serves all users of the main lounge/dining areas and is open 7 days a week.

Table 1 – Appendix 1 lists the electrical equipment within the bar. There are a series of energy demanding pieces of equipment within the bar areas including three bottle fridges which were purchased at least 15 years ago and are therefore likely to be inefficient; a dishwasher and air conditioning unit. It is crucial that all non-essential equipment is switched off when not required and regarding the bottle fridges it would be advantageous to fit timer devices to these appliances which negates the need for them to be switched on 24 hours a day. A timer that ensures the contents of the fridges are sufficiently cool by the time of the bar opening, would contribute significantly to reducing energy demand within the bar area. It is estimated that switching fridges off between the hours of 12am and 7am would result in a saving of approximately £40 per year.

There are a number of ring and spotlights in the bar area and these should be replaced with more energy efficient varieties. Lighting in the bar alone currently costs the club approximately £752 per year. The installation of LED lighting could potentially reduce this figure tenfold.

The cellar area is home to the drinks pumps, carbonating machine, soda re-circulating machine and freezer. The room is kept at a constant 12 °C by an electronic refrigeration unit. The site visit revealed a significant gap in the main double doors of the beer cellar, leading directly outdoors. This poor insulation was resulting in the refrigeration unity being overworked, therefore consuming more electricity than necessary. Installation of a well sealed door will significantly improve the insulation in this area, therefore allowing the refrigeration unit to work more efficiently.

Issue	Solution
Equipment left on or on-standby when not in use	Turn equipment off when not in use. Employ "switch me off" stickers as reminders
Halogen spotlights currently fitted	Install LED lighting
Bottle fridges left on 24 hours a day	Fit timers to ensure fridges are only on when required.

5.3 DINING AREA

Table 2 (Appendix 1) highlights all equipment in the dining area and its estimated cost to the club. The large dining area at Conwy Golf Club is fitted with partitions which can divide the room into four smaller functions. It is not known how frequently these partitions are used, but at the time of the STRI site visit the room was fully open, despite there being a low number of people using it. It is recommended that the room be divided into sections as frequently as possible, dependent upon expected number of occupants. By dividing the room into sections, one or more sections can be off limits at any one time and therefore will not require heating or lighting.

Heat within the dining area is supplied through elevated heating ducts. The elevated location of these heating ducts is questionable given the premise that heat rises.

The dining room is an efficient location. There are a total of 18 double glazed windows which not only provide good insulating properties but also are maximising the input of natural light into the room. Interior lighting has a wide range of differential controls and dimmers and these were being used to good effect during the time of STRI's visit with only the minimum required lighting on at any one time. Lighting in the dining room is however costing the club in excess of £1000 per year. The installation of low energy light bulbs would reduce this figure considerably. Replacing the halogen spot lights with LED's would have a significant effect on cost.

Issue	Solution
Room partitions not used to full effect	Ensure room is divided to the minimum appropriate size thereby reducing the area requiring heating and lighting.
Inefficient lighting	Replace all incandescent bulbs and halogen spot lights with energy efficient varieties

5.4 OFFICE

The office at Conwy Golf Club is home to a wide variety of electrical equipment (this is detailed in Table 3 of Appendix I). Much of this equipment was found to be left on or on standby when not in use. The annual cost of electrical equipment in the office is thought to be £245. If all none essential equipment was switched off during a lunch hour period for example this would result in an annual saving of approximately £30 per year. Switching off equipment left on standby overnight would further add to this saving.

During STRI's visit the office was found to be excessively warm (22^{o}C). Reducing the thermostat setting by 3-4^{o}C will result in a considerable cost and energy saving.

Issue	Solution
Large amount of electrical equipment, some left on/on standby when not required	Ensure appliances are switched off at the mains at night, and when not required during the day
Room heated excessively	Reduce thermostat setting by 3-4^{o}C

5.6 LOCKER ROOMS/TOILETS

Table 4 (Appendix 1) lists electrical equipment within the club's locker rooms. All locker rooms and toilets within Conwy Golf Club were found to have reasonably good insulation with double glazing and well fitted doors. It was noted during STRI's visit that the temperature of certain areas, in particular the gents locker room and the ladies toilets was quite excessive and that the thermostatic radiator controls were set to maximum. Reducing the temperature to between 18 and 19^{o}C would result in considerable savings during the course of the year. There is an overriding need within all locker rooms and toilet facilities at Conwy Golf Club to install both energy efficient lighting and motion centres to ensure lights are only in operation when required. It was noted that lights were left constantly on in many of the locker room and toilet areas. It may also be beneficial to consider light level sensors for areas where there is ample natural lighting during daylight hours.

The Club supplies both paper towels and electric hand driers within the locker rooms. **Each** hand dryer is thought to cost the club approximately £227 per year. This cost should be compared with the cost of paper towels and a decision made as to which of the two options to retain.

The 8 showers provided at Conwy cost the club an estimated £6000 per year. Highlighting this to the membership/ visitors through signage and perhaps web notifications and encouraging the length of showering to be kept to a minimum would help reduce the considerable financial burden of these appliances

Issue	Solution
Lights on when room unoccupied	Motion sensor / signage / introduce "light monitor" personnel.
Showers demand considerable amounts of energy	Educate users and encourage length of showers to be kept to a minimum
Some inefficient light bulbs remain	Replace all incandescent bulbs with compact fluorescents. Replace halogen spotlights with LEDs
All lights on during day despite good natural lighting	Fit light level sensors and utilise flexible lighting
Both paper towels and hand dryers available	Provide only one hand drying option

5.6 COMMITTEE ROOM

The committee room contains double glazing throughout, differential light controls and thermostatic controls on the radiators. It was noted during STRI's visit that the room was kept at an excessive temperature of 20°C with thermostats set to maximum. Crucially it was noted that a window was open whilst the heating was on, highlighting the excessive temperature.

All lights should be replaced with energy efficient varieties and signage should be employed to ensure that lights are switched off once the room is vacated.

Issue	Solution
Heating left on when rooms not in use and room heated to excessive levels	Ensure thermostatic radiators are switch off unless room is to be used. Assign responsibility for this. Reduce thermostat setting when in use
Lighting inefficient	Install low energy bulbs and assign "light monitor" to ensure lights are switched off when room is vacant

5.7 SNOOKER ROOM

The snooker room at Conwy Golf Club was not being used on the day of STRI's visit. Despite this the room was being heated to an excessive temperature of 22ºC. Given the sporadic usage of the snooker room this area should be kept at a relatively low temperature until in use at which time heating can then be increased.

Issue	Solution
Heating left on when rooms not in use and room heated to excessive levels	Ensure thermostatic radiators are switch off unless room is to be used. Assign responsibility for this. Reduce thermostat setting

5.8 PRO'S SHOP

Table 5 (Appendix 1) lists electrical equipment within the pro's shop and its estimated annual cost. The pro's shop at Conwy Golf Club requires a great deal of light to showcase the golf and products on sale. In addition to the eighteen fluorescent strip lights within the pro's shop there are a total of twenty eight halogen spot lights. LED spot lights use considerably less energy than halogen spot lights and the installation of LED's would result in a significant saving. It is important to note however that LED bulbs and halogen bulbs should not be mixed in the same lighting array and a new transformer may be required to ensure compatibility with the LED lights. The halogen spotlights in the pro's shop are costing the club approximately £272 per year. The installation of LED's would potentially reduce this figure ten fold.

During the onsite inspection it was noted that a number of pieces of equipment were left on or on standby when not required within the pro's shop. Items such as the television and DVD player should be switched off at the mains when not required.

The drinks cooler within the pro's shop, like the chillers in the bar area, should be fitted with activation timers to reduce their energy demands.

Issue	Solution
Some inefficient light bulbs remain	Replace all halogen spotlights with LED's
Large amount of electrical equipment – much left on when not required	Ensure all equipment is off at mains when not in use. Assign responsibility
Drinks cooler on 24 hours a day	Fit timers to ensure cooler only operational when necessary

6.0 GOLF COURSE MAINTENANCE

As the highest energy user at a golf club attention is generally focussed on the clubhouse, however energy, cost and carbon savings can be made through changes to golf course maintenance practices and facilities.

6.1 MACHINERY USE

The diesel receipts for the club show that 1201 litres of diesel were delivered to site in 2008. Petrol is also used for small items of equipment and bought in small jerry cans (1263 litres for 2008). This fuel is used exclusively to run course maintenance vehicles. The use of these vehicles is essential to maintain the golf club and it is unlikely that use can be reduced significantly. However, some simple measures could be implemented to reduce fuel consumption:

- Ensure vehicle tyres are correctly inflated to maximise fuel efficiency
- Schedule work tasks so that work requiring the same vehicle or piece of equipment can be completed together and in similar areas of the course to reduce unnecessary travel between tasks and multiple trips to and from the storage sheds
- Consider fuel efficiency when purchasing new equipment or replacing old equipment
- Do not leave transport vehicles idling when completing work on site
- Evaluate mown areas of the golf course. Do all areas currently mown need to be? Could some areas be managed as tall rough? Reducing mowing frequency in these areas reduces fuel use and can also have wider environmental benefits.

6.2 IRRIGATION AND WATER USE

The golf course at Conwy is served by an automatic irrigation system with water entirely sourced from a borehole. Using borehole water is considerably more cost and carbon efficient as there are no sewage or treatment charges associated with it.

The irrigation system has recently been upgraded with new pumps and pipes and as such is running efficiently. This system does however require a considerable amount of energy to pump extracted water across the golf course.

Saving water on the golf course will save the club money in terms of electricity use. Several measures for reducing water use could be adopted:-

- Consider hand watering of greens and high spots to reduce the need for irrigation.
- Check sprinkler heads and pipes frequently to improve resource efficiency.
- Irrigate the golf course based on weather conditions, i.e. to replace water loss through evaporation rather than routinely irrigating or irrigating on the basis of time rather than water lowering.

- Install correct sprinkler heads for the situation, e.g. 180º sprinkler heads at the edge of maintained areas that reduce overflow of water to none target areas.
- Consider grass species within playing surfaces such as tees and greens and perhaps switch to more drought tolerant species.
- In addition to the fuel use, machinery also requires energy as part of the daily cleaning routine. The maintenance machinery at Conwy Golf Club is washed down using a mechanical water recycling unit. This unit effective plans its wash down water removing chemical residues and nutrients and as the water is recycled also reduces the amount of water required by the club each year. However the recycling unit does require a constant supply of electricity to sustain the microbes using the system and this constant energy use may be significant when considered on an annual basis. However quantifying this energy consumption on site was not possible as this would have required temporarily switching the unit off.

6.3 MAIN GREENKEEPING FACILITY

The main maintenance shed at Conwy comprises a machinery storage area, office and canteen. Table 6 (Appendix 1) lists equipment within these areas and its estimated annual cost. Lights were found to be switched off in the main machinery storage area when vacant and this area was not being heated as the main doors were generally left open during working hours. Windows in both the office and canteen are double glazed and heating is supplied from an electric plug in heater. It was observed during STRI's site visit that this heater was in use and that a window had been left open resulting in a considerable waste of energy.

Incandescent light bulbs were fitted within the office canteen and toilet and these should be replaced with compact florescent alternatives. The office and canteen contain high energy consuming equipment including a computer, printer, microwave and toaster. Electrical equipment within the office and canteen costs a total of £328 per year. Switching equipment off when not required would reduce this figure markedly.

The maintenance facility also contains a shower room fitted with an electric power shower. Electric power showers are extremely demanding in terms of energy requirement and is one of the most power consuming appliances fitted within the maintenance facility. It will be important to make potential users of the shower room aware of this fact and perhaps through signage encourage them to keep their length of shower to a minimum.

Issue	Solution
Power shower is extremely energy demanding	Encourage users to keep length of shower to a minimum.
Equipment in offices/kitchen left on standby when not in use	Ensure all equipment is switched off at mains when not required
Office heated excessively whilst windows left open	Ensure electric heater is switched off when not required

7.0 CONCLUSIONS

The carbon and energy audit provides a detailed assessment of the various facets of the golf club and golf course operations at Conwy Golf Club. The room by room analysis provides a quantitative assessment of the energy used in each area and highlights where potential energy, carbon and cost savings can be made. The 2008 carbon footprint for the club allows the club to assess future changes and future progress, relative to the 2008 baseline, in reducing the impact of the clubs operations on the environment.

Appendix 1

Conwy Golf Club Equipment Audit

TABLE 1: Bar and Beer Cellar

Electricity

Type of equipment or bulb	Number	Total kWh	Cost (£/year)
Bar			
Large spot light	11	6026.6	500.21
Flourescent 2d square bulb	11	2169.6	180.08
1200 mm strip lights	4	876.6	72.76
TV, media reciever and sky digibox	1	596.1	49.48
Beer Cellar			
Soda recirculation equipment	1	5697.9	472.93
Carbonator	1	4207.7	349.24
1.5 m strip light	6	142.4	11.82
Drinks pumps	14	?	?
Freezer	1	?	?
Room refrigeration unit	1	?	?

TABLE 2: Dining Room

Electricity

Type of equipment or bulb	Number	Total kWh	Cost (£/year)
Flourescent 2d square bulb	56	11045.2	916.75
Coffee machine	1	3837.3	318.50
Wall lights	8	2629.8	218.27
Halogen spot lights	6	1314.9	109.14
Picture light (incandescent)	2	657.5	54.57
Computer	1	635.5	52.75
Side light	1	328.7	27.28
Computer monitor	1	210.4	17.46
Disco lights	2	?	?

TABLE 3: Secretary's Office			
Electricity			
Type of equipment or bulb	**Number**	**Total kWh**	**Cost (£/year)**
Strip lights	12	898.6	74.58
Printer	3	872.2	72.39
Kettle	1	767.0	63.66
Photocopier	1	537.6	44.62
Electric heater	1	362.5	30.09
Computer	2	249.6	20.72
Monitor	2	99.8	8.29
Fax machine	1	23.7	1.97
Laminator	1	28.3	2.35
Air conditioning	1	?	?
Shredder	1	?	?
Computer server	1	?	?

TABLE 4: Locker Rooms and Toilets			
Electricity			
Type of equipment or bulb	**Number**	**Total kWh**	**Cost (£/year)**
Ladies lockers – members			
Shower	2	14593.2	1211.24
Hand dryer	2	3835.1	318.32
Hairdryers	2	3287.3	272.84
Flourescent 2d square bulb	6	1183.4	98.22
Strip lights	2	821.8	68.21
Strip lights	3	493.1	40.93
Drying room			
Strip light	1	27.4	2.27
Ventilation system	1		
Ladies lockers – visitors			
Electric shower	2	14593.1985	1211.235476
Hand dryer	2	5478.75	454.73625
Halogen spot lights	17	4319.7	358.5351
Hair dryer	1	712.2375	59.1157125
Curler	1	222.8025	18.4926075
Personal hygiene dispenser	1	?	?
Mens locker room			
Shower	3	21889.8	1816.85
Hand dryer	2	5478.8	454.74
0.5 m strip light	40	4383.0	363.79
1800 mm strip light	2	821.8	68.21
1.5 m strip light	2	712.2	59.12
Extractor fan	?	?	?
Visitors locker room			
Hand dryer	1	9587.8	795.79
Shower	3	21889.8	1816.85
1800 mm strip light	8	3287.3	272.84
Halogen spots	5	219.2	18.19
Extractor fan	?	?	?
Caddy room			
1800 mm light strip	5	2054.5	170.53
Junior changing room			
1800 mm light strip	6	2465.4	204.63

TABLE 5: Pro's Shop			
Electricity			
Type of equipment or bulb	**Number**	**Total kWh**	**Cost (£/year)**
1800 mm strip lights	18	3944.7	327.41
Halogen spot lights	28	3272.6	271.63
Fridge	2	2505.7	207.97
TV	2	1099.8	91.29
Hot water boiler	1	993.8	82.49
Computer	2	350.6	29.10
450 mm strip light	2	263.0	21.83
Computer monitor	2	140.3	11.64
DVD player	1	?	?
Digital message board	1	?	?

TABLE 6: Maintenance Area			
Electricity			
Type of equipment or bulb	**Number**	**Total kWh**	**Cost (£/year)**
1800 mm strip lights	12	3506.4	291.03
Compressor	1	2081.9	172.80
Kettle	1	1604.2	133.15
Incandescent bulb	3	876.6	72.76
Shower	1	608.0	50.47
Electric heater	1	334.6	27.77
Computer	1	175.3	14.55
Microwave	1	173.5	14.40
Toaster	1	112.8	9.36
Computer monitor	1	70.1	5.82
Irrigation equipment	1	?	?
Printer	1	?	?
Fridge	1	?	?
Outside lights	2	?	?