

Building Services and Energy Audit

Cardiff University – Optometry and Vision Sciences Building

1st February 2018



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2.0 Scope of Works

With the ability to already carry out in depth surveys, analysis and create business cases, the scope for this survey will be to establish if any improvements can be made by exploring how the building could be managed differently, with the aim of producing low cost solutions. The report will follow the format detailed in CIBSE Guide F, appendix A2 of which the objectives for this survey will be, but are not exhaustive to;

1. To identify opportunities to reduce energy cost.
2. To estimate the potential savings, and where applicable, implementation costs.
3. To provide an audit for the site on the basis of the previous 12 months' invoiced accounts and energy data.

(CIBSE Guide F, 2012)

3.0 Limitation of Survey

This survey has some limitations attached to it. These limitations are as follows;

- Some of the data provided has been created through software. This is due to communications issues on the network. Therefore I am unable to rely on some of the data produced for the last 12 months.
- A very short site meeting and walk around was able to take place. Approx. 4 hours was spent at site.
- Not all of the areas were accessible during my site visit.
- There was no opportunity to install additional metering to gain accurate data results.

4.0 Building Overview

The Optometry and Vision Sciences building at Cardiff University was officially opened in 2008. The building is a purpose built facility bringing research, teaching and patient clinics together in one place. (Cardiff University)

The Cardiff University estates department benefits from having a full time Energy Manager who constantly analyses trends and identifies areas of improvement. The department also has the use of a full time controls engineer who has the access rights to enable controls changes to take place.

The buildings main use is as a research and teaching facility for the students of Cardiff University but there is a small section of the building that is open to the public for consultation. The opening hours

for the site are from 0800 – 2000 and in the summer months is still operational but with less users in the building due to the students being on leave.

The building has a large atrium area that is glass fronted that has a sky light in the roof. The areas of use are split into small, lab like areas with a large lecture hall located on the ground floor.

The services of the building are made of 4 x ground source heat pumps which form the primary source of space heating and cooling. There are 2 x Broag boilers that heat the hot water throughout the buildings toilets and wash hand basins and are also used to heat the LTHW circuits to the air handling units.

There are large, 11Kw pumps on the cooling circuits, that have a VSD (Variable speed drive) function allowing the speed of the motors to be regulated, which feed a 4 pipe fan coil unit system throughout the building. The fan coil units are controlled in a zone formation via a Trend IQ3 building management system.

The electrical distribution network of the building is made up of an incoming main supplying sub panels. The plant making up the services to the building is supplied via these sub mains panels. The small power and lighting in the building are fed from distribution boards within riser cupboards on each floor. These boards are fed by a common bus bar running up the entire length of the riser voids which is also fed from the sub mains. All of the distribution boards are metered, as well as the bus bars, sub mains and incoming main. A schematic drawing of the system can be found in Appendix 6.

Although there was no access at the time the site visit, after consulting google maps it is clear to see that there is a large condenser located on the roof area.

The building is ventilated via air handling units located in the basement and roof area. These air handling units have the ability to recover heat from the building.

5.0 Management Summary

The management summary outlines the potential energy savings identified by the survey. (CIBSE, 2012) The survey consists of the afternoons site visit hosted by Mark, (Cardiff University Energy Manager) along with the analysis of the data gather by myself and provided by the site.

The table below details the implementation costs and potential savings.

Area	Action/ Comparison	Imp. Cost (£)	Saving (£)
Boiler	Reduce the water return temperature to achieve 60degC. Overall reduction based on BMS graphic of 1.5degC. 8% reduction in fuel consumption can be achieved by reducing the temperature by 1degC. £5352. 96 cost for gas in 2017 based on the cost of gas of £0.02 per Kwh.	£0	£642.36 per year

FCU	Replace the ac fan motors for electronically commutated (EC) motors. Operating cost Per Unit Operating 8760 hours per year Annualised average ECM wattage = 213W Annualised average AC motor wattage = 281W (wattage varies dependant on motor type) Cost of electricity = £0.10 Saving = £59.57 per unit per year. (Temspec) Life cycle of EC motor of 20 years	Motor - £250 (costs vary) Installation cost based on 1.5 hours for 1 engineer @ £30.00 ph = £45.00 Total = £295	Pay back = 5 years Additional savings based over the lifecycle of the motor = £893.55 per unit (dependant on fuel cost)
Heat Pump	Switch off the heat pumps between the hours of 2000 – 0600. 35667 Kwh of energy used between these times during 2017. Additional savings can be made if it is viable to switch the system off over the weekend period.	£0	£3566.70 per year (based on unit cost of electricity of £0.10)
Lighting	Replace current 18W fluorescent tubes for LED retrofit <u>CFL</u> Operating hours – 4380 per year Annual Kwh = 321.2 Kwh per light fitting Cost of electricity of £0.10 Total = £32.12 per year <u>LED</u> Operating hours – 4380 per year Annual Kwh = 175.2 Kwh per light fitting Cost of electricity of £0.10 Total = £17.52 Saving of £14.60 per year per light fitting (Stateline Eco)	Lamp cost – £31.20 per light fitting Installation cost based on 1 engineer for 15min @£30.00 ph = £7.50 Total = £38.70	Pay back = 2.7 years Additional savings after pay back based on 40,000 lifecycle = £26.28 per fitting

6.0 Preliminary data evaluation

Prior to my visit to site Mark kindly provided the previous year's meter data ranging from 1st Jan 2017 to 31st Dec 2017.

A pre-site review of the building systems and their operation generated a list of specific questions and issues to be discussed during the visit to the site. This preparation will ensure that the on-site time is used effectively and will minimise any potential disruption to building personnel. (Adnot, J., Bory, D., Butala, V., Knight, I., Masoero, M., Muhic, S., Silvi, C.)

An analysis of this data provided will allow the following items to be established;

- Set a point for reference.
- Identify areas for more detailed study.
- Identify immediate improvements

(Patel, T. Panchal K. 2015)

Appendix 1 in this report sets out the data that was received and details the logs from each energy meter in Kwh. The data received had a mixture of black and red text within the document. On further analysis of this data anomalies were identified within the trends. The reason for different coloured text became a point of interest and was an area for further questioning during my site visit. I found that the reason for the text coloured in red was due to the meter data being produced by software instead of actual meter reads. This was due to communications issues on the system so therefore the data received cannot be fully relied upon.

Appendix 2 and 3 is a diagrammatically representation of the data from appendix 1. As previously stated, the trends identified an anomaly in the data during the month of January. The anomaly identified a very low recording for gas usage during that month compared to the reading recorded in February and in comparison there was a very high electricity usage which dropped off dramatically from February onwards. During my visit this was raised during the walk round where it was discovered that the building has been experiencing issues with corrosion to the pipework. This caused a major leak in January forcing the demand from the site to be fully supplied from the ground source heat pumps, hence the increase in electricity consumption and a decrease in the gas consumption as the boiler were isolated whilst the repair took place.

7.0 Benchmarking

The energy performance of a non - domestic building is frequently quantified by judging its performance against that of a sample of other similar buildings, usually through the application of a benchmark calculation. Alternatively, a prototypical building may be used as the benchmark. (Liddiard, Wright, Marjanovic-Halburd, 2008)

Methods used for energy benchmarking non – domestic buildings include;

1. Statically, within peer groups. Performance indicators are calculated, normalised and placed in rank order. The performance will often be reported as a percentage score, in quartile or in decile.

2. Over time, usually by year, either using performance scores from the statistical data above or by self - referencing through comparing previous values. For self - referencing to be a valid way of benchmarking it will need to take into account external variables (typically degree days for weather variations) and internal variables such as changes of use within the building or changes in equipment.
3. By comparing performance with numerical standards.

(Bordass B, Cohen R, Spevack R, Burman, E, Hong S, Ruyssevelt P, Field J., 2014)

Some people believe that energy benchmarking does not work. Cooper writes that the only way to determine if a building is energy efficient is by applying engineering principles to the plethora of inputs and outputs, could it be determined if the premises is operating efficiently. Essentially, a building can only be efficient as itself and its potential.

(Cooper, 2012)

The figure below benchmarks the building against a typical university set out in document CIBSE TM46: 2008 Energy benchmarks.

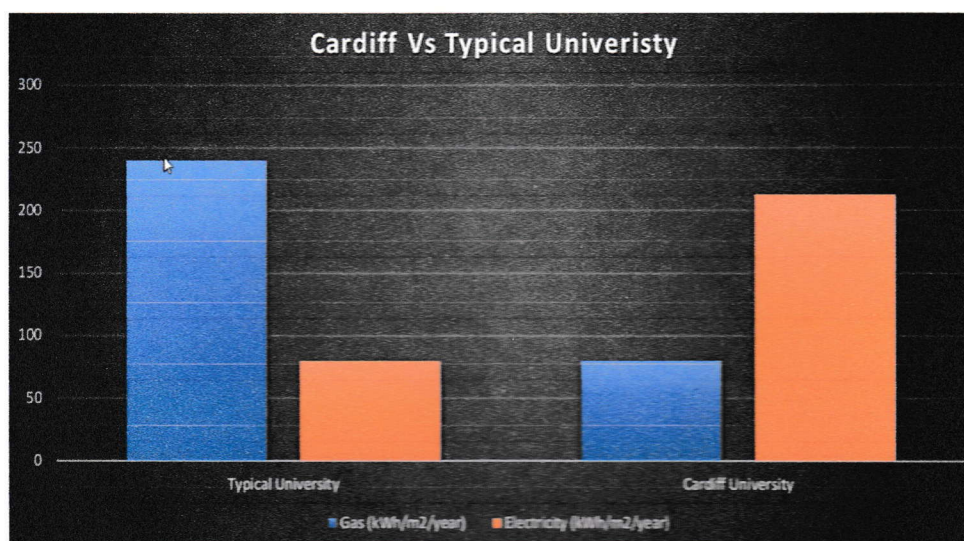


Figure 1: Benchmark: Typical vs Cardiff

The figure demonstrates that currently the **building is consuming more electricity and less gas** than what we would typically see against the benchmark used for this type of building. It shows that the benchmark set out in CIBSE TM46 is not an accurate and a true representation for this site and would back up the comments made by Cooper. Due to the complex services of this building it would be best to benchmark this building against itself which will give a true representation of performance over time. Although the actual energy use against the benchmark has a large discrepancy between both the gas and electricity, the services used in the building to heat the space would lend to this result.

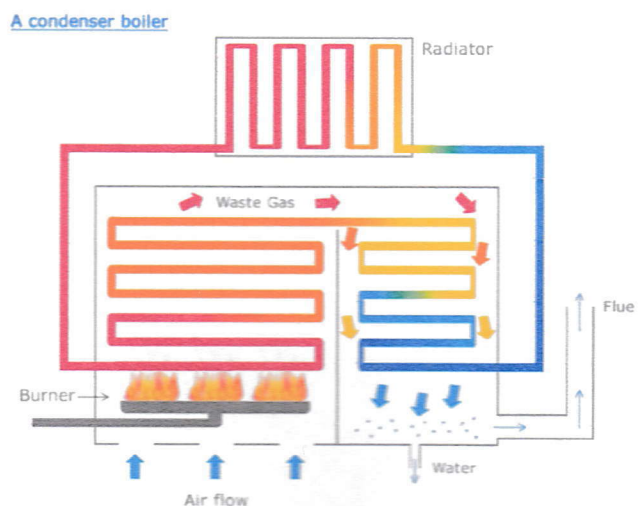
8.0 Energy Use

8.1 Boilers

The site has two Broag Remeha boilers located in the basement plant room. They heat the hot water to the building and also supply the air handling unit low temperature hot water as demonstrated in the appendix 4.

The model of these Remeha boilers is 210 ECO – 160 and is described by the manufacturer as a highly efficient condensing boiler that has a heat to water efficiency of up to 98% at an average water temperature of 70degC.

Figure 2, to the right demonstrates how a condensing boiler works. A non – condensing boiler will waste the wasted gas produced from combustion, allowing it to escape through the flue. However, in a condensing boiler, the waste gas remains trapped inside. The gas itself is in the form of a heated water vapour, and when the condenser has used up the heat from it, it forms droplets of condensation, escaping as steam and water out of the system. The waste gas helps to pre heat the returning water coming back into the boiler from the heat emitters, meaning that less time is taken **wasting energy on reheating cold water**. Pre warmed water requires far less energy to be able to **reach it required set point** temperature, and as such, the energy usage should naturally decrease. (DMS Installers, 2016)



The boilers were last maintained in November 2017 and their condition is good with all associated pipework well insulated. During this inspection the efficiency of the boilers were measured and were recorded at between 88.3% and 97.4% on low flame and between 87.6% and 96.6% on high flame.

The boilers are configured in a lead/ lag sequence as demonstrated in figure 3. The set points are set at 69degC for the lead boiler and 66degC for the lag boiler. The flow temperature was measuring at 78.4degC and the return temperature was measured at 61.9degC.

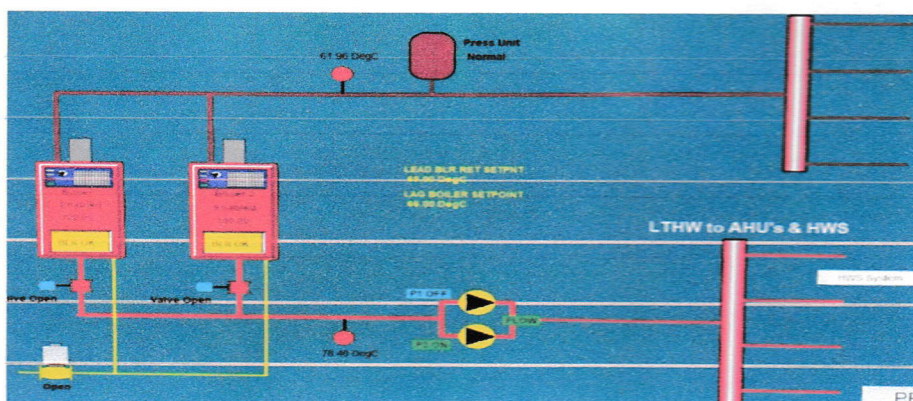


Figure 3: BMS graphic of LTWH service

The gain a condensing boiler can effectively achieve is dependant largely of the return water temperature. The lower the return temperature the better recovery of the latent heat of vaporisation, and hereby better boiler efficiency. (Grundfos) The system is supplying the hot water services around the building and will need to be stored at 60degC to avoid the growth of legionella within the water system, avoiding risk to the people using the building. The carbon trust has stated that by reducing the heating temperature by 1degC you can save 8% on fuel consumption. (Carbon trust, 2011) As the system is operating slightly higher than the temperature looking to be achieved there is scope to reduce this by 1 – 1.5degC, allowing for any differential in the thermostat.

8.2 Space heating and cooling

The space heating and cooling for this site is supplied via a 4 pipe fan coil unit system. The hot and chilled water supplying this system are both supplied from a ground source heat pump set up located in the basement plant room. The BMS graphic in figure 4 demonstrates how this system is set up and appendix 5 demonstrates how this system serves the building. The water is pumped around the system by an 11Kw grundfos pump on each system that is inverted.

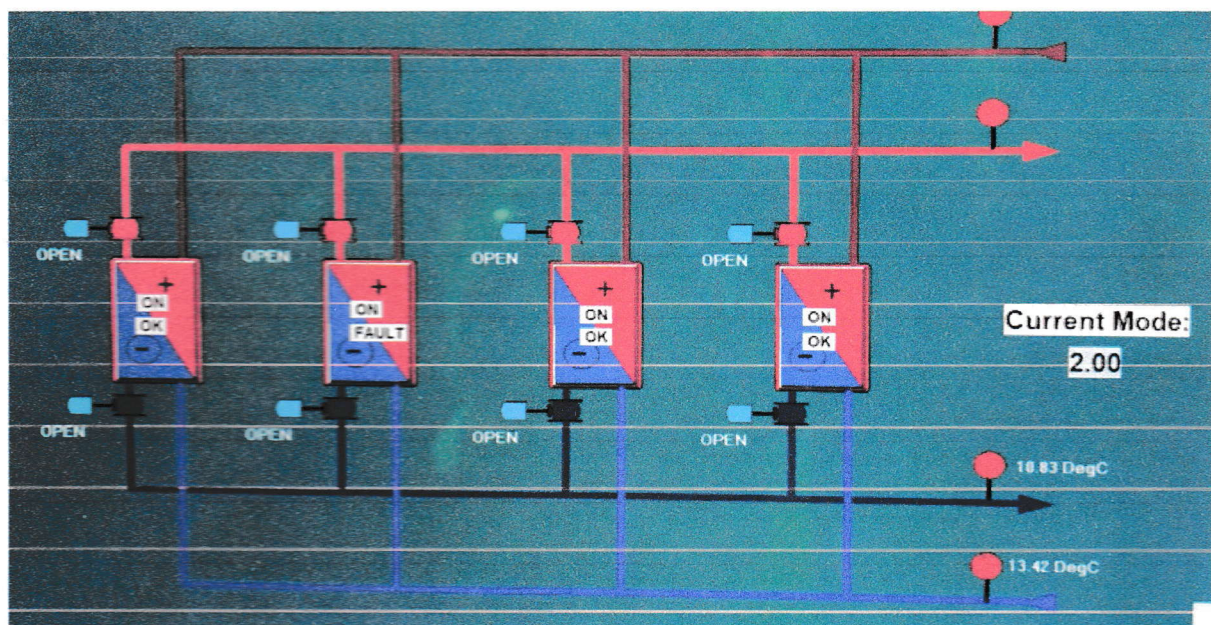


Figure 4: BMS graphic of ground source heat pump arrangement.

8.2.1 Fan coil units

A fan coil unit contains a fan which draws the air in a space into the unit then blows it over a cooling or heating coil. The air comes out of the fan coil unit either cooler or hotter than before. Typically an individual fan coil unit serves up to 150m² of floor space so there can many units installed in any one building. (Better building partnership, 2015)

The age and condition of a fan coil unit system will significantly affect running costs. Older systems tend to have higher rates of temperature controller failure, poorly operating valves and inefficient central plant, all of which can increase costs. (Better building partnership, 2015) During the site visit, my site contact made reference to the ageing valves and that they can regularly breakdown. This issue has been addressed with the BMS manufacturer and the site is in the process of replacing old valves.

Traditionally, forward bladed centrifugal fans in fan coil units have been driven by AC motors, which are typically around 45% efficient. However, electronically commutated (EC) motors are now becoming more popular and can be up to 80% efficient, leading to significant operational benefits. (Palfrey, 2006)

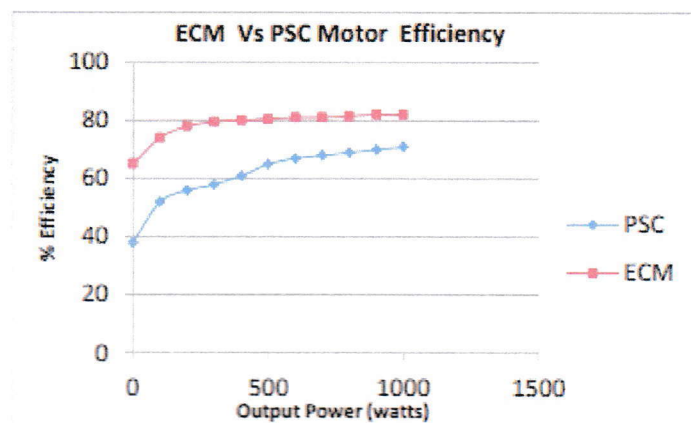


Figure 5: Efficiency comparison – EC motor vs PSC

Palfrey has identified some major benefits that EC motors are able to offer;

1. high efficiency of up to 85%, leading to lower input power
2. Efficient speed control
3. Longer motor life resulting from lower running temperatures
4. Longer bearing life because of the soft start feature
5. Suitable for a 230V supply

Although I was unable to ascertain whether these motors form part of the system already, I will include this comparison within the management summary for consideration.

8.2.2 Ground source heat pumps

As previously stated the ground source heat pumps are the primary source of space heating and cooling for the building.

Ground source heat pumps provide a clean way to heat buildings, free of carbon emissions at site level. Heat pumps have the ability to be reversed, so can also provide cooling for a building. Heat pumps make use of the solar energy stored in the ground to provide one of the most energy efficient ways of heating and cooling buildings. Solar recharge of the ground is an integral part of ground source energy which is used to increase the efficiency of ground source heat pumps. (Ground source heat pump association)

The efficiency of a heat pump can be measured in Coefficient of Performance (COP) and energy efficiency ratio (EER). The COP of a ground source heat pump is usually in the range of between two to four (Barrett, 2017) and the most desirable EER rating is 10 or greater.

Analysis of the data shows that the heat pumps are operating outside of operating hours of the building. Having the heat pumps on overnight is using energy that no one within the building is feeling the benefit of. The figure below demonstrates the amount of Kwh used by the heat pumps during the evening between the hours of 2000 to 0600. Switching the heat pumps off overnight can save additional costs on energy consumption. My recommendation is that the heat pumps are switched off during the period stated but temperatures monitored prior to the building users being in the building to ensure the building is achieving the correct temperatures at the required times. The calculations for this saving will be shown in the management summary.

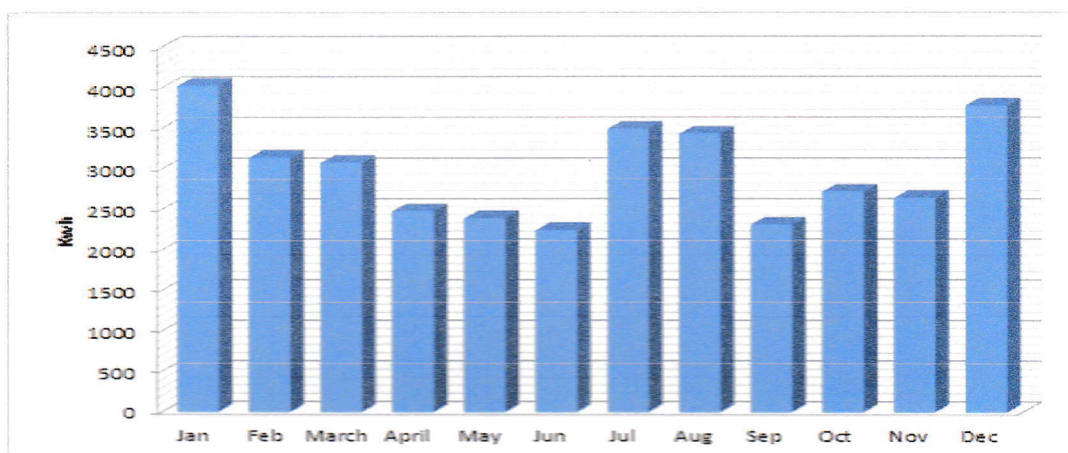
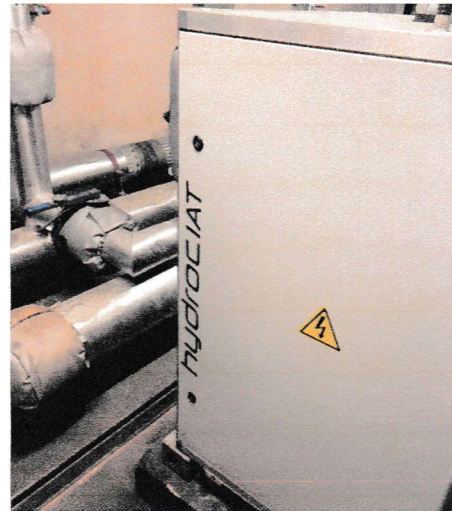


Figure 6 – Heat pump Kwh usage between the hours of 2000 and 0600

8.3 Power and lighting

Lighting is often the single largest end user of electricity in buildings, accounting for over 40% of electricity costs. (CIBSE, 2012)

The lighting within the building is made up of compact fluorescent lights and 600mm x 600mm, T8 fluorescent tube lighting throughout. The lighting of the main atrium area of the building has been retrofitted with LED lighting.

Light Emitting Diodes (LEDs) have entered the lighting market as an energy efficient alternative to traditional light sources such as incandescent and fluorescent lamps. These lights have undergone an enormous technological growth since being introduced and since entering the market offer various advantages over all other forms of lighting. (Horgan, M., Dwan, D., 2014)

LED lighting is bringing a lighting revolution to our buildings and estates all around the world. The advantages of LED lights are;

Efficiency – Energy savings from 50% to 70% compared with conventional technologies result in similar cuts to carbon emissions.

Controllability – Superior control over light colour, intensity and direction allows novel lighting system designs that can deliver a wide range of social co – benefits. Outdoor LEDs offer improved visibility for pedestrians and traffic, as well as reduced light pollution. Indoor LED smart control systems have been shown to improve student behaviour and study performance, and when smart controls allow LEDs to dynamically change lighting levels in response to conditions, total system energy savings can reach up to 80%

Lifespan – Well-designed LEDs are expected to last for 50,000 to 100,000 hours or more.

(The Climate Group, 2012)

In comparison to the advantages, LED lighting has some disadvantages. On an Initial capital cost basis, LEDs are more expensive, measured in price per lumen, than more conventional lighting technologies. (Philips) However, this cost is narrowing as the technology becomes easier to manufacturer.

LED performance largely depends on the ambient temperature of the operating environment. Driving the LED hard in high ambient temperatures may result in overheating of the LED package, eventually leading to device failure. (Philips)

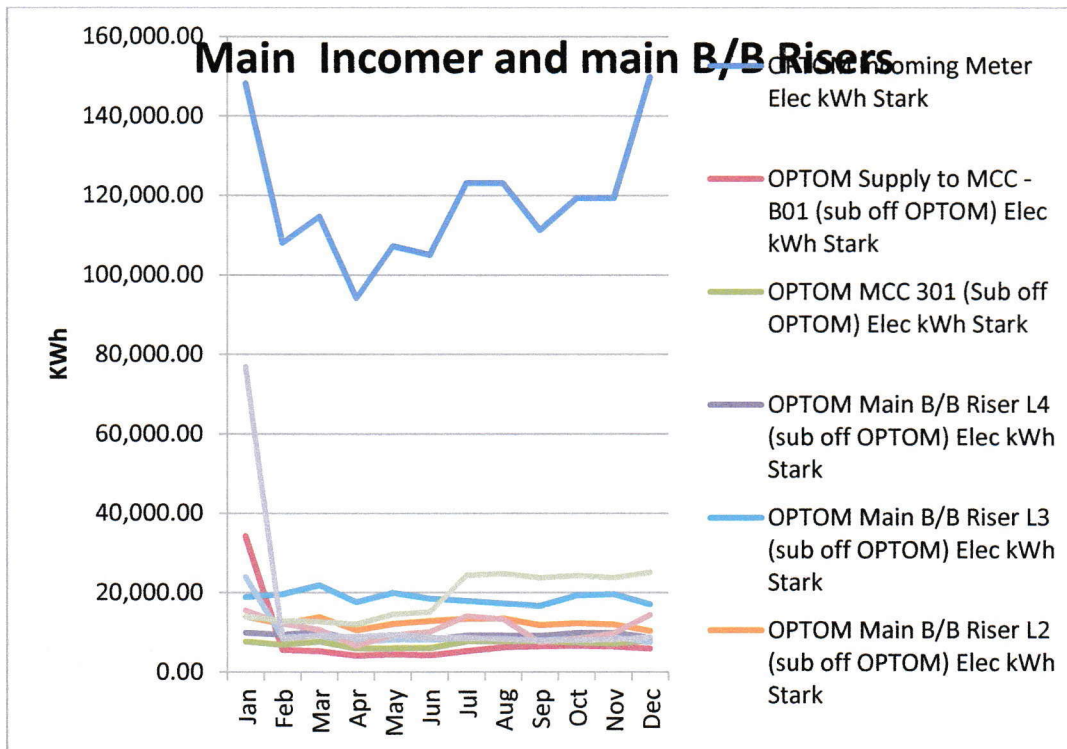
Taking this comparison into consideration my recommendations will be to install LED lighting throughout the building. The implementation costs and savings are outlined in the management summary.

9.0 List of Appendices

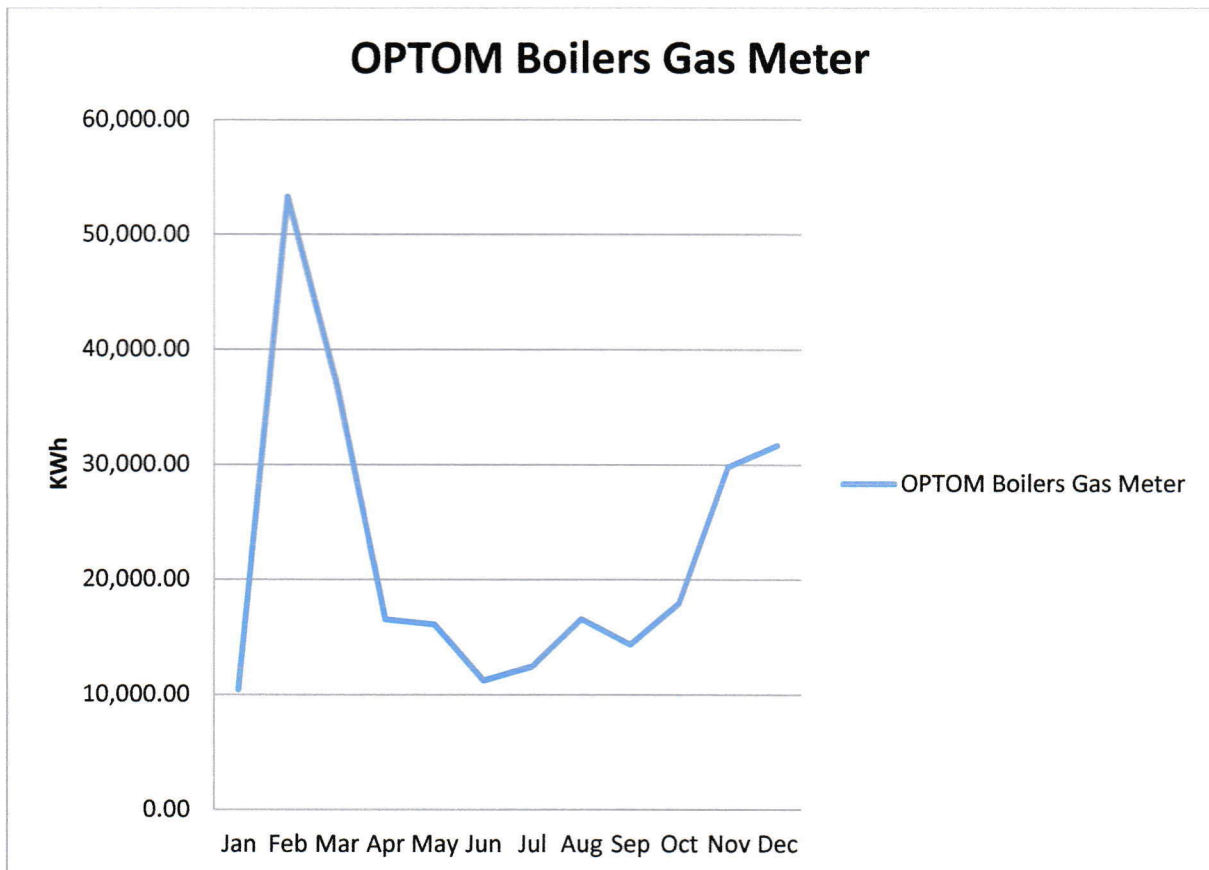
Appendix 1: Example of energy data

Meter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
OPTOM Boilers Gas Meter	10,429.10	53,333.06	37,001.11	16,572.88	16,122.13	11,244.46	12,479.79	16,610.07	14,361.42	17,981.86	29,827.57	31,684.61
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
OPTOM Incoming Meter Bec kWh Stark	148,291.97	108,097.00	114,777.42	94,243.76	107,281.80	105,128.60	123,103.40	123,102.00	111,346.00	119,395.00	119,381.00	149,880.00
OPTOM Supply to MCC - B01 (sub off OPTOM) Bec kWh Stark	34,246.74	5,569.00	5,238.01	4,125.98	4,458.00	4,204.83	5,289.17	6,260.00	6,495.00	6,591.00	6,396.00	5,906.00
OPTOM MCC 301 (Sub off OPTOM) Bec kWh Stark	7,668.29	6,909.00	7,675.07	5,898.57	5,954.37	5,963.70	7,678.30	7,712.00	7,705.00	7,418.04	7,090.00	7,695.00
OPTOM Main B/B Riser L4 (sub off OPTOM) Bec kWh Stark	9,935.23	9,481.00	10,209.82	8,088.57	9,362.61	8,220.87	9,208.13	9,187.00	9,140.00	9,846.00	9,944.00	8,634.00
Optom Riser 4 DB-L4-4 Bec kWh Stark	3,184.72	48.62	43.48	43.00	44.52	43.30	112.70	120.00	116.00	120.00	116.00	121.00
Optom Riser 4 DB-L4-3 Bec kWh Stark	1,345.59	1,332.00	1,276.50	1,010.56	1,247.94	1,150.28	1,180.72	1,117.00	1,179.00	1,259.00	1,197.00	916.42
Optom Riser 4 DB-L4-2 Bec kWh Stark	12,327.67	2,049.00	2,456.66	1,929.89	2,213.45	1,760.63	1,632.37	1,852.00	1,638.00	2,123.00	2,257.00	2,017.32
Optom Riser 4 DB-L4-1 Bec kWh Stark	7,792.10	808.00	901.56	845.35	896.09	1,031.00	996.00	852.00	1,177.00	1,174.17	1,207.00	866.92
Optom Riser 4 DB P4-4 Bec kWh Stark												
Optom Riser 4 DB P4-3 Bec kWh Stark	149.63	456.00	205.00	217.25	489.75	623.80	675.20	1,546.00	1,789.00	1,861.00	1,459.00	497.71
Optom Riser 4 DB P4-2 Bec kWh Stark	65,952.35	386.00	403.58	342.65	429.68	411.19	430.81	439.00	422.00	520.00	497.00	461.00
Optom Riser 4 DB P4-1 Bec kWh Stark	9,202.53	2,111.00	2,154.96	1,320.76	1,670.28	1,266.41	1,921.68	1,900.00	1,802.00	1,833.00	1,906.00	1,366.20
OPTOM Main B/B Riser L3 (sub off OPTOM) Bec kWh Stark	19,020.53	19,710.00	21,996.68	17,663.82	20,036.50	18,600.18	18,019.82	17,346.00	16,720.00	19,366.00	19,688.00	17,096.00
Optom Riser 3 DB-L3-4 Bec kWh Stark	11,326.90	1,657.67	2,204.76	1,552.87	1,763.37	1,584.30	1,646.49	1,595.00	1,480.00	1,799.00	1,832.00	1,436.53
Optom Riser 3 DB-L3-3 Bec kWh Stark	34,054.24	3,702.00	4,212.67	3,631.07	3,755.26	3,476.30	3,297.70	2,952.00	2,485.00	3,418.00	3,695.00	3,169.64
Optom Riser 3 DB-L3-2 Bec kWh Stark	23,187.03	3,497.00	3,623.78	2,374.72	3,141.49	2,954.35	2,252.65	2,219.00	2,122.00	3,020.00	3,242.00	2,441.10
Optom Riser 3 DB-L3-1 Bec kWh Stark	31,156.28	3,084.00	3,525.07	2,479.72	3,270.28	2,911.84	2,921.16	2,855.65	3,001.00	3,320.00	3,102.06	2,488.63
Optom Riser 3 DB P3-4 Bec kWh Stark	2,814.11	1,622.00	1,839.24	1,584.63	1,652.93	1,961.20	1,810.80	1,685.00	1,553.59	1,578.00	1,571.00	1,594.63
Optom Riser 3 DB P3-3 Bec kWh Stark	6,708.96	2,760.00	3,200.89	2,921.25	3,261.86	2,935.43	2,647.57	2,461.00	2,354.00	2,238.00	2,296.00	2,480.65

Appendix 2: Diagrammatic representation of main incoming electricity meter

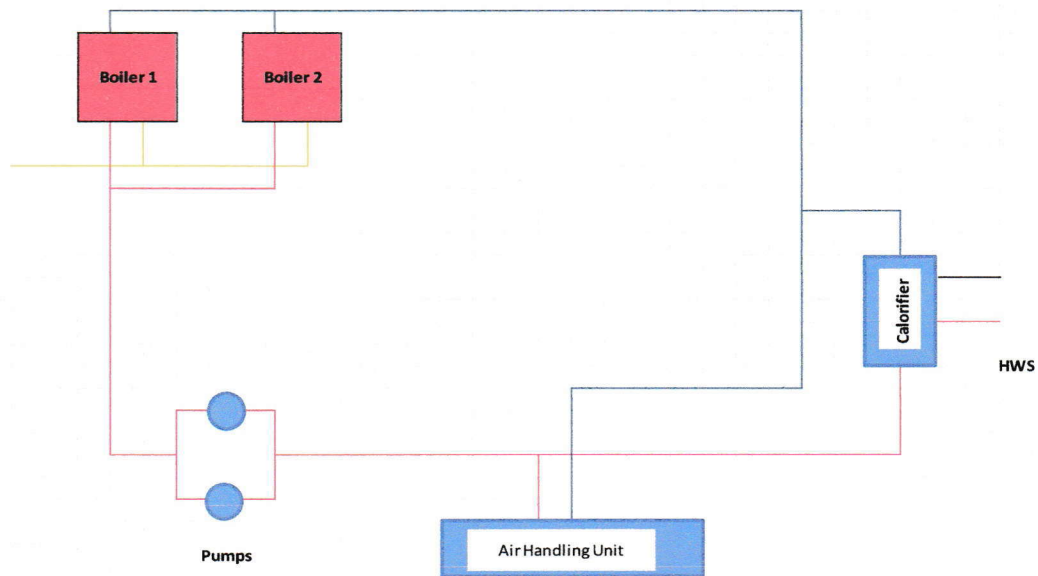


Appendix 3: Diagrammatical representation of gas meter

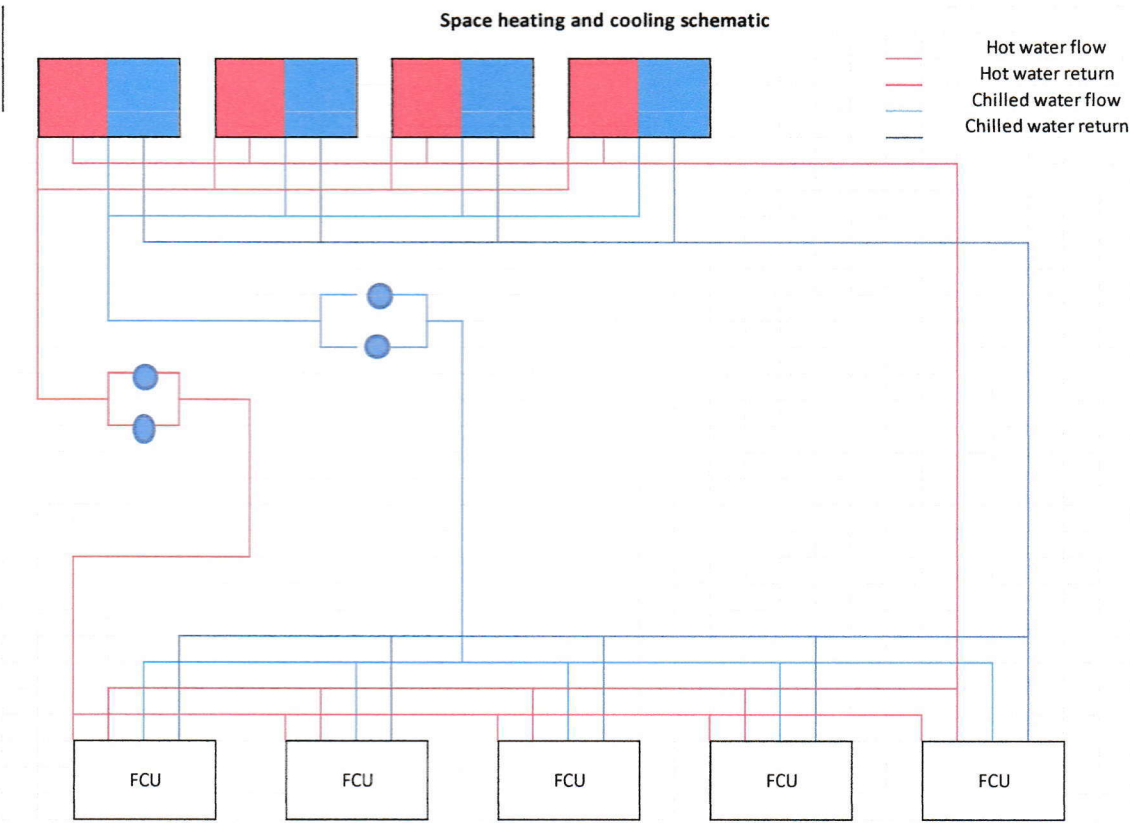


Appendix 4: LTHW Services schematic drawing

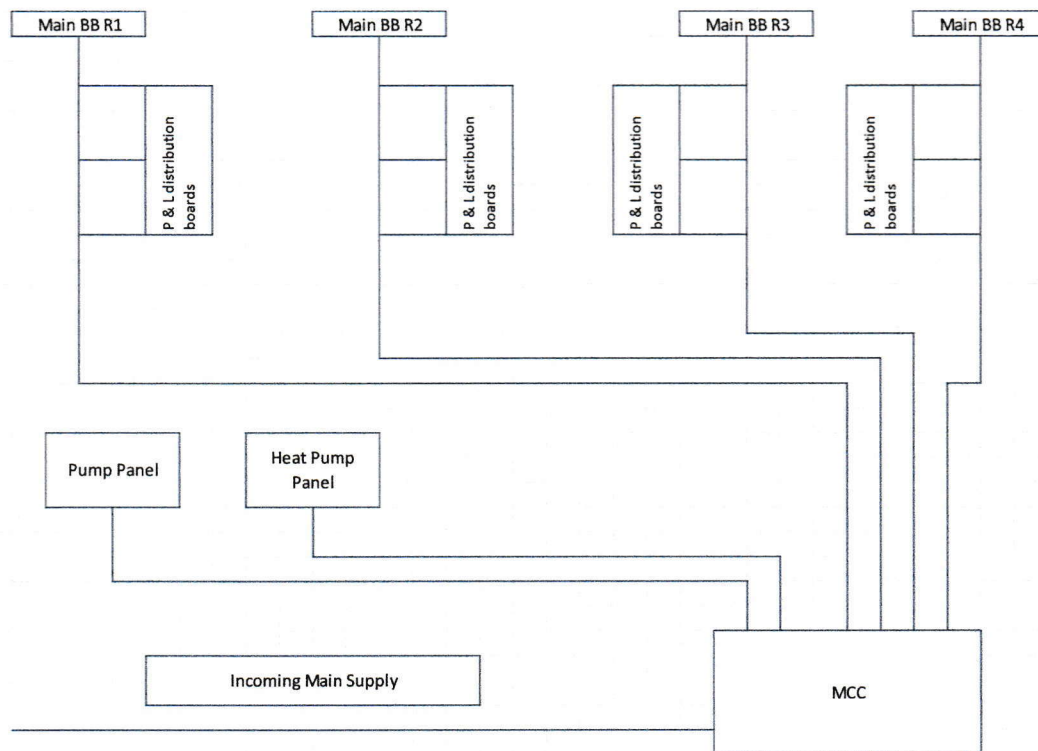
LTWH Services Schematic



Appendix 5: Space heating and cooling schematic



Appendix 6: Electrical distribution network



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Business Case

Maintenance Strategy for Optometry and Vision Sciences building at Cardiff University.

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11 March 2018

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1. List of Figures

Figure 1: Levels of outsourcing maintenance work

2. Executive Summary

The aim of this business case is to examine what maintenance strategy would best suit the Optometry and Vision Sciences building at Cardiff University. The report will explore;

1. Review of maintenance strategies, their benefits and down falls by completing a literature review.
2. Compare the cost of each strategy.
3. Recommendations based on analysis results.
4. Summary of implementation cost and return on investment.

A review of each of the items above has concluded that an outsourced maintenance strategy would best suit this building.

3. Introduction and Overview

The Optometry and Vision Sciences building at Cardiff contains complex services consisting of ground source heat pumps, condensing boilers, HVAC system and a state of the art building management system which monitors all of these services.

The purpose of this business case will be to gain approval to proceed with the chosen maintenance strategy and begin to implement. This will compare all options consisting of out sourcing the maintenance and completing the maintenance through an in house team of engineers.

The objective of the above is to provide a maintenance strategy that is cost effective and meets the demands of the building users

4. Maintenance Strategy Comparison:

Outsourcing Strategy

Outsourcing is a key tool for reducing enterprise expenses – typically by 20%. Companies need an internal manager to oversee the results provided by the contractor(s), not manage the maintenance staff. Outsourcing can be profitable and should improve the overall every day service if properly managed. (Al-Mutairi, A., Al-Hammad, A.)

There are many approaches that can be taken towards outsourcing. Al-Mutairi has broken these levels down as demonstrated in the figure below.

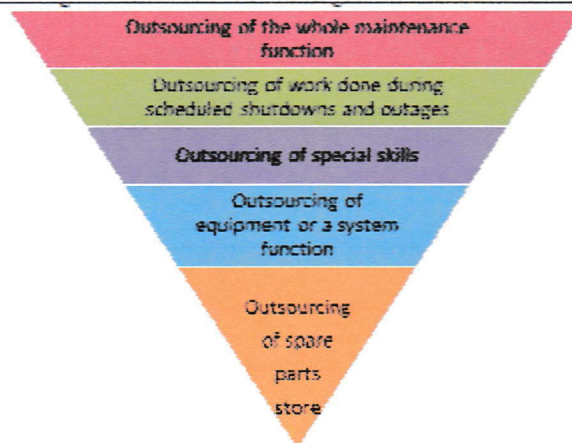


Figure 1: Levels of Outsourcing Maintenance Work

Outsourcing Advantages

Cost control is a driving issue for most industries and is a primary motive for outsourcing. In house staff wages and benefits may become too costly for the company to subsidise. Outsourced contractors can provide flexibility in delivering the proper staff level and required skill set quickly, with less cost and time investment, as well as providing expertise.

When completely outsourcing the maintenance function the responsibility of personnel issues lies with the contractor. Grievances and disciplinary actions are managed by the contractor releasing management from the responsibility and time requirements in doing so.

Outsourced contractors can provide staffing well versed in the usage of the most current technologies, (Johnston, 2014) taking on the cost and acquisition of any equipment in order to run the technology.

Outsourcing Disadvantages

There are a number of disadvantages associated with outsourcing the maintenance function. Listed below are the disadvantages;

1. Vendor unable to deal with volume of activities.
2. Variance in work ethic between the organization and vendor.
3. The outsourcing vendor might be unable to perform tasks in specified time and fail to produce contractual results.
4. Lack of flexibility.
5. Contracts solely focus on cost cutting issues.

(Ahamed, M., Perera, B., Illankoon, I.)

In-House Strategy

In-House Advantages

In general, organisation's should try to keep maintenance in – house on critical assets when possible. The ability to have proactive maintenance such as preventive maintenance or inspections is essential to asset efficiency and effectiveness.

Five reasons organisations should keep maintenance in-house are listed below.

1. Control – Maintenance management will have more control on in-house maintenance and is not subject to vendor availability or reliability problems.
2. Response times – Faster response to problems vs calling the vendor (Smith, 2012)
3. In-house workforces usually perform better than outsource employees who make decisions based on how they will affect their own employer. (Kamarazaly, 2007)

In-House Disadvantages

Kamarazaly writes that in a sector that has a sustainable and compatible outsourcing practices, it may be considered that in-house provision has a lower economic worth. The author also lists the disadvantages of in-house provisions and these are as follows;

- A poorly defined scope will lead, almost inevitably, to problems in the management of the service with higher supervision costs and lowering of customer satisfaction.
- Without defined roles and responsibilities, it can be difficult to measure the performance of in-house personnel.
- In-house teams may lack the skills that outsourcing may be able to provide.

5. Cost Analysis

In-House Maintenance Strategy

To manage the building in-house without any external influence, the organisation will require the following trades on site.

Multi-skilled engineer (Gas Safe and Mechanical)
Electrician
Controls specialist

The cost analysis for employing these trades is set out below;

Salary - £30,000.00 per annum

Employer NIC - £3,013.37

Pension based on 5% - £1,650.67

Annual training - £600.00

Communication equipment - £375.00

Total employment cost for 3 engineers per annum - £106,917.12

(Good calculators)

Outsourcing Maintenance Strategy

The cost below are estimated but are based on industry knowledge and prior pricing experience.

Labour:

1 multi skilled engineer, 1 day per week for 8 hours @ £35.00 to complete emergency lighting testing, (annual and monthly) Water regime requirements and complete minor remedial works.

Cost - £13,440.00

The engineer that attends this site may differ in order to capture the pump and AHU maintenance.

Heat Pump maintenance – 2 day's work for 1 engineer completed annually @ £500.00 per day
Cost - £1000.00.

Boiler maintenance – 8 hours work for 1 engineer completed annually @ £35.00 per hour.
Cost - £280.00

Building management system – This system is an integral part of the overall system and will require regular monitoring and maintenance. 1 engineer attending 1 day per month @ £550.00 per day.
Cost – £6,600.00

Fan coil units – Due to the locality of the units the maintenance will be required to be completed out of normal working hours. 8 hours work for 4 engineers over 2 weekends @ £45.00 per hour.
Cost - £5,760.00

Total Maintenance cost = £27,080.00

6. Conclusion and Recommendations

It is clear that there are benefits for both in-house maintenance teams and outsourcing. My recommendation is that this building will not require a full time maintenance team in order to keep the plant maintained, where the likelihood would be that the team will not be kept productive. There would be a possibility of employing a multi skilled engineer to cover two or more of the functions but realistically this will not be possible.

Taking into account the requirements of the building and the differences in cost my recommendation would be to outsource the maintenance of this building.

I will however add, that if the estate was taken into consideration the business case would look stronger to support an in-house function, but as a stand alone building my recommendation above stands.

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