utility aid

Remote Building Assessment

Session by: Ruaire Glackin

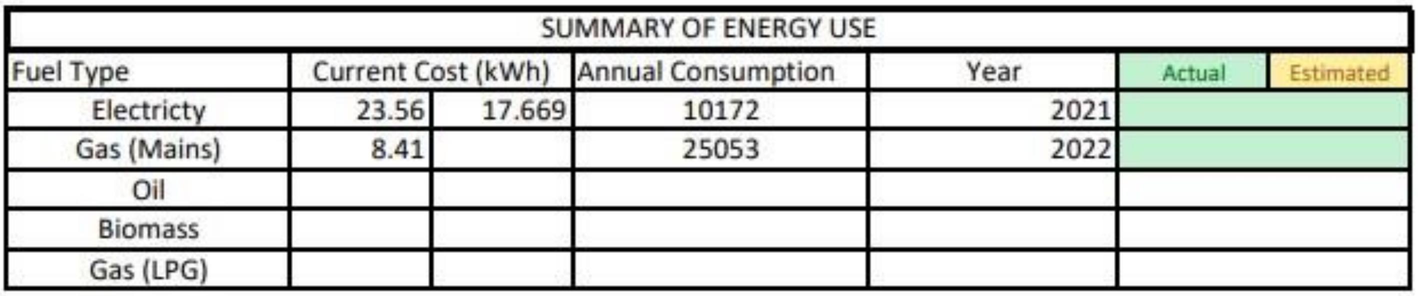
Date: Friday 4th November 2022, 2.03pm

The remote audit was carried out by ……, and Ruaire Glackin of Utility Aid Ltd to determine the works that could be suitable and the potential impact that this will have on the consumption of energy.

The purpose of the document is to provide guidance on the potential for improvement and suitability for improvements to the building for the purpose of reducing energy. It is recommended that prior to the installation of any of the measures recommended that the suitability for the improvement is confirmed by a qualified or experienced installer.

Utility Aid will accept no responsibility for any loss or damage caused by the installation of any measures recommended. This will remain the liability of the installation contractors at all times.

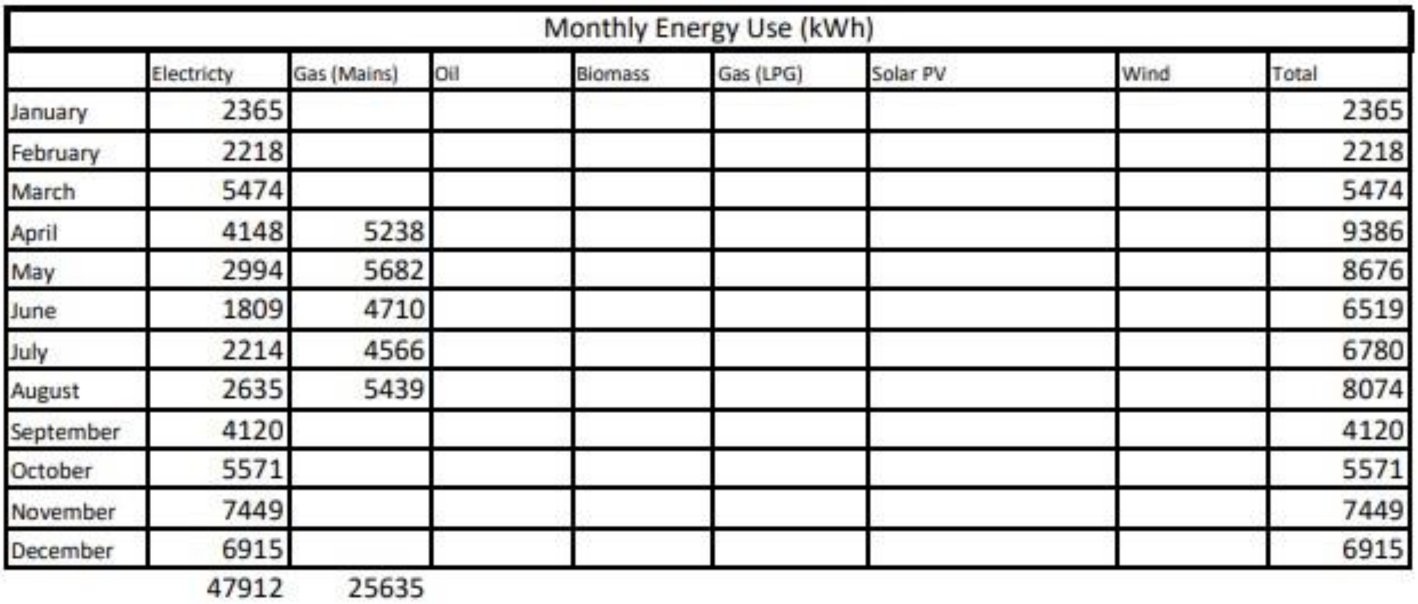
The document is based on estimates and therefore the values provided are indicative only.



SUMMARY OF ENERGY USE

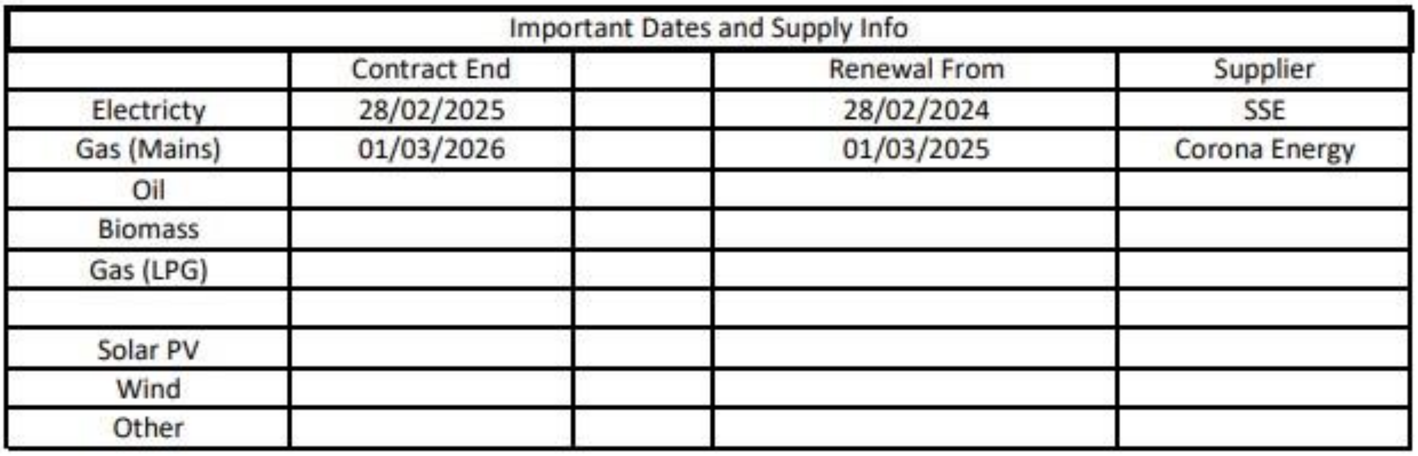
Fuel Type	Current Cost (kWh)		Annual Consumption	Year	Actual	Estimated
Electricty	23.56	17.669	10172	2021	🟩	
Gas (Mains)	8.41		25053	2022	🟩	
Oil						
Biomass						
Gas (LPG)						

Onsite Generation	Generation Total	Export Total	Year	Actual	Estimated
Solar PV					
Wind					
Other					



Monthly Energy Use (kWh)

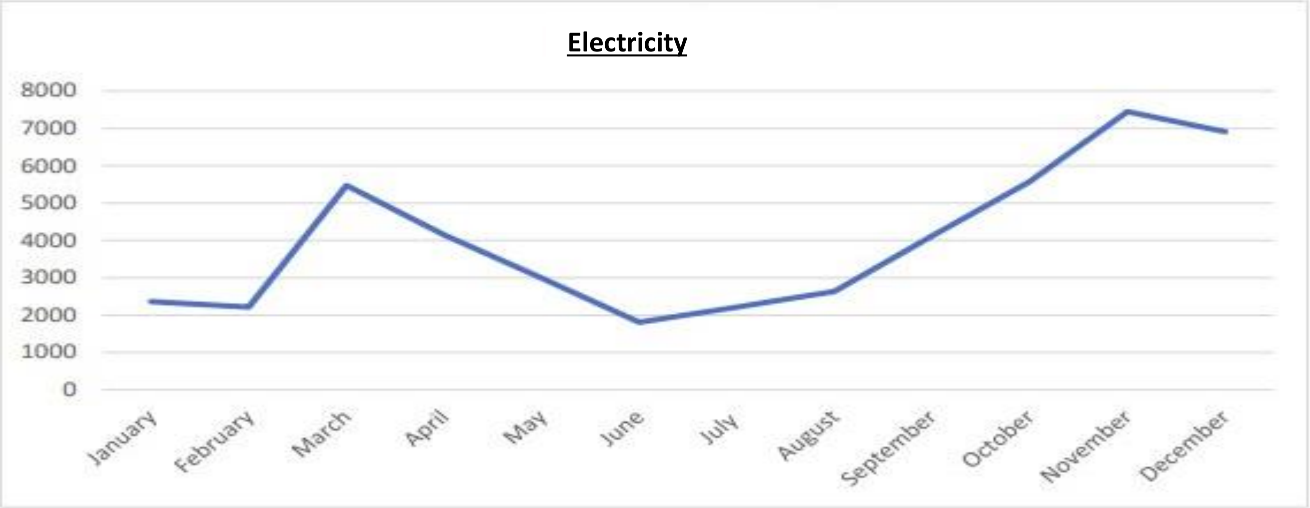
	Electricty	Gas (Mains)	Oil	Biomass	Gas (LPG)	Solar PV	Wind	Total
January	2365							2365
February	2218							2218
March	5474							5474
April	4148	5238						9386
May	2994	5682						8676
June	1809	4710						6519
July	2214	4566						6780
August	2635	5439						8074
September	4120							4120
October	5571							5571
November	7449							7449
December	6915							6915
	47912	25635						

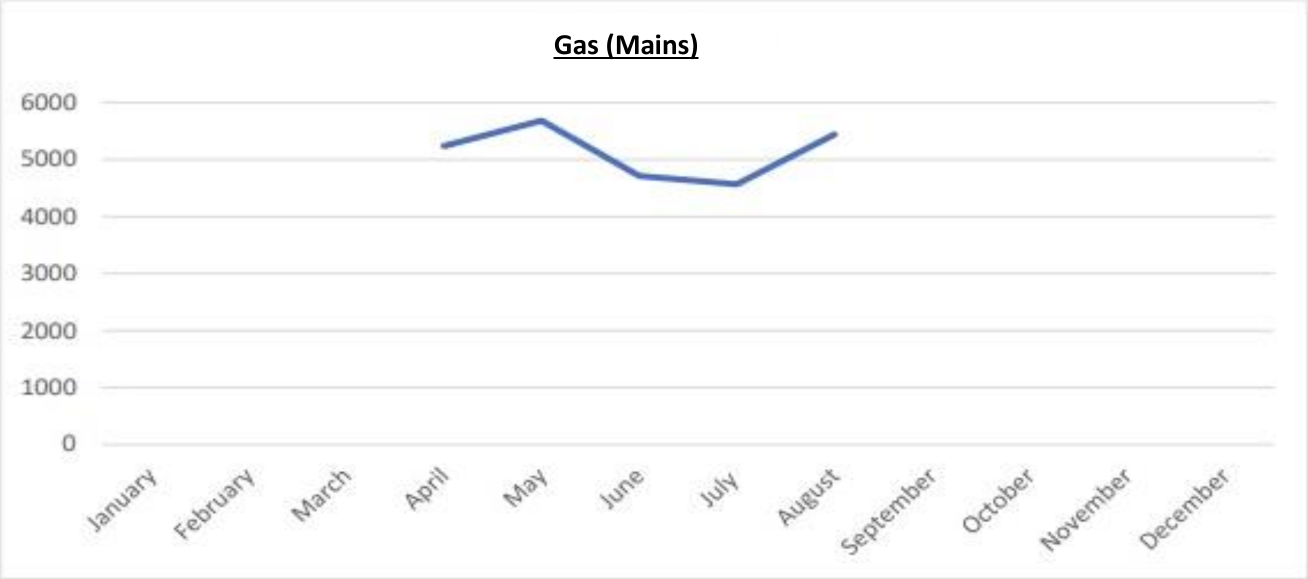


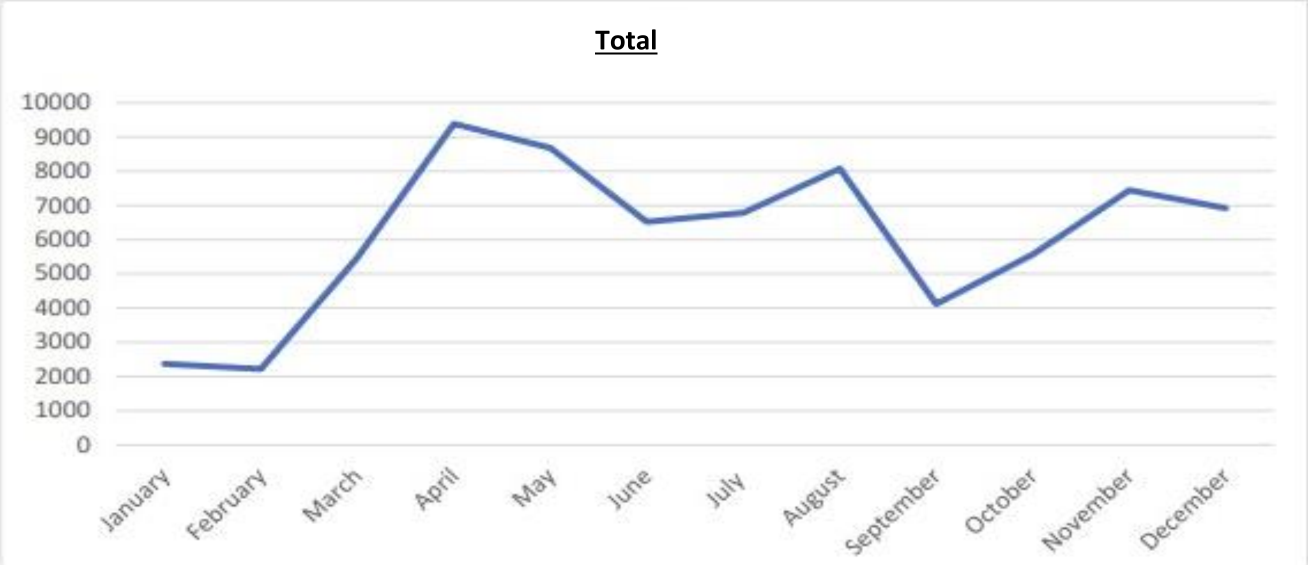
Important Dates and Supply Info

	Contract End		Renewal From	Supplier
Electricty	28/02/2025		28/02/2024	SSE
Gas (Mains)	01/03/2026		01/03/2025	Corona Energy
Oil				
Biomass				
Gas (LPG)				
Solar PV				
Wind				
Other				

Monthly Consumption Curves







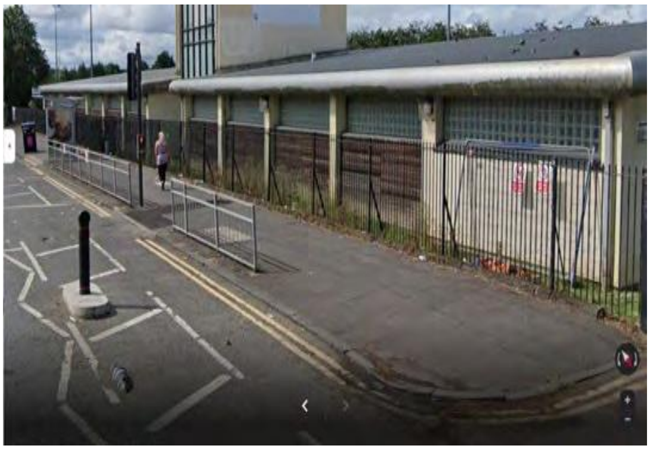
External Elevations and Building Type

The building at… was reconstructed in the 1990s. The building has a solid ground floor with cavity wall-type construction and industrial roofing panels. The middle part of the building is retained from the original building and is two-story. The section is used as a plant room and is not an occupied part of the premises. The new part of the building is double-glazed and has glass suitable for the purpose of the changing rooms.

Due to the build date, it is probable that the external walls have insulation installed either partially or fully. A bore-scope inspection or access to the architectural drawings is required to confirm this.

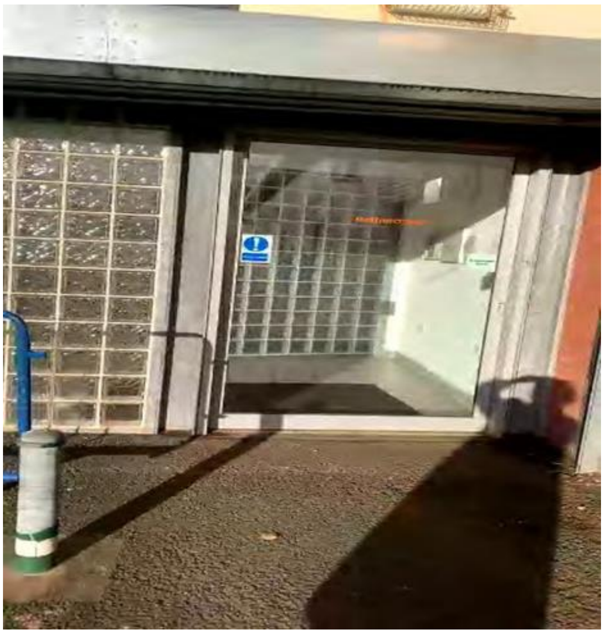
The roofing panels will be insulated as per the building specification and have a U value of approx. 0.26wM2.

An assumption has also been made about the floor insulation as there is nothing visible.



Windows and Doors

The external doors are double-glazed and automated. There is a double door to minimise heat loss, and the entrance orientation is south, so it should not be a victim of prevailing winds.



The fire doors look appear to be tightly fitted, this area should be checked for drafts on an annual basis with draft-proofing measures fitted where applicable.

The windows in the usable areas of the building are double-glazed, there are single-glazed windows in the original part of the building with a wooden frame. This area houses the heating system, which generates a lot of secondary heat. This area should be monitored to see how the temperature is affected when the heating and hot water are turned on. If temperatures are high in the winter, then this excess heat could be diverted to another part of the building or recovered through a heat exchanger in the ventilation system.

Internal Roof Areas

There are some areas of the building which have an installed ceiling, this includes the entrance and the changing rooms. Adding insulation to these areas would have a benefit if the rooms were heated during the winter season or get too warm in the summer. The management would need to consider the preferred internal temperatures of these areas.

The exposed roof areas could be insulated, but the gains would be minimal due to the expected insulation value of the current roofing panels.

Internal Lighting

The internal lighting is all low energy with a mix of LED, T5 Fluorescent and Compact fluorescent fittings. The lighting controls were manually operated. It would be worth considering additional signage to encourage users to turn the lights out after use or fitting motion detection sensors to operate the lighting automatically.

Lights should be replaced with a LED equivalent when they require replacing.

External Lighting

The car park lights are on from dawn to dusk. This averages 12 hours per day over the year. Estimating the lights are 77w in consumption, the annual energy use is 3326kWh*. Changing the controls for these lights to ensure they switch off when the building is closed at 10 pm would reduce the annual consumption to 600kWh*. Thus, saving 2725kWh per annum.

Consider fitting a lux sensor with a timer to ensure lights are only on when required.

Consider replacing this with a suitable LED when lighting maintenance is required.

There is a proposal from Halliday Lighting to replace the external lighting around the track, 3G pitches and the 5-a-side pitches with LED. This would reduce the hourly consumption of all lights being on from 110kWh* to 59.06kWh. If we estimate that the lights are on for an average of 1 hour per day, the annual saving is estimated at 18,338kWh* per annum. (£4,320) per year.

Hot Water (Primary)

The Remeha 210 ECO PRO boiler has a seasonal efficiency of 95.8%.

The boiler provides both the heating and the hot water for the building. The gas consumption provided was for five months of the summer period with a total of 25,635kWh used. Estimating that this was for hot water use only, this is the equivalent of 3000 litres per day.

This main use for hot water is the showers and has an estimated output of 10 litres per minute. This would mean one shower was constantly on for 5 hours every day. It is difficult to determine if this figure is true as there are so many influencing factors. The timings for generating hot water should be investigated, as when the survey was taking place there was hot water available at the tap. This would suggest there was up to 500 litres of hot water available at 2 pm in the afternoon, even though it was unlikely to need this quantity until one hour after the pitches were opened.

There does need to be hot water provision for all building users when the building is open, but 500 litres is excessive and costs the organisation a lot of money.

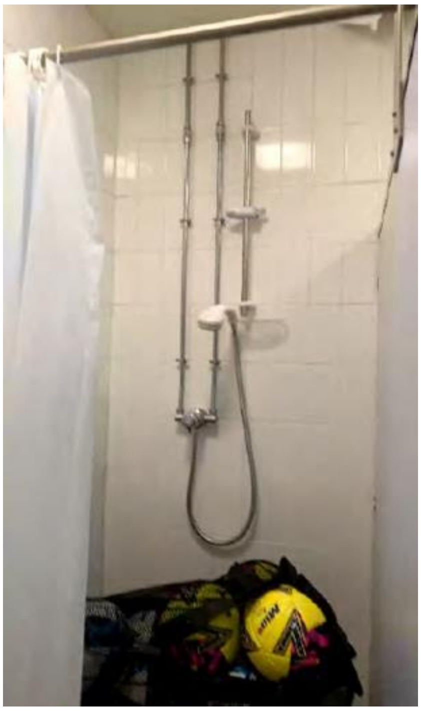
Hot Water (Secondary)

While the boilers were not working, the unit was fitted with these point-of-use water heaters to provide hot water for the purpose of hand washing. Since the boilers started working these have become defunct.

It is worth considering installing point of use water heater in the sink area of each of the bathrooms for when the building has very low occupancy (outside pitch, or gym operating times). The primary hot water supply (Gas Boiler) can be timed to provide hot water when the occupancy or facility user numbers increase.

This should be discussed further with all staff and an agreement reached on the possible locations of the secondary hot water provision.

Hot Water (Flow Rates)



Another way to reduce consumption is to investigate the current flow rates of showers and hot water taps and see if this can be reduced.

Taps can have a flow rate between 5 and 10 litres per minute. The lower the flow rate the less hot water is consumed. Showers can come in different flow rates as well.

Consider replacing shower heads and taps with reduced flow models.

Improvement Measure: Solar Thermal

One of the main costs facing the complex is hot water use, solar thermal should be considered as the building is not in use all day and the hot water requirement is in the evening. Having Solar Thermal installed would allow hot water to be generated all day and then be used in the evening. This would mean the existing boiler would only have to top up the temperature once the building came into use.

Further professional advice is required, but on average a 4m2 evacuated tube installation could save an estimated 1,000kwh per year. The complex should consider a larger, more commercial installation. As this is essentially a decarbonisation of heat project there may be funding available through CARES.

Improvement Measure: Solar PV

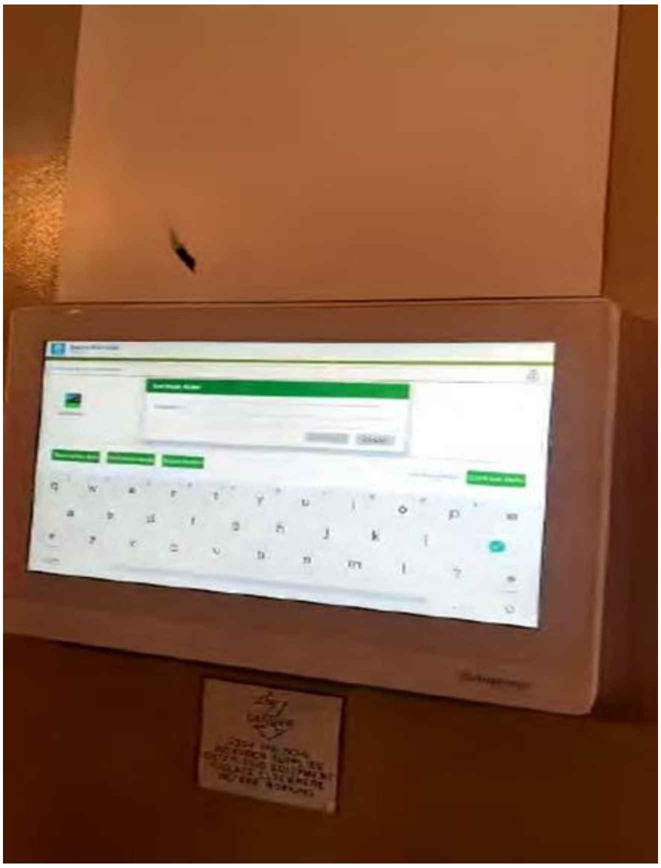
Many organisations are considering installing Solar PV as an on-site micro-generation system. The complex is not suitable for a large solar array as most of the power consumption is currently in the late afternoon or early evening. This would mean a large percentage of the energy generated by such a system would be exported to the grid for a low tariff.

If solar was considered a small array (1,2 or 3kWp) that might be suitable to meet the daytime consumption rates, further investigation into this consumption would be required to match a system output with demand.

Heading System

The primary heating system is from the Remeha Boiler, and this feeds the radiators, ceiling panels and the preheat/ heat to the ventilation system. The system is controlled by a BMS of which the instructions for use were not passed over to the current management.

Consider asking the BMS engineer to provide a demonstration on how to change the settings for the heating and ask for an updated list of the thermostats and weatherisation devices that are fitted to prevent the building from overheating.



Heating System (Air Conditioning)

The gym and the dance studio are fitted with air conditioning units, these are Mitsubishi air-to-air heat pumps which can also provide cooling. There are no gas-linked radiant heaters in these areas. At the time of the audit, these units had not been used as the gym was not open. It is hoped that these areas' use will increase, and we would expect the energy consumption to increase in line with this.

The temperature of these areas should be set much lower as activity will be taking place and therefore settings of 20 degrees are not required. Make sure and use the settings for air conditioning to either heat or cool to avoid the room being heated and cooled on the same day.

Consider replacing with the most efficient unit when the life cycle of the current units is reached. Ensure that there are good maintenance plans in place as low gas levels will increase energy consumption.

Improvement Measure: Develop Green Procurement Plan

Secondary electrical items or plug-in units like fridges, kettles, and toasters should be replaced with the most efficient goods when their life cycle is complete. Developing a plan to determine what each item should be replaced with before goods needing to be replaced are replaced ensures that the most efficient item is purchased, even in the event of an emergency. This plan should list all secondary electric items and have the replacement identified. The process for identification would include the cost, the energy consumption, and the expected lifecycle. The plan could include other items like lighting, heating, or ventilation equipment.

Conclusions and Recommendations

The fabric of the property is appropriate for the purpose of the building, some improvements could be made, but further inspection and investigation are required. To identify the potential for improvement 6 months of heating figure would be required to determine the heating load as the current gas bill only cover the summer months and we would assume the gas used during this period is for hot water.

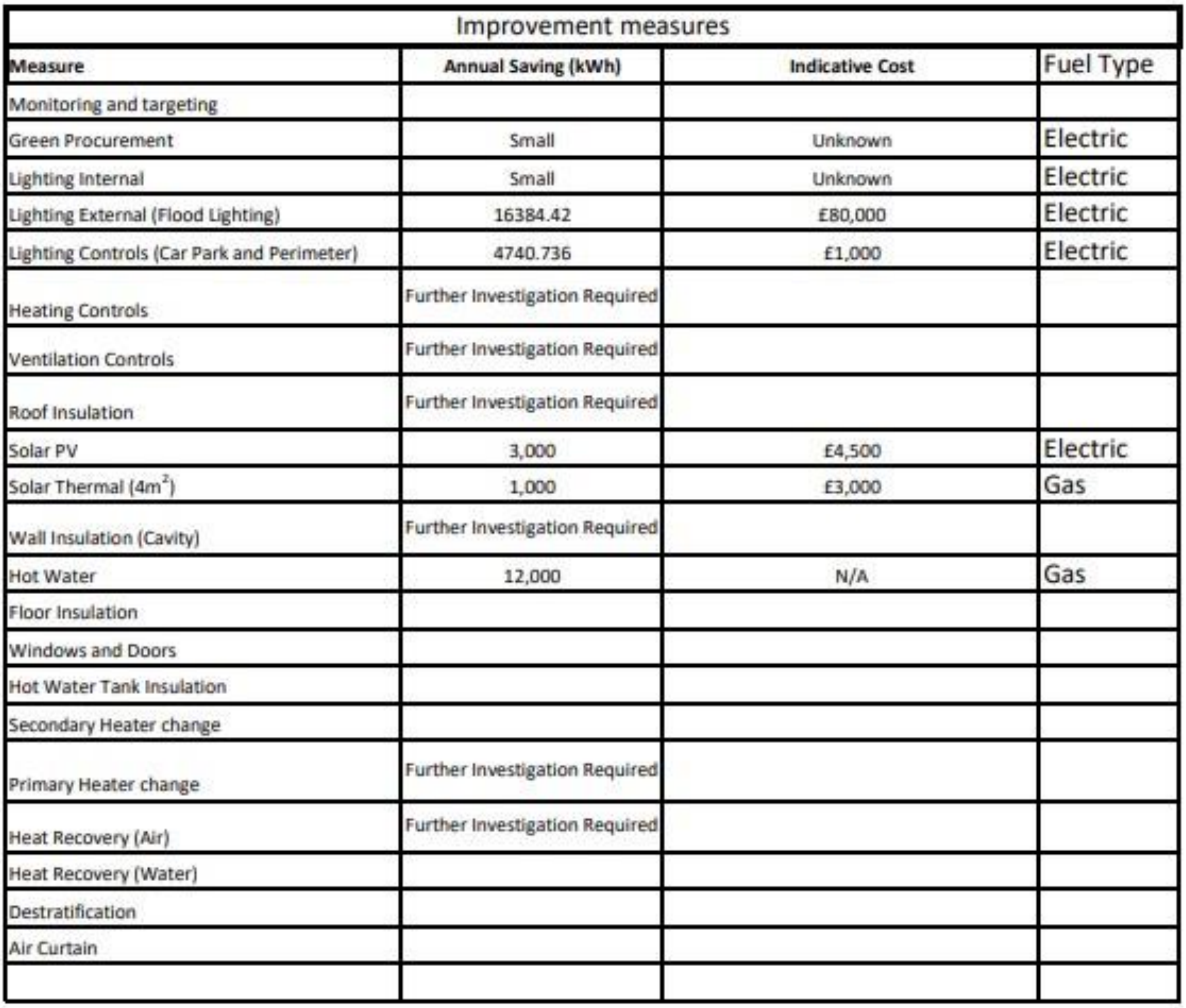
There are no recommendations suitable for improving the air conditioning and ventilation systems as the usage was deemed to be very low. Should this increase then consideration should be given to heat recovery, DCV, and ensuring the units are serviced regularly.

The consumption of gas for hot water could be reduced by thinking about when the need for large amounts of hot water is required. At present, the 500l hot water tank is warm even when there is only 1 of the building users on site. Considering how the building is used and what would suffice as an adequate provision at this time will reduce costs.

Most of the lighting has been changed or is already considered low energy therefore only small savings can be made internally when lights are being replaced. The external lighting proposal from Halliday will produce energy savings as well as ongoing maintenance savings if the terms of the guarantees provided are met.

Recommendations

1. Develop a green procurement plan for internal lighting and secondary electrical appliances.
2. Consider hot water use and identify the demand periods when it is appropriate to have 500l ready for delivery.
3. Install LED externally.
4. Connect time switch and lux sensors to the external car park and boundary lights to minimise consumption.
5. Where lighting is switched ensure that switches have notifications to encourage building users to switch off when not in use.
6. Ensure all secondary appliances have notifications to encourage building users to switch off.
7. Implement a monitoring and targeting program for energy use, including taking regular meter readings and determinations for power consumption during these periods.
8. Obtain building drawings to determine the current level of insulation and expected U Value to determine if the improvement is feasible.
9. Before opening the gym for full-time use, conduct an assessment of ventilation to examine controls and potential for heat recovery
10. Measure average hourly consumption of energy to determine Solar PV feasibility.
11. Engage with Solar Thermal Provider to determine the potential and cost for installation of evacuated tubes.



Improvement measures			
Measure	**Annual Saving (kWh)**	**Indicative Cost**	Fuel Type
Monitoring and targeting			
Green Procurement	Small	Unknown	Electric
Lighting Internal	Small	Unknown	Electric
Lighting External (Flood Lighting)	16384.42	£80,000	Electric
Lighting Controls (Car Park and Perimeter)	4740.736	£1,000	Electric
Heating Controls	Further Investigation Required		
Ventilation Controls	Further Investigation Required		
Roof Insulation	Further Investigation Required		
Solar PV	3,000	£4,500	Electric
Solar Thermal ($4m^2$)	1,000	£3,000	Gas
Wall Insulation (Cavity)	Further Investigation Required		
Hot Water	12,000	N/A	Gas
Floor Insulation			
Windows and Doors			
Hot Water Tank Insulation			
Secondary Heater change			
Primary Heater change	Further Investigation Required		
Heat Recovery (Air)	Further Investigation Required		
Heat Recovery (Water)			
Destratification			
Air Curtain			

The table above shows the potential for energy reduction where possible. The figure quoted should be multiplied by your current or expected unit rate to determine the potential cost saving.

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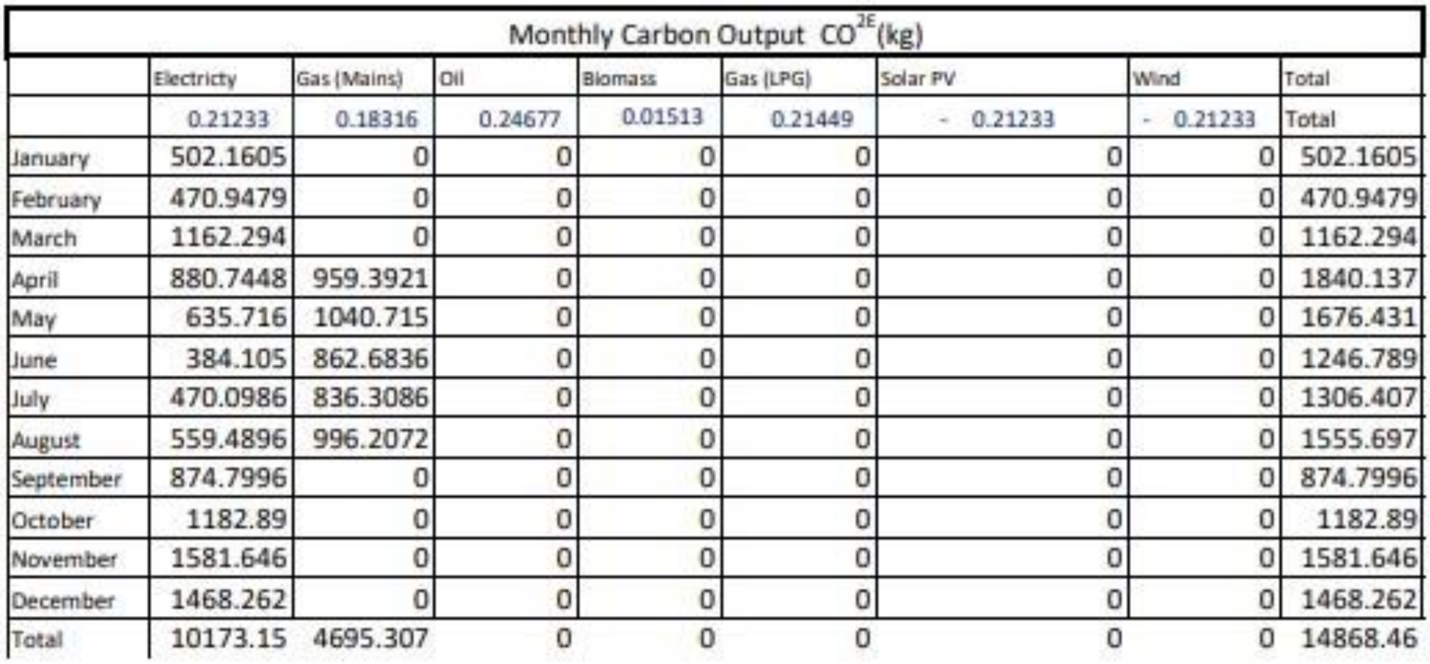
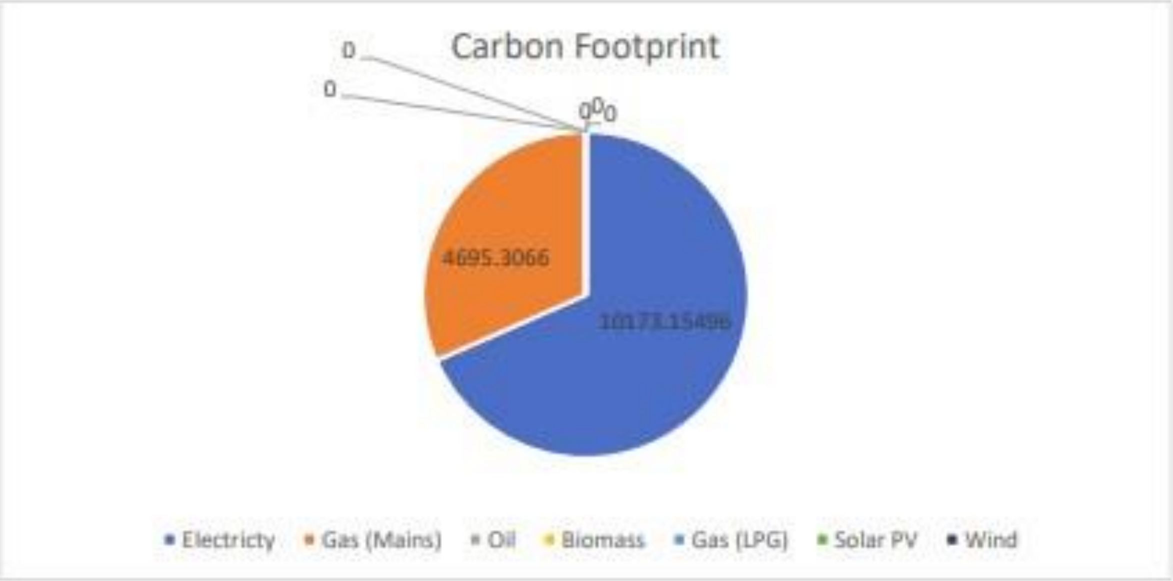


Monthly Carbon Output CO^{2E} (kg)								
	Electricty	Gas (Mains)	Oil	Biomass	Gas (LPG)	Solar PV	Wind	Total
	0.21233	0.18316	0.24677	0.01513	0.21449	- 0.21233	- 0.21233	Total
January	502.1605	0	0	0	0	0	0	502.1605
February	470.9479	0	0	0	0	0	0	470.9479
March	1162.294	0	0	0	0	0	0	1162.294
April	880.7448	959.3921	0	0	0	0	0	1840.137
May	635.716	1040.715	0	0	0	0	0	1676.431
June	384.105	862.6836	0	0	0	0	0	1246.789
July	470.0986	836.3086	0	0	0	0	0	1306.407
August	559.4896	996.2072	0	0	0	0	0	1555.697
September	874.7996	0	0	0	0	0	0	874.7996
October	1182.89	0	0	0	0	0	0	1182.89
November	1581.646	0	0	0	0	0	0	1581.646
December	1468.262	0	0	0	0	0	0	1468.262
Total	10173.15	4695.307	0	0	0	0	0	14868.46



Total	**14.87**	Tonne

Annual Reduction Target	0.531016484 Tonne