Essex County Council

School Energy Team

School Energy Survey

Opportunities for carbon reduction and increased energy efficiency

Essex County Council

ECC School Energy Team: School Energy Survey

[redacted] PS / 20 Feb 2023 Complete

Score	51.51%
Site conducted	[redacted] PS, Essex, [redacted]
Conducted on	20.02.2023 10:00 GMT
Prepared by	Hilda Wu
Location	[redacted]

Disclaimer

The surveyors believe the information contained within this report to be correct at the time of sending. The surveyors do not accept responsibility for any consequences arising from the use of the information herein. The report is based on matters which were observed or came to the attention of the surveyors during the day of the assessment and should not be relied upon as an exhaustive record of all possible risks or hazards that may exist or potential improvements that can be made. When implementing any changes always follow your schools standard procedures, procurement policies, code of conduct and appropriate health and safety checks.

Please contact ECC for any further guidance:

School Energy Team: schoolenergyteam@essex.gov.uk
Sustainable Travel Plans: nicholas.hill@essex.gov.uk
Energy initiatives/pupil involvement: lowcarbon@essex.gov.uk.
Climate Action Fund: climate.challengeprize@essex.gov.uk

School Energy Survey - 51.51%

51.51%

Office/engagement - 40%

40%

Energy data. Insert any pictures of bills and unit rates.

The school has secured with Smartest Energy for electricity and Total Energies for gas.

Gas rate: [redacted]p per kWh
Electricity rate (flat): [redacted]p per kWh
kVa charge: 65kVA @ £[redacted] per kVA

Photo 1

Photo 2

Photo 3

Is someone responsible for monitoring energy consumption?	We review the invoices and store them clearly (in an accessible folder), but do not note our consumption (i.e. on a spreadsheet).
Is information on consumption shared with everyone in the school?	There are no displays regarding energy consumption.
Is there any asbestos?	Yes.
Do you have an energy action/eco team? The school is setting up an eco-team with the school council.	We have an energy action team but the meetings are irregular.
Does your school have an environmental and/or energy policy?	We do not have a school energy policy in place.
Do you run activities to engage students; raising awareness around energy/sustainability?	We occasionally run activities to engage students and raise awareness around energy/sustainability.
Are pupils involved in reading meters and monitoring the results?	We have never ran an activity where we allow pupils to read meters/monitor energy use.
Sustainable transport - any walk to school initiatives, adequate bike storage, sustainable travel plan?	We would be interested in developing a sustainable travel plan, or improving our own.

Photo 4

Has the school received the ECC Schools Advice Pack?

The school will be emailed a copy of the Schools Advice Pack after the visit.

Boiler room, BMS/controls, meters and distribution boards - 70%

70%

Pictures and descriptions of the technologies which provide heat and hot water to the building. include any boiler ages.

Main boiler room:
2 x Ecoflam boilers with condition issues - the burners were likely installed in 2002 suggesting the entire plant is aged 2002.
1 x Andrews 32/143 33.4kW 145L gas fired HWS.

Small boiler room:
1 x Albion 600L hot water cylinder with 2 x Heatex immersion electric heaters rated at 6kW each.


Photo 5


Photo 6


Photo 7


Photo 8


Photo 9


Photo 10


Photo 11


Photo 12


Photo 13

Photo 14


Photo 15


Photo 16


Photo 17

Are boilers regularly serviced?

Boilers are serviced once a year.

Are pipes and valves fully insulated?

There is a good level of insulation throughout the pipes and valves, but some areas have been missed.

There are some areas of exposed pipework and valves which are missing insulation. See the thermal images report.

Photo 18

Do heating and hot water times match the occupancy of the school? Please note times.

Heating and hot water times have been reduced as much as possible.

The heating times are set to run from 6:30am to 8:39am and from 3:25pm to 5:44pm during weekdays and remains off over weekends. This equates to roughly 4 hours of operation on each weekday, or 20 hours of operation per week, which shows good practice. If the school is looking for opportunities to further reduce the heating times, they could consider removing the heating times from 3:25pm to 5:44pm as most of the students have already left at this time. Alternatively, to maintain the same number of heating hours while matching the heating times better with the occupancy of the school, consider setting the heating to run from 8:00am to 10:00am and from 1:00pm to 3:00pm. Latent heat in the building after 3:00pm should keep the building warm enough for the later staff members, such as the admin team.

In the main plant room with the 145L smaller HWS, the hot water times are set over two different time schedules; one on the Drayton BMS and another on the Grasslin timeclock. At the Drayton BMS, the hot water is set to run from 6:30am to 4:45pm on weekdays and is off over weekends, while it is likely set to run from 7:00am to 5:00pm at the Grasslin timeclock. The school should check whether the Drayton BMS or the Grasslin timeclock has a higher priority in controlling the 145L smaller gas fired HWS. In the small boiler room with the 600L electric HWS, the hot water times are controlled by another Grasslin timeclock which is set to run hot water from 6:00am to 5:00pm. Hot water times throughout weekdays should be reduced after consulting staff; kitchen staff and cleaners will be the biggest users. If point of use hot water stations can be assigned to the earliest/latest hot water users, this should be done in favour of running the large store at extensive hours. Immersion heaters store water at hot enough temperatures long after they are timed to go off. Therefore, the timings set should be minimised as much as possible, e.g., switching the larger electric HWS off after the kitchen staff have finished the dish-washing; this should leave plenty of hot water to use in the remaining school hours. A time schedule of 8:00am to 1:00pm has been a successful policy in other schools.

In both of the plant rooms, the Grasslin timeclocks are also controlling the extractor fans. In the small plant room, the extractor fans are timed from 6:00am to 5:00pm. The other one in main plant room is timed from 8:00am to 4:00pm. The school should investigate what these extractor fans are used for (kitchen or for general ventilation purposes) in order to set time programmes which are fit for purpose. For example, the extractor fans could be set to switch on from 08:30am to 1:30pm if they are for kitchen use or set to run from 8:30am to 3:30pm for general ventilation purposes. Timings set should exactly match the kitchen/school hours, as there is no warm-up time required for a ventilation system.

We can see the holiday programmes have been set at the Drayton BMS, this shows good practice. However, it seems that the holiday periods are overlapping each other, resulting a very long holiday periods from 1 January to 19 February. The school should investigate further and to correct the dates. Inputting all holiday dates and bank holidays at the beginning of each year will ensure seamless operation of the boiler and reduce the possibility of providing heat and hot water to an empty building. This will also ensure that the boilers frost protection settings remain in tact as the boilers are not being turned off completely - they are just entering holiday mode.

Also, consider consulting your BMS installers to fit further zone controls into both BMS. This will allow the school to limit over and under heating where structure, orientation, occupation or emitters have different characteristics.


Photo 19


Photo 20


Photo 21


Photo 22


Photo 23


Photo 24


Photo 25


Photo 26


Photo 27


Photo 28


Photo 29


Photo 30


Photo 31


Photo 32


Photo 33


Photo 34


Photo 35


Photo 36


Photo 37

What temperature is the water heated to? It must be heated to a minimum of 60 degrees but needn't be higher than this.

The hot water setpoint is 60 degrees.

We have not seen the hot water setpoint in the visit, but the temperature gauges for both HWS are showing at around 60 degrees.

Photo 38

Photo 39

Electric meters

Photo 40

Electric MPAN numbers and meter serial numbers

MPAN: [redacted]. Meter serial number: [redacted]

Photo of main incoming UKPN head

Photo 41

Gas/Oil meter

Current meter read: 205,806.32 m3

Photo 42

Photo 43

Gas MPRN number and meter serial numbers

MPRN: [redacted]. Meter serial number: [redacted]

Water meter

Requires further investigation/not seen on visit

Are distribution boards labelled clearly?

The labelling of distribution boards could be improved.

In the last photographed distribution board, some the consumer units were left blank. Direct labelling would improve site knowledge and help with the installation of timers.

Photo 44

Photo 45

Photo 46

Are there any distribution board/consumer unit timers? Are they set up and timed correctly?

There are distribution board/consumer unit timers, but timings could be minimised.

Apart from the above-mentioned Grasslin timeclocks controlling the water heaters and extractor fans, a timer for controlling outside lights was found during the survey. The timer is set to switch on from 6:00am to 8:30am and from 3:00pm to 9:30pm, see further discussion in the external lights section below.

Photo 47

Windows and Lighting - 41.18%

41.18%

What type of glazing does the school have? Note condition.

The school is fully double glazed.

The double glazed windows/doors were installed 5 years ago but the old metal frames were not replaced.

Photo 48

Photo 49

Photo 50

Photo 51

Photo 52

Are windows and skylights cleaned regularly to allow maximum natural daylight in?

There is scheduled maintenance for skylight cleaning/ skylights are generally clean.

The school has put UV film on the windows throughout the hall.

Photo 53

Photo 54

What kind of lighting does the school have?

Some areas in the school have LED lighting while others do not.

The school has replaced with LED in the hall, main reception, some hallways and in the new build, while other areas are using fluorescent tubes and CFLs.


Photo 55


Photo 56


Photo 57


Photo 58

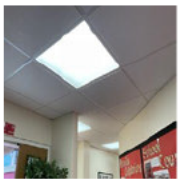


Photo 59


Photo 60


Photo 61

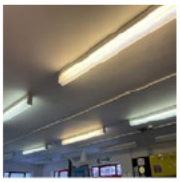


Photo 62


Photo 63

Are there any lighting sensors? Are they timed appropriately e.g. to go off after 1 minute of inactivity, rather than 30 minutes?

We have some sensors, but the timers could be adjusted/reduced.

There are motion sensors in cupboards of the new build. The school should investigate further and ensure the sensors are timed appropriately.

If LEDs are required, is this in the maintenance programme?

The school replace with LEDs as older lighting fails.

An LED project has the potential to yield huge energy savings for the school, with a quick ROI. For example, there were 13 fittings in the Robin classroom, each with single fluorescent tubes estimated at 36W. If running for 8 hours a day at the school's current day rate (29.35p), this singular room will cost £208.78 a year in electricity. Alternatively, 13 LED tubes at 16W each, would cost £92.79 for the same run time. This represents an 55.5% reduction in electricity running costs for the Robin classroom.

If there are multiple light switches in rooms, are they clearly labelled to prevent them from being used unnecessarily?

Some light switches are labelled e.g. with a colour coded system/switch of reminder.

The school has labelled the light switches with 'traffic light stickers', also with "save energy" reminders which is considered good practice.


Photo 64


Photo 65


Photo 66


Photo 67


Photo 68

List some LUX levels checks. General teaching spaces are recommended to be at 300 lux, while sports halls and kitchen prep areas are recommended to be at 500 lux. Circulation spaces can be between 80-120 lux.

Classrooms are generally exceeding the recommended LUX levels. Levels ranged from 390 to 740 lux, while one classroom is slightly falling below advised levels at 260 lux. The hall is at 1,380 lux and a circulation hallway is at 2,020 lux, when lights in both spaces are not switched on – this is the natural light level.


Photo 69


Photo 70


Photo 71


Photo 72


Photo 73


Photo 74

Are there controls for exterior lights? Are they checked regularly to ensure they match occupancy periods and hours of daylight?

There are controls for exterior lights but the timers could be reduced.

A timer for controlling outside lights was found during the survey. The timer is likely set to switch on from 6:00am to 8:30am and from 3:00pm to 9:30pm. The school should ensure the exterior lights are operating with minimal hours, e.g., allowing all exterior lights to switch off at 7:00pm rather than staying on until 9:30pm. Timers should also be altered seasonally so that lights come on later during the summer.


Photo 75


Photo 76

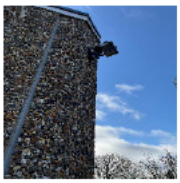


Photo 77


Photo 78

Kitchen - 42.86%

42.86%

Is catering equipment switched off immediately after use, including extractor fans?

Catering equipment is usually switched on from when kitchen staff arrive up until when they leave e.g. extractor fan stays on even when cooking has finished.

According to the kitchen staff, extractor fan and ovens can often be switched on on arrival, while the hot cupboard is switched on from 10:00am to 12:30pm for the lunch service from 12:00pm to 1:00pm. The Rational oven is rated at 11kW; switching it on just 2 hours later/less every day, over 190 school days a year, would save the school £1,226.83 yearly in electricity (calculated using the school's electric rate of 29.35 pence per kWh).

Switching extractor fans off as soon as cooking has ceased, or not putting the fan on full on arrival, could also yield significant savings. Fan speed should be tailored to cooking patterns and not just switched on to full. If just a few items are cooking, creating minimal heat/moisture, consider using a lower fan speed.

One of the freezers appears to be set to -23 degrees. Could this be reduced to -18 degrees and satisfy safe storage for food requirements?

Photo 79

Photo 80

Photo 81

Photo 82

Photo 83

Photo 84

Photo 85

Photo 86

Photo 87

Photo 88

Photo 89

Photo 90

Where possible are fridges and freezers located in areas away from heat sources?

Fridges are located as far away from heat sources as possible.

Are fridges and freezers defrosted regularly?

Fridges and freezers are defrosted regularly e.g. every two months or every half term.

Some modern units are self-defrosting while other units are defrosted every half term.

Is cooking equipment labelled with pre-heat times?

Equipment is not labelled with clear preheat times or appropriate usage advice.

Where possible are fridges and freezers emptied and switched off during holiday periods with doors propped open? If multiple appliances are present, the contents can be combined so some can be switched off.

Fridges/freezers are generally left on throughout holiday periods.

The fridges and freezers are generally left on over holiday periods. Over the periods of low stock/holiday, the school should move stock into other units so some can be shut down and allowed to defrost.

Are ventilation units and extractor hood grease filters cleaned regularly?

Ventilation units and extractor hood grease filters are a part of the regular cleaning/maintenance schedule.

Photo 91

Fabric - 50%

50%

When was the school built?

The school was originally built in 1981, while the relatively new extension was built in 2002.

What is the roof type? Has it been recently replaced/repaired?

A mix of roof types; including flat and pitched.

Photo 92

Photo 93

Is the level of insulation good? Where can this be improved? (roof, internal wall, external wall, around windows/doors)

There are areas which can be better insulated (subject to budget constraints).

Some of the windows and doors are draughty. Draught strips, door seals and insulated blinds should be added/replaced to retain heat within the school. See the thermal images report for details.

The current DEC recommendation report suggests the following:
- Consider implementing regular inspections of the building fabric to check on the condition of insulation and sealing measures and removal of accidental ventilation paths.
- Consider insulating the solid concrete external walls, giving consideration to external wall insulation over internal lining (to maintain thermal mass and help regulate the temperature during the summer and reduce over-heating).

Photo 94

Photo 95

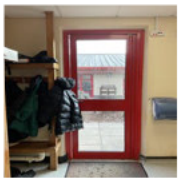


Photo 96

Photo 97

Are any parts of the school too hot? if so, where? Insert thermal camera images here if required.

See thermal images pdf

Are any parts of the school too cold/draughty? If so, where? Insert thermal camera images here if required.

See thermal images pdf

List some room temperature checks. During the heating season is the temperature of classrooms, libraries and IT suites 18 degrees? Sports halls, circulation spaces and toilets have a recommended temperature of 15 degrees.

The school maintains a satisfactory temperature of 17-18.5 degrees throughout.

Heating emitters and point of use hot water - 55.56%

55.56%

Are there any point of use (POU) electric water heaters? Are they on timers or switched off at the end of the day (especially over weekends/school holidays)?

It is uncertain whether any of the POU heaters are on timers and there is no switch off protocol. They are likely operating 24/7.

We have seen 3 POU water heaters in students' toilets and cleaners' cupboard. There are 6-7 POU units throughout the school. They are not on timers and operating 24/7. The school should ensure the units are set to 'Eco Mode' and there is an end of day switch off protocol. Each Andris POU is estimated to consume 519 kWh annually, which means each unit will cost £152.3 a year in electricity to run (calculated using annual electricity consumption provided by Andris for model of Andris Lux 10 OR and the school's electricity rate of 29.35 pence per kWh). POU heaters should be operating at appropriate temperatures (making use of Eco Modes) and running according to strict 7-day timers which fit school occupancy patterns. This way, POU hot water stations could be used by the earliest/latest staff/cleaners at extended hours while the centralised system runs at minimal timings.


Photo 98


Photo 99


Photo 100

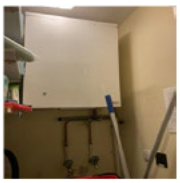


Photo 101


Photo 102

Are heating emitters (radiators, convectors etc.) free from obstructions such as tables, storage and bags?

A significant number of heating emitters are obstructed.


Photo 103


Photo 104


Photo 105


Photo 106


Photo 107


Photo 108


Photo 109


Photo 110


Photo 111


Photo 112

Are there thermostatic radiator valves (TRVs) or wall thermostats? Are they in good condition? Please note any exceptions.

There are TRV's/wall thermostats in every room in good, working condition.


Photo 113

Is there a heating emitter maintenance programme? e.g. cleaning, draining (with sampling) and bleeding radiators?

There is a heating emitter maintenance programme; bleeding/draining/cleaning has been undertaken where appropriate.

Is your school free from supplementary heaters (i.e. electric plug-in heaters?) The use of these indicate an inefficient heating system	Plug-in heaters are not used/necessary.

Ventilation

What kind of ventilation does the school have? Good ventilation is necessary to provide healthy and productive indoor environments throughout the year. This includes lower CO_2 levels, which are linked to cognitive performance, reducing the risk of airborne diseases (such as COVID-19 and influenza) and overheating during the summer season.	Natural and mechanical

Electrical equipment - 71.43%

71.43%

Is IT equipment such as PC's, laptops, whiteboards, projectors and TV's always switched off at the socket when not in use?	IT equipment is unplugged when not in use i.e. there is an end of day switch/unplug off protocol.

An end of day switch off protocol is in place at school which shows good practise. The network for the IT suite is shut down at 5:30pm and iPad trolleys are turned off in the evenings and just before holidays.

However, since the survey was conducted during school hours, we cannot tell for certain whether equipment is fully switched off at the end of the day. The school could carry out further investigation after school hours / during holidays. This will help staff to assess how well the school 'shuts-down'.

Photo 114

Photo 115

Photo 116

Photo 117

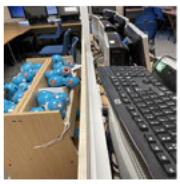


Photo 118

Photo 119

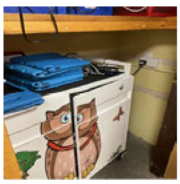


Photo 120

Photo 121

How many printers and photocopiers are there? Could this be reduced?	The school operate with the minimum number of printers/photocopiers possible.

Photo 122

Photo 123

Is IT equipment such as printers, photocopiers switched off overnight?

Printers and photocopiers enter sleep mode/standby, but are never switched off at the socket.

Since the survey was conducted during school hours, we cannot tell for certain whether equipment is fully switched off at the end of the day. The school could carry out further investigation after school hours / during holidays.

Are classroom fridges and staffroom appliances turned off when not in use e.g. over holidays?

Classroom fridges and staffroom equipment are turned off over some holidays but not others e.g. just the summer holidays.

The fridge for breakfast club in the hall is turned off for holidays but the fridges in the staffroom are not. There are 2 fridges and 1 freezer in the staff room, one of which is empty. The empty mini fridge consumes 113 kWh electricity yearly, which costs the school £33.2 a year (calculated using the school's electricity rate of 29.35 pence per kWh). The school should consider consolidating these units to reduce the number of appliances needed e.g., only 1 fridge and 1 freezer in the staff room.

We have seen 3 water dispensers throughout the school, which appear to be on 24/7. Each dispenser, with an electric load of 100W, will be costing the school £257 a year (calculated using the school's electricity rate of 29.35 pence per kWh). The Elson boiling water heater at staffroom is also likely running 24/7. These should be switched off at the end of each day and throughout holiday periods.

Since the survey was conducted during school hours, the school could review the usage of their staffroom appliances during holidays.

Photo 124

Photo 125

Photo 126

Photo 127

Photo 128

Photo 129

Photo 130

Photo 131

Photo 132

Photo 133

Photo 134

Photo 135


Photo 136


Photo 137


Photo 138


Photo 139


Photo 140


Photo 141

Air-conditioning - 0%

0%

Is there any air conditioning?

Yes.

How many air conditioning units are there? Where are they?

There is a single air conditioning unit located in the ICT suite.


Photo 142


Photo 143


Photo 144

what is the kW rating for air-conditioning units?

Requires further investigation

What are the set points/controls? Air conditioning should not operate below temperatures of 24ºC, unless there is a specific process requirement.

Air conditioning controls are unrestricted.

Though the air conditioning unit is likely remote controllable, there are strict usage policies in place.

Swimming Pool

Is there a swimming pool?

The school does not have a swimming pool.

Renewables - 0%

0%

Are there any renewables in place? e.g. solar PV

The school does not have any renewables in place.

Other: Positive practice, floor plans and any other issues to report

A space for positive practice observed which could be replicated in other schools.

- Having minimal heating times - 4 hours on each weekday
- Labelling the light switches with 'traffic light stickers', also with "save energy" reminders
- Having an end of day switch off protocol for the IT suite's network and iPad trolleys

A space for any floor plans/drawings found.

Photo 145

Photo 146

Cracking/damp/mechanical faults and any other issues

Nothing to report

Report Summary: Benchmarking and next steps - 100%

100%

Benchmarking: Insert average energy use per pupil and per SQM according to latest DEC. In the UK, 110kWh/m2/year is considered good practice for a primary school without a pool. Typical usage is 119kWh/m2/year.

The schools average energy use is considered 'good practice'.

Annual electricity use (kWh/m2/year): 52.72
Annual gas use (kWh/m2/year): 59.07
Annual energy use (kWh/m2/year): 111.79

Annual electricity use (kWh/pupil/year): 317.48
Annual gas use (kWh/pupil/year): 355.72
Annual energy use (kWh/pupil/year): 673.19

Opportunities for carbon reduction and increased energy efficiency

Office/engagement

- ☐ Create a school energy policy: To ensure the success of your energy saving programme, including any of the suggestions below, it's important to develop an action plan with realistic targets which engage everyone in the school community. This will give everyone an active and traceable responsibility for monitoring and reducing energy consumption throughout the school. It will also allow the school to track any progress. There will be a template sent with this survey to help you start a school-wide energy policy. The benchmarks above can be inserted into the template as a starting point. As the school does not currently share/display energy consumption with the whole school; this could be a good first target. The policy should be displayed, updated and any progress sent to governors/parents on a regular basis.
- ☐ Consider purchasing a business energy monitor display. They work by attaching a sensor to your electricity meter, which then monitors your usage by measuring the current that flows through to the meter. This sensor has a transmitter attached, which wirelessly relays this information to your display unit, showing measurements such as costs, power usage, and CO2 emissions. Displaying these monitors to staff and having the site manager logged into an associated app will help to put the school in direct control of electricity usage. Periods of high use/cost can be immediately flagged for investigation!
- ☐ ECC is currently participating on a project called "2imprezs/Energy Challenges". The objective is to get school children to campaign, in their own way, for energy savings in their school by doing surveys & monitoring; understanding how different equipment/lighting uses energy; and leading on changing behaviours. Schools that participated in this programme before have reduced energy consumption by an average 15%. If you would like more information, please email lowcarbon@essex.gov.uk.

- [ ] Play The Serious Energy Game with students. Find all possible measures of saving energy in the Serious Energy Game and earn as many points as possible by using only the smartest and most economical measures. Will you be at the top of the scoreboard soon? Download the app here: https://www.energychallenges.eu:44300/SeriousGame/#[object%20Object]
- [ ] Sign up to Better Planet Schools to integrate energy and sustainability into the school curriculum. Better planet schools provides ready-made teacher/student resources on 9 different topics. ECC is currently a sponsor of Better Planet Schools. This means that if you select 'ECC' as a sponsor during sign up, your account creation will be free. Better Planet Schools allows teachers to select one topic per term to teach, which is then divided into easily accessible and planned weekly lessons. https://www.betterplanetschools.org.uk/signupschool
- [ ] As the school has a smart meter, considering signing the school up for Energy Sparks. After signing a letter of authority, Energy Sparks requests access to your live electricity data. The site then displays your data in easy to use graphs separating daytime, overnight, weekend and holiday usage. The website gives tailor-made recommendations and student-led activities for reducing consumption. https://energysparks.uk/.
- [ ] Consider reducing the schools monthly KVA charge (AvCap). The schools maximum KVA demand can be found on the schools electric meter and is usually much below the KVA being billed for monthly. Consider reducing the capacity (KVA) you pay for, while maintaining a 10% buffer e.g. if the maximum demand is 50KVA (found on the smart meter) and your AvCap charge is £120 (£1 per KVA, displayed on the monthly bill), consider reducing your charge to 55KVA for a saving of £65 a month, or £780 a year. If the schools electric meter has been changed recently, consider seeking historical data to get an accurate depiction of the schools max demand in KVA. The KVA (AvCap) may need to be increased again in the future if the school has any plans to add to the electrical load e.g. extra IT equipment, air-con, EV chargers, solar PV or a heat pump. Consult with your schools electrical contractor before approaching UKPN. https://www.ukpowernetworks.co.uk/electricity/reduce-my-power. Please be aware that once you have reduced your power UKPN will release capacity back into their network. It is then available for others to use and may not be there for you in the future. You may have to pay to have extra capacity provided again.

Boiler room, BMS/controls, meters and distribution boards

- [ ] Consider using bespoke removable insulation jackets, foil/fibreglass wrap or tubular sleeves to cover exposed hot surfaces in the plantroom which have been left open for maintenance access (e.g. heat exchangers and pipe connections). Please see pdf of thermal images for best places to install further insulation. Insulation can reduce heat loss from pipes by up to 90%, resulting in a reduction in energy costs.
- [ ] Under 'block dates (half terms)' and 'single dates (bank holiday)', no holiday programmes have been set. This means that the heating/hot water likely run when the school is empty, unless manual shutdown is undertaken. Inputting all holiday dates and bank holidays at the beginning of the year will ensure seamless operation of the boiler and reduce the possibility of providing heat and hot water to an empty building. This will also ensure that the boilers frost protection settings remain in tact as the boilers are not being turned off completely - they are just entering holiday mode.
- [ ] Consider reviewing the main BMS to see if the setpoint for heating can be adjusted. Heating should be on in classrooms and general workspaces until internal temperatures reach 19 degrees. The setting for sports hall's and circulation spaces is recommended to be lower than this, at 15 degrees.
- [ ] Many heating control systems review the outside temperature and have set points at which the system will automatically switch off when it is warm enough outside. This is often called the 'eco summer hold-off' or similar. If this is available, you should set the outside temperature to between 15°C and 17°C to prevent the heating operating on warmer days and open the windows to cool the building down.

- [ ] Reduce the schools hot water times. Some schools have found that timing hot water to go off a few hours before it is last needed, or after the catering staff finish, leaves the water warm enough for the last user. For example, switching off the hot water at 13:30pm when the last users leave the building around 5/6pm. Later building users usually have minimal hot water needs (occasional handwashing); If hot water is set to 60 degrees, it is only needed at 43 degrees for handwashing. Success will depend on the efficiency/insulation of your hot water store and time changes may require trial and error, but could have huge benefits. Reducing heating and hot water times by 1 hour a day can equate to a 10% reduction in bills, while reducing heating by $1^{o}C$ can reduce bills a further 10%. You do not need to run hot water 24 hours a day, 7 days a week for legionella protection. You can switch off systems overnight and at weekends and should switch them on again in time to heat the water sufficiently before use. For more information on managing legionella risk, read the Health and Safety Executive (HSE) guidance Legionnaires' disease: hot and cold water systems.
- [ ] Where hot water is staying on extremely early/late for cleaning or staff, consider assigning them to one point of use hot water station, or installing one specifically for this purpose. This will mean the entire system will not have to operate when just one assigned location may suffice.
- [ ] If you have a conventional boiler with a hot water cylinder, then you could try turning the boiler's flow temperature down to 65 degrees. Don't set it any lower than this or the boiler won't be able to heat your hot water cylinder to 60 degrees. The temperature must be no lower than 65 degrees to keep your hot water supply to your taps safe, otherwise there's a risk of legionella bacteria growing in the cylinder. Reducing the flow temperature also lowers the return temperature. All boilers are more efficient when the return temperature is low, and this can save you energy and money. It's important to get your heating controls right first before you try to adjust the boiler's flow temperature with your boiler's thermostat. Before you make any adjustments, it's a good idea to take a photo or make a note of how everything is set. That way you'll know what to turn it back to if you need to (e.g. if after lowering the flow temperature, the radiators which are furthest away from the plant fail to get hot enough).
- [ ] Room thermostats and temperature sensors, usually tied into the BMS, need a free flow of air to sense the temperature, so make sure they're not blocked by curtains or furniture, and keep them away from heat sources.
- [ ] Consider consulting your BMS installers to fit further zone controls. This will allow the school to limit over and under heating where structure, orientation, occupation or emitters have different characteristics.
- [ ] Direct labelling in all distribution boards would improve site knowledge and help with the installation of timers.

Windows and lighting

- [ ] Windows/doors that can be opened, and are generally in good condition, should be draughtstripped. Draught-proofing strips stick around window/door frames and fill the gap between the window and the frame.This reduces cold draughts and ventilation heat loss.
- [ ] Regularly clean all windows, skylights, transparent doors and lights.
- [ ] Consider fitting secondary glazing and/or under glaze sky lights where appropriate.
- [ ] Replace with LEDs as and when the school can afford. The most underlit areas of the school and areas with the highest wattage lighting should be prioritised. When carrying out upgrades, consider adding occupancy/daylight/absence/motion sensors. These should be timed to switch lights off after short periods of inactivity e.g. 5 minutes. Replacements should comply with the building regulations and meet the requirements set out in DfE's output specification (Technical Annex 2E). Replacing inefficient lights, such as fluorescent lights, with LED lights, alongside movement and daylight sensors, can reduce your energy consumption from lighting by over 84%.

- [ ] Reduce timers for outside lights. This will vary with the seasons but as schools are a locked premises the requirement for well lit areas is relatively low. Set timers, sensors and controls to suit the schools operational needs, including adjustments required for the varying seasons. This is especially important for security lighting, which can be energy intensive. You should not usually leave external lighting on permanently overnight for security reasons. Instead, install motion sensors on the external lighting to alert others in the area of movement around the school overnight.
- [ ] Make good use of the lighting sensors and ensure the motion sensors are timed appropriately e.g. to go off after 1 minute of inactivity, rather than 30 minutes. Further adjustments could be made after a period of time with feedbacks collected from the teachers and other users.

Kitchen

- [ ] Turn off fridges and freezers during holiday periods, where appropriate. If it is not possible to switch off all appliances, consolidate the contents so that some can be turned off; freezers operate more efficiently when they are full.
- [ ] Check dishwasher cycle settings e.g. consider reducing drying times on dishwashers and allowing residual heat to finish the drying process.
- [ ] In the kitchen, add clear stickers to all equipment displaying the preheat times/usage information. A clear sticker stipulating when extraction fans should be used is particularly important. These labels will raise awareness and ensure no equipment is left on unnecessarily. Many modern ovens, fryers and hot cupboards will warm up in under 10 minutes. You should only turn them on at the start of the day if you're using them in the first 15 minutes.
- [ ] Switching extractor fans off as soon as cooking has ceased, or not putting the fan on full on arrival, could yield huge savings for the electric bill. Fan speed should be tailored to cooking patterns and not just switched on to full. If just a few items are cooking, creating minimal heat/moisture, consider using a lower fan speed.
- [ ] Implement a regular defrosting programme in the school kitchen to increase the efficiency of freezers. The Carbon Trust recommend defrosting every two months as a minimum or following manufacturers' recommendations
- [ ] Check that all refrigeration/freezer temperatures are set appropriately. Refrigeration temperatures set 1ºC too low can increase running costs by 2-4% (Always ensure that the temperature setting satisfies the requirements for safe storage of food).
- [ ] Ventilation units and extractor hood grease filters should be cleaned at regular intervals, as recommended by the manufacturer. Energy consumption can increase by up to 60% if regular maintenance is not undertaken. Dirty or faulty fans, air ducts and components directly affect system efficiency and will increase running costs and risk of breakdown.
- [ ] Consider heat recovery from the kitchen. Large volumes of warm air are expelled from catering facilities through the ventilation system. Over 50% of this 'waste' heat can be recovered using heat recovery devices which can significantly reduce energy costs. An air-to-water recovery device is often the most effective method of recovering heat because it can then pre-heat hot water, providing a year-round use.
- [ ] After implementing equipment labelling to ensure ovens/extractors are not on for longer than necessary; review the temperature and comfort of kitchen staff. If the area is still overheating easily, consider a evaporative cooling unit or heat recovery.

Fabric

- [ ] During winter close blinds/curtains where possible, this will stop cold draughts from entering the room and limit heat loss through the windows, especially overnight. During summer, this will prevent any unwanted solar gain. This can be the daily responsibility of a classroom energy monitor.

- [ ] Consider upgrading blinds/curtains to thermal or insulated blinds. They have a close fit around the window and most are designed to trap a layer of air inside the blind, so the blind works in a similar way to double glazing. This makes them great for preventing heat loss, especially when closed overnight. Alternatively, internally fitted magnetic single glazing could be considered as an easy to install option.
- [ ] Consider purchasing draught strips/seals for draughty areas with poor insulation or single glazing. These self-adhesive foam strips or brushes will reduce heat loss and can prevent the need for additional heating. After review of the thermal images, decide the best places to add this extra protection.
- [ ] Consider installing reflective foil behind radiators in particularly draughty areas. Foil can be installed behind radiators at any time and is low cost. The foil surface reflects heat back into the room that would otherwise be lost through the wall. As well as reducing heating energy consumption, warm up periods are reduced and better heat distribution can be achieved. This measure is especially effective in intermittently heated areas with uninsulated solid walls.
- [ ] Block up unwanted gaps that let cold air in and warm air out. Seal old extractor fan outlets with bricks or concrete blocks from both the inside and outside, fill in any cracks using cements or hard-setting fillers, fill gaps in floorboards and skirting boards with flexible filler, fill small gaps around pipework with silicone fillers and fill larger gaps with expanding polyurethane foam.
- [ ] 25% of a buildings heat can be lost through the roof in an uninsulated building. Roof/loft insulation generally has a lifespan of 40+ years, by which time the school would have recovered capital costs in energy bills many times over. In the 1980s, it was quite standard to install any thickness from 25 to 50 mm. Then, building regulations stated that homes should have as much as 100 mm of loft insulation. This gradually increased to 200 mm and now stands at 270 mm for new builds and is recommended for other properties. So if there is existing insulation, consider increasing the thickness. Be sure to also insulate the loft hatch. Read the Energy Savings Trusts' guide on roof insulation and consider engaging local experts for advice/quotes https://energysavingtrust.org.uk/advice/roof-and-loft-insulation/
- [ ] About a third of all the heat lost in an uninsulated building escapes through the walls. Consider whether your building has cavity or solid walls and what options there may be for improved insulation (If a brick wall is more than 260mm thick then it probably has a cavity). Payback on wall insulation generally takes longer than other kinds of insulation, or an LED project, but can make more sense financially alongside redecoration. Read the Energy Savings Trusts' guide on wall insulation and consider engaging local experts for advice/quotes https://energysavingtrust.org.uk/advice/cavity-wall-insulation/
- [ ] 10-20% of heat loss from a building can come from the floors if they're not insulated to a reasonable standard. The main source of heat loss from flooring is wooden floors and draughts that come through gaps in between floorboards, skirting boards and around pipes. Both wooden and concrete floors can be insulated. Read the Energy Savings Trusts' guide on floor insulation and consider engaging local experts for advice/quotes https://energysavingtrust.org.uk/advice/floor-insulation/

Heating emitters and point of use hot water

- [ ] Room thermostats should be set to the lowest comfortable temperature, which for most is between 18°C and 21°C. For every degree you increase the temperature, it will increase the heating bill by about 10%. You don't need to turn your thermostat up when it is colder outside; the school will heat up to the set temperature regardless. It may take a little longer on colder days, so you might want to set your heating to come on earlier in the winter.
- [ ] Ensure radiators are free of obstruction. There were several partially/fully covered radiators throughout the school, (see photographs). Shelving, desks, coats and furniture against a radiator block heat from being properly distributed throughout the room.
- [ ] TRVS should be maintained so that settings can be adjusted. Consider turning TRVs on-low in rooms that easily overheat or aren't used often.

- [ ] Install thermostatic radiator valves (TRVs) to all radiators which do not have one. TRVs maintain the room at a set temperature and allow local control of heating. TRVs are a simple retrofit solution that you can fix to all existing radiators.
- [ ] Consider purchasing consumer unit/distribution board timers for point of use hot water stations. They are usually all on one board so installation should be relatively straightforward, with a short payback as units are left on 24/7 at present. Once installed, limit timings as much as possible. Assign the earliest/latest hot water users to just one or two POU stations e.g. cleaning staff. Until timers can be installed, consider appointing someone to switch these off directly at the unit at the end of each day.
- [ ] Run electric point of use water heaters with low storage volumes (15 litres or less - generally under the sink units) at 50°C, not the 60°C needed for legionella protection in larger storage tanks.
- [ ] Install point of use water heaters in areas where long pipe runs are needed to connect to the central hot water supply. This can help reduce heat loss through the pipework. Additionally, consider installing just one unit for the earliest/latest staff members e.g. cleaning staff. This way the whole system will not have to run at extended hours e.g. 6am-6pm. Hot water could generally be turned off as soon as the kitchen go home (they are usually the biggest users) e.g. 8:30am-1:00pm. If your hot water tank is well insulated, this should leave plenty of hot water for handwashing for the rest of the school day.
- [ ] Consider the possibility of decentralising the provision of hot water in the school. Where the requirement for hot water is small, it may be worth installing instantaneous point-of-use (POU) water heaters, avoiding heat loss from pipework and storage cylinders. If there are already some POU water heaters, consider how many the school would need to add to make the hot water store redundant. Seriously consider if there is a real need for hot water in classrooms. POU heaters should be on strict timers and shut down at the end of the school day.

Ventilation

- [ ] During winter, you can use CO_2 monitors to help balance good ventilation while keeping rooms warm. You do not have to fully open windows or keep ventilation systems on to achieve good ventilation. CO_2 monitors measure and display the CO_2 levels of the space. A higher CO_2 level means you need to increase the ventilation. If your CO_2 monitor is showing levels under 800ppm (green light), you can consider fully or partially closing the windows/vents/trickle vents. Do so gradually and in stages. If your CO_2 monitor is showing levels over 800ppm (amber light), consider opening the windows/vents/trickle vents and doors. Open the higher windows first, then the lower windows and doors, if necessary. If your CO_2 monitor is showing over 1500ppm (red light), your ventilation is poor. Open the windows and doors until the reading lowers.
- [ ] For training on using DfE issued CO_2 monitors visit https://www.coschools.org.uk/.
- [ ] If your CO2 monitor shows consistent inadequate ventilation then consult with your school leadership team to identify long-term solutions, in the meantime you might want to consider installing an air cleaners, typically just HEPA (high efficiency particulate air) filters. Use the following link for the DFE approved units within educational settings: https://s107t01-webapp-v2-01.azurewebsites.net/list/air-cleaning
- [ ] Regularly clean any extractor fans in bathrooms and kitchens. Check the manufacturer's instructions for any whole building mechanical ventilation system you have and ensure the filters are replaced in line with those instructions, usually this would be annually.

Electrical equipment

- [ ] Where possible, use 7-day time switches to automatically switch off equipment at the end the school day, weekends and during holiday periods. Digital timer switches or smart plugs are relatively inexpensive and widely available. Equipment that needs to be charged can be timed to do so during your cheaper 'night rate' tariff. This will be particularly important for large storage chargers containing ipads/laptops, printers and photocopiers. For other equipment like smart boards and ICT suite computers, consider appointing energy monitors. These students/staff members will ensure projectors, lights and other electrical equipment is switched off (at the plug!) during break-times, lunchtimes and at the end of the day. The same students/staff members can take regular meter reads to quantify the differences they are making. Templates for this will be provided in the email.
- [ ] The server should be reviewed to see if a computer shut down can be programmed into the system e.g. all computers in the ICT suite to power down at 3:30pm. If this is not possible, consider appointing an energy monitor to switch every computer off at the plug at the end of the day. A single, relatively modern, computer using 10w of energy on standby 24/7 can cost £17.52 a year in electricity (based on 25p/15p day/night rate).
- [ ] Undertake a technical audit of your ICT assets to identify opportunities to transition to more energy efficient cloud-based services. The school can migrate to cloud-based alternatives to replace energy intensive computing equipment, such as servers – for example, management information systems (MIS) or file storage. For guidance, read 'support schools when choosing a MIS'.
- [ ] Replacing desktop computers with laptops or tablets that use less energy could typically reduce energy consumption from the equipment by up to 80%.
- [ ] Consider distribution board/consumer unit timers for any/if not all electrical equipment. e.g. if all your lighting is on one board this can be timed to switch off every night and over weekends.
- [ ] Staff and classroom fridges should be consolidated and switched off over holidays (and weekends, if possible!). A typical 150W mini fridge, running 24/7, can cost £262.80 a year to run (based on 25p/15p day/night rate).
- [ ] Water coolers should be switched off at the end of each day. Consider smart plugs or switch bots to power these appliances down overnight and start them up again in the morning.

Air-conditioning

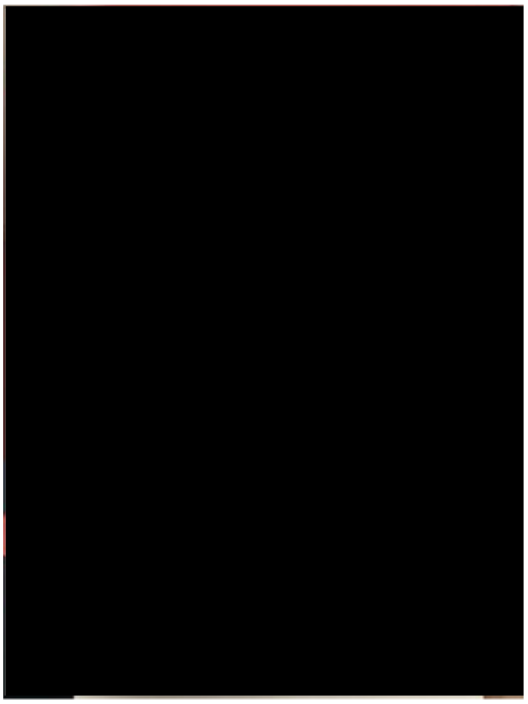
- [ ] Check to see if air-conditioning controls can be restricted e.g. only the lowest fan setting enabled and minimum temperature restrictions. Most server rooms need not run any lower than 21°C.
- [ ] Consider implementing regular filter cleaning into the maintenance programme. Over time, the air filters in air conditioners collect dust and debris, and eventually restrict air flow. When air flow is interrupted, the AC unit will strain to keep your school cool, and that will make it use more energy. Cleaning and changing them every 30 to 90 days should keep the air flowing smoothly through your unit.
- [ ] Consider reviewing the main BMS to see if the setpoint for air conditioning can be adjusted to reduce the need for manual control. The typical 'set-points' are 24–25°C in summer.
- [ ] Consider low energy cooling (without energy intensive refrigerants like in air-conditioning) or solar powered ventilation to improve hot or poorly ventilated areas. Passive ventilation, also called natural ventilation, makes use of natural forces, such as wind and thermal buoyancy, to circulate air to and from an indoor space. These ventilation systems work to regulate the internal air temperature as well as bring fresh air in and send stale air out. These systems can be solar powered. This means that during normal conditions adequate ventilation with no energy consumption is possible and during sunny periods, fan speed can be increased to improve comfort using the sun's energy.

Swimming pool	N/A
Renewables	N/A

Other

- [ ] When buying new equipment, factor in energy efficiency as part of your decisions. Consider whether increased costs upfront will be offset by savings over time with more energy efficient equipment.
- [ ] There is a DfE approved procurement framework for school's purchasing LED lighting. This can be found here: https://find-dfe-approved-framework.service.gov.uk/find/type/buying/what/energy-efficiency/energy-efficiency-categories/lighting-renewables/led-lights
- [ ] There is a DfE approved procurement framework for school's purchasing renewables e.g. solar PV. This can be found here: https://find-dfe-approved-framework.service.gov.uk/find/type/buying/what/energy-efficiency/energy-efficiency-categories/energy-audits/energy-audits
- [ ] There is DfE issued guidance on energy purchasing including a set of minimum standards and a DfE approved gas/electric procurement framework. Remember to review this guidance long before your contracts are due to end - switching can take up to 2 months while some contract types are only available 6-12 months in advance. The key to securing the best rates will be to request written quotations from your selected suppliers – if using a broker who offers multiple quotes already you should still ask for quotes from at least one other supplier as opposed to the broker: https://www.gov.uk/guidance/buying-for-schools/energy
- [ ] Schools can access free support from the DfE to use any of the above frameworks. The 'get helping buying for schools' team can give advice, obtain quotes and help with energy purchasing advice after reviewing the school's recent energy bills. Support can be accessed via a quick online form. The team endeavor to reply within two working days: https://www.get-help-buying-for-schools.service.gov.uk/procurement-support?referred_by=UmVjb21tZW5kZWQgZnJhbWV3b3JrIHBhZ2UgaHR0cHM6Ly9maW5kLWRmZS1hcHByb3ZlZC1mcmFtZXdvcmsuc2VydmljZS5nb3YudWsvZmluZC90eXBlL2J1eWluZy93aGF0L2VuZXJneS1lZmZpY2llbmN5L2VuZXJneS1lZmZpY2llbmN5LWNhdGVnb3JpZXMvbGlnaHRpbmctcmVuZXdhYmxlcy9sZWQtbGlnaHRz&session_id=ac566ab8-2c8b-4a17-be19-5cf65e8c1f34

Media summary



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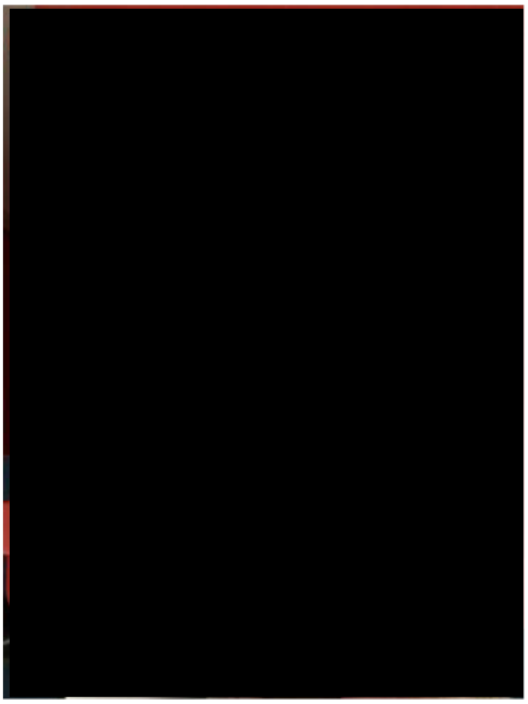

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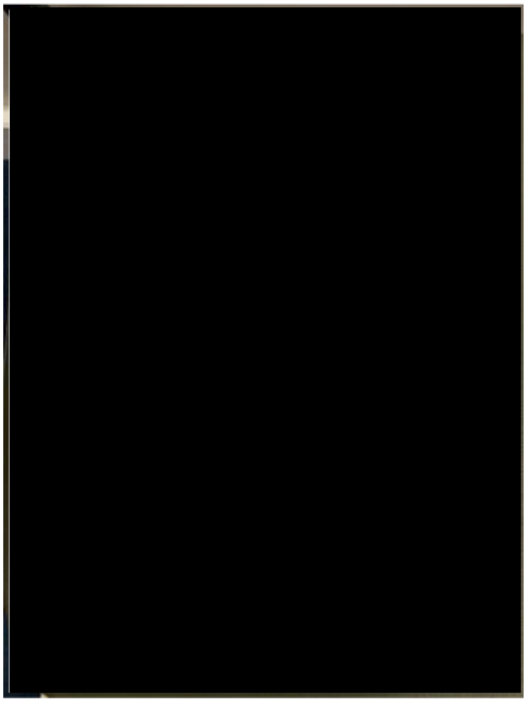

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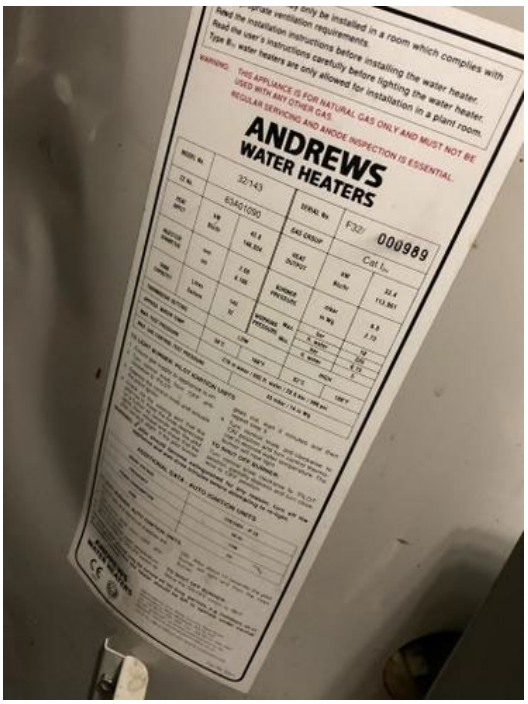

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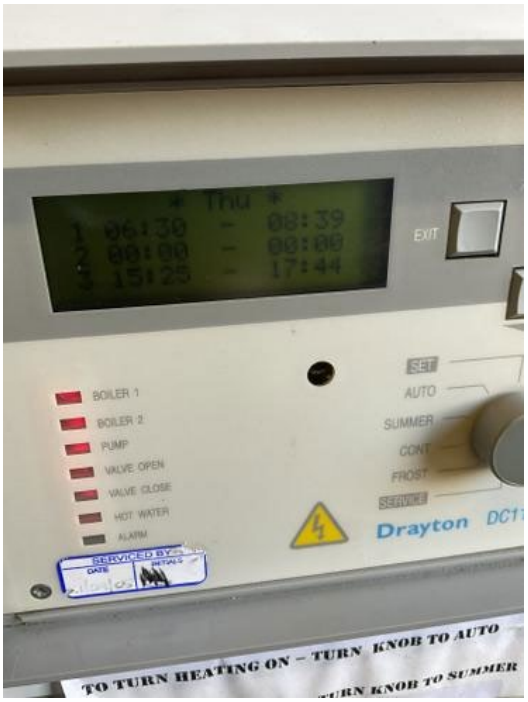

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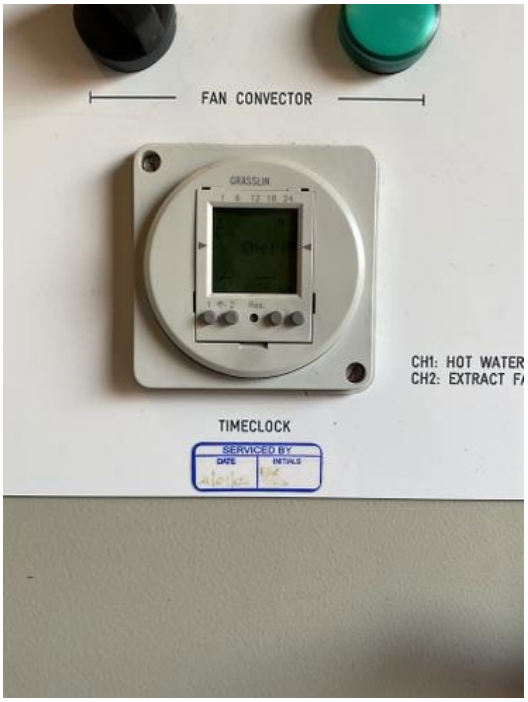

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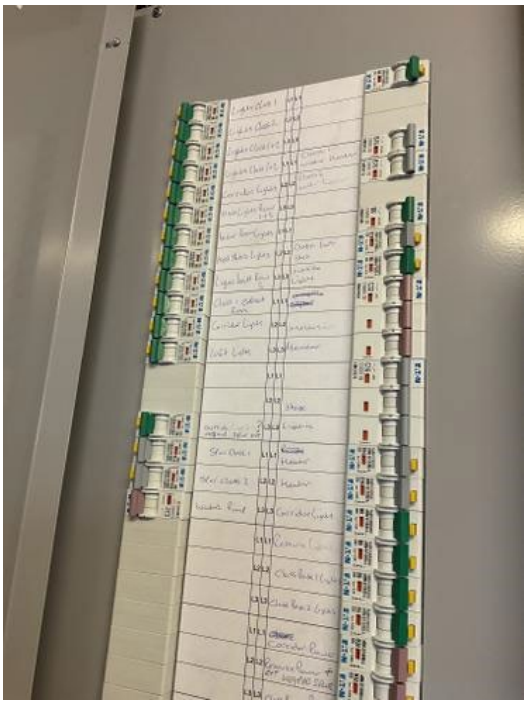

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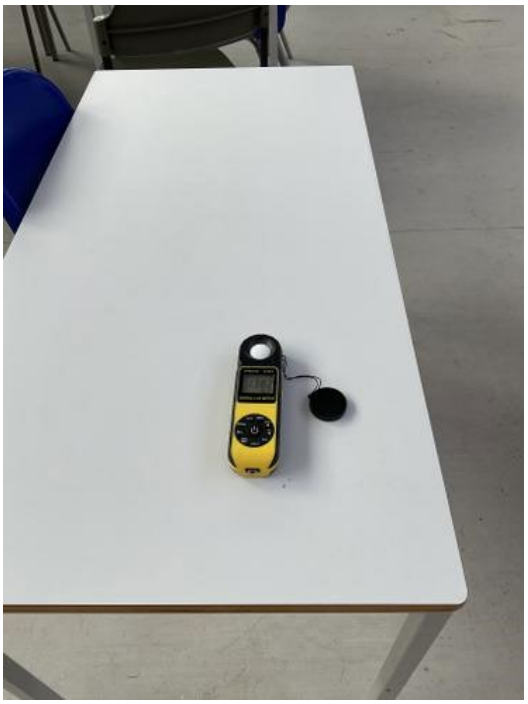

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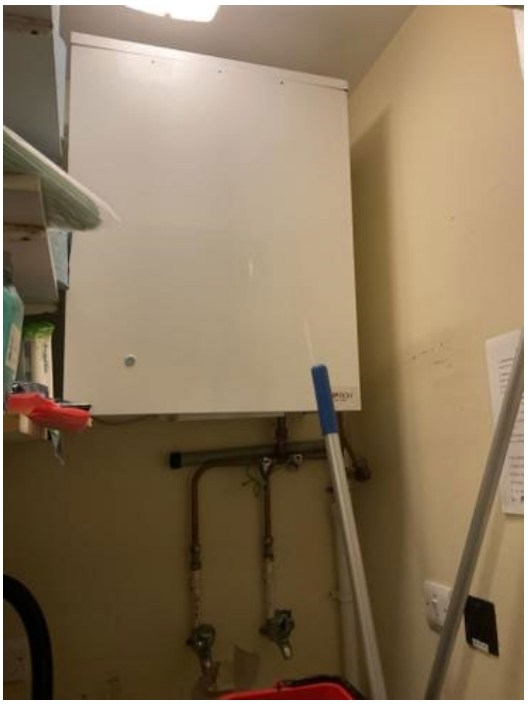

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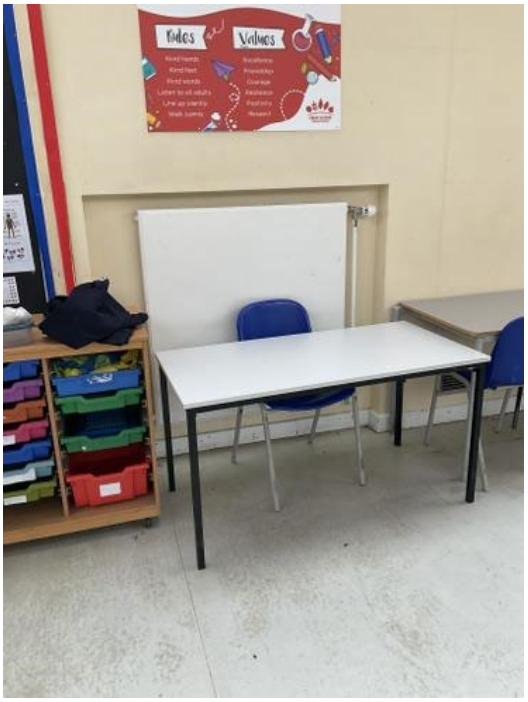

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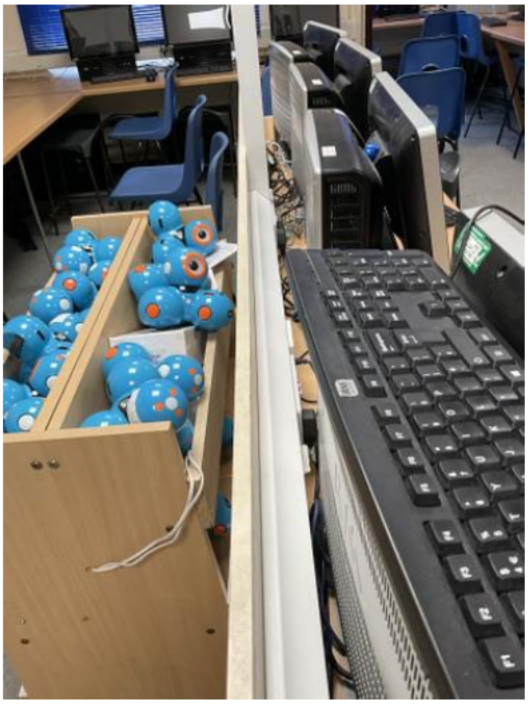

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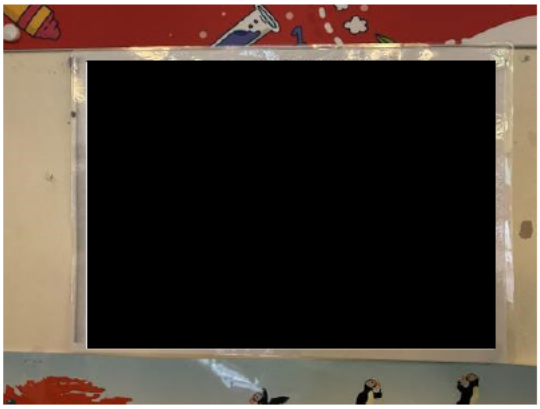

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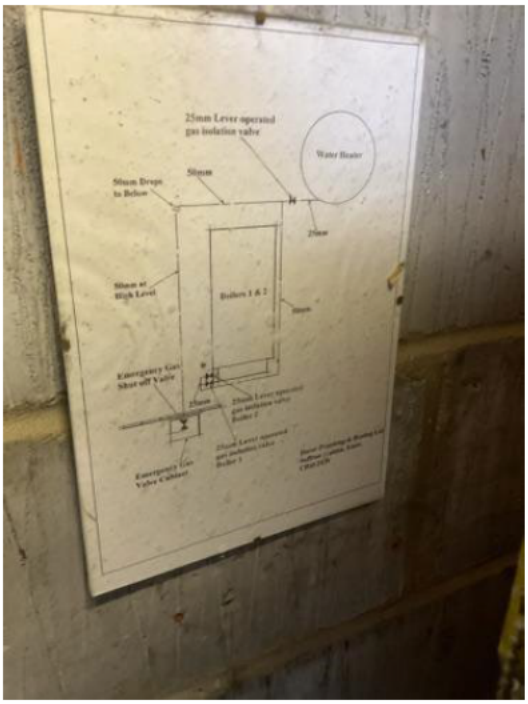

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