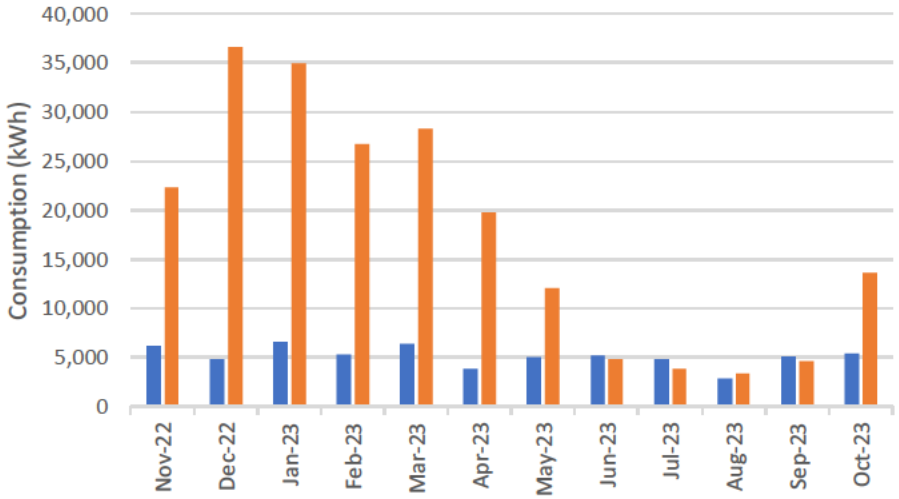
Energy Consumption Analysis

[redacted] School
1 November 2022 – 31 October 2023

Essex County Council
School Energy Team

The analysis below is based on electricity and gas consumption (kWh) and costs provided from your energy broker Laser. Due to data constraints, we only received electric data up to October 2023. To provide a comparison between electricity and gas consumption, the following analysis primarily focuses on the period from November 2022 to October 2023. However, the gas section will cover from May 2023 to April 2024 to better reflect recent consumption patterns.

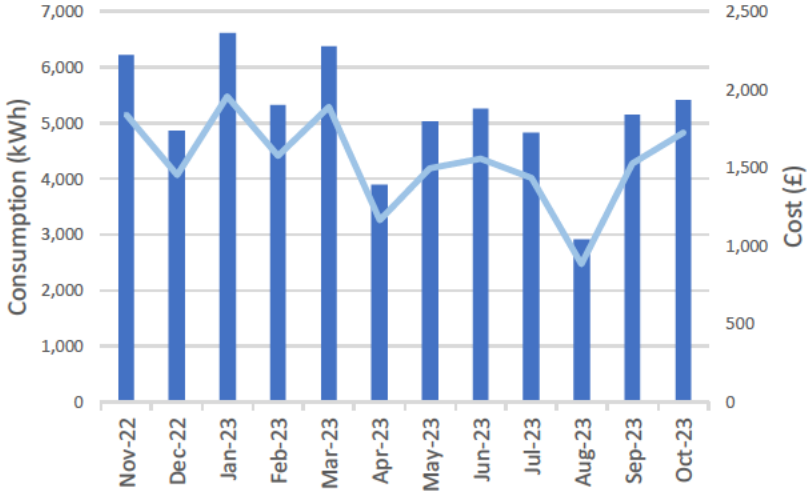
Overall Energy Consumption



61,878 kWh
Electricity

211,255 kWh
Gas

Overall Electricity Consumption and Cost



	kWh	£
Nov-22	6,218	1,841
Dec-22	4,865	1,449
Jan-23	6,612	1,956
Feb-23	5,320	1,576
Mar-23	6,380	1,888
Apr-23	3,896	1,165
May-23	5,033	1,496
Jun-23	5,260	1,559
Jul-23	4,828	1,437
Aug-23	2,912	882
Sep-23	5,148	1,526
Oct-23	5,406	1,724

Observations

Monthly average consumption:

The average monthly electricity consumption during the autumn and winter months (November 2022 to March 2023) is approximately 5,879 kWh, while the average consumption over the spring and summer months (April to July 2023) is approximately 4,754 kWh.

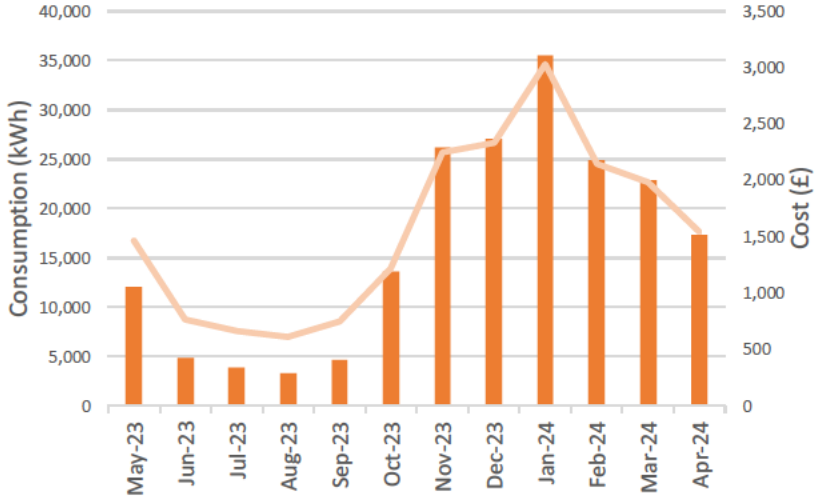
Seasonal variations:

Generally, there is a trend showing increased consumption during the colder months, likely due to higher heating and lighting demands. Peak consumption occurs in January 2023, with the highest monthly electricity consumption reaching 6,612 kWh, approximately 1.7 times the lowest monthly consumption recorded in April 2023.

August and holiday consumption:
Even though the school is mostly shut down during August, it still consumed 2,912 kWh of electricity. This represents approximately 61% of the school's typical monthly consumption over the spring and summer months. The data suggests that during the summer holidays, despite being closed, the school consumed over 61% of its average monthly electric consumption. It will be crucial to review and refine the school's shutdown procedure to minimise electricity wastage during periods of closure.

Despite the summer holiday, there is a noticeable pattern throughout the year influenced by school holidays. Decreases in consumption are observed during half-term breaks or holidays, such as in December, February, and April, suggesting that the school has successfully implemented holiday shutdown procedures.

Overall Gas Consumption and Cost



	kWh	£
May-23	12,088	1,461
Jun-23	4,820	764
Jul-23	3,896	661
Aug-23	3,328	611
Sep-23	4,639	747
Oct-23	13,652	1,218
Nov-23	26,135	2,250
Dec-23	27,068	2,330
Jan-24	35,511	3,029
Feb-24	24,930	2,147
Mar-24	22,860	1,981
Apr-24	17,319	1,536

Observations

Monthly consumption:
The highest monthly gas consumption was observed in January 2024, reaching 35,511 kWh, with associated invoiced cost amounting to £3,029. In contrast, the lowest monthly gas consumption (excluding August due to the summer holiday period) was recorded in July 2023 at 3,896 kWh, resulting in charges totalling £661.

Seasonal variations:
Gas consumption shows a noticeable pattern of increased usage during the colder months, likely corresponding to the school's demand for heating and hot water. The peak consumption period spans from November to March.

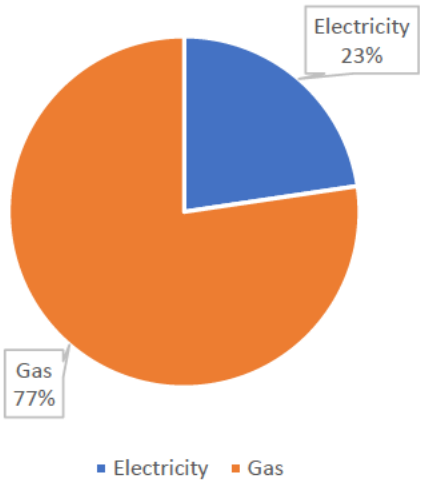
Rate of increase:
There is a substantial jump in gas consumption from September to November, with the latter month witnessing approximately 5.6 times the consumption of the former. This rapid increase likely marks the school's seasonal transition from 'summer' to 'winter' mode. Conversely, a decrease in consumption is evident from March to April, indicating the onset of spring and the school's shift back to 'summer' mode.

Hot water consumption:
Assuming that the primary gas consumption during summer months is for hot water (i.e., the AO Smith, 217L, direct hot water heater in the plant room, and the Andrews, 182L, direct hot water heater for the kitchen), the estimated average monthly gas consumption for hot water storages is approximately 4,452 kWh, costing around £724 per month (based on the months from June to July and September). Reducing hot water timings, as recommended in the main report, will be key to consistent monthly cost savings.

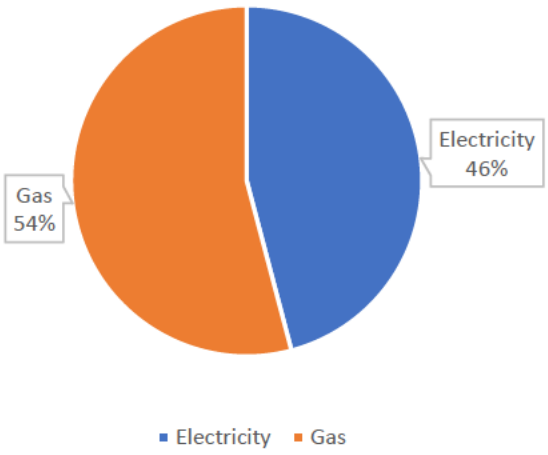
August consumption:

During August, when the school is mostly closed, there was gas consumption of 3,328 kWh, solely from the boiler rooms. This represents approximately 75% of the average summer consumption, suggesting that the hot water cylinders in the plant rooms were unlikely properly shut down during this period. It is important to implement holiday shut-down by switching the 'Heating control' and 'HWS control' knobs on the control panel to 'Hol' instead of staying as 'Auto'. Simply switching to 'summer' mode will only stop heating operation; the hot water will continue to run according to the time schedule set.

Consumption Distribution



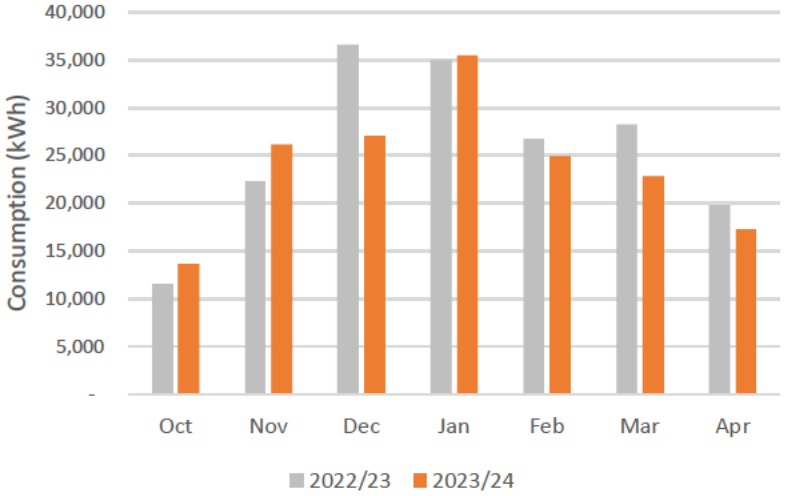
Cost Distribution



Observations

In terms of energy consumption (kWh), electricity accounts for 23% of the total energy used within the school. However, electricity costs make up 46% of the total energy costs. This disparity is due to the higher cost of electricity; the school's recent electricity day rate is around 3.9 times higher than the gas rates.

Year-on-Year Gas Consumption Comparison



180,374 kWh
Gas Consumption
from Oct 22 to Apr 23

-7.15%

167,475 kWh
Gas Consumption
from Oct 23 to Apr 24

Observations

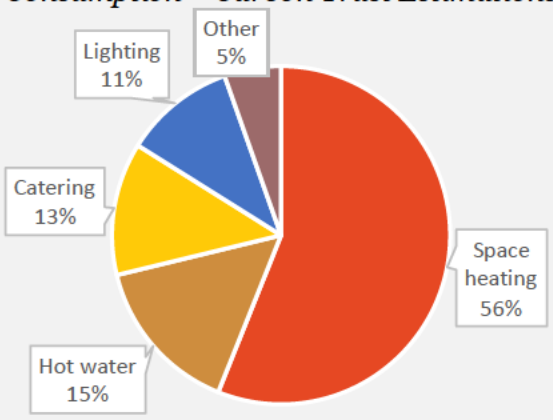
From October 2023 to April 2024, the school has consumed less gas than in the previous year, with an average decrease of 7.2%. This decrease ranged from 26.8% in December to a 18% increase in October.

This suggests that the school might have improved its heating and hot water management compared to the previous year. Further improvements in heating and hot water management could yield even more savings, please refer to the main report for detailed recommendations.

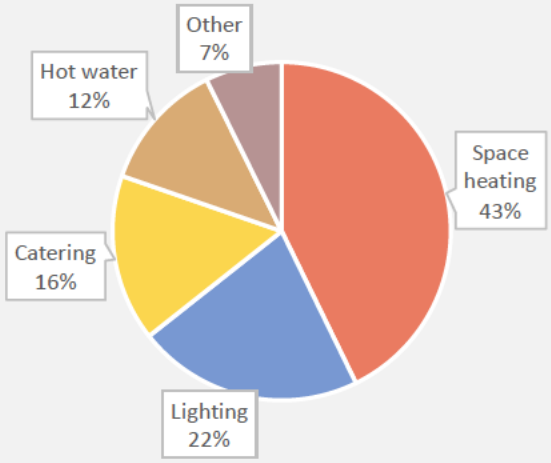
Energy Use and Cost in Different Areas

The sections below are estimations only. The Carbon Trust provides breakdowns of energy consumption in a typical school e.g. space heating, lighting and catering. These percentages have been applied to the school's actual consumption and unit rates to show how electricity/gas consumption/cost may be distributed.

Consumption – Carbon Trust Estimations



Cost – Carbon Trust Estimations

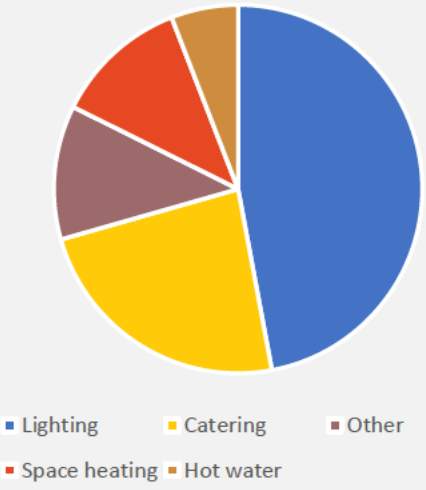


We can see space heating takes up the highest percentage of energy used and nearly 43% of the cost. Therefore, shortening the heating times and reducing setpoints should reduce the consumption and cost for this biggest sector – see the main report for recommendations.

Also, electric lighting may only use 11% of the total energy consumption, but can cost as much as 22% of the final bill. This is because electricity is more expensive; the school's previous electricity day rate is around 3.9 times higher than the gas rate. This means upgrading the fluorescent tubes and CFLs to LEDs, and installing sensors should result in significant savings.

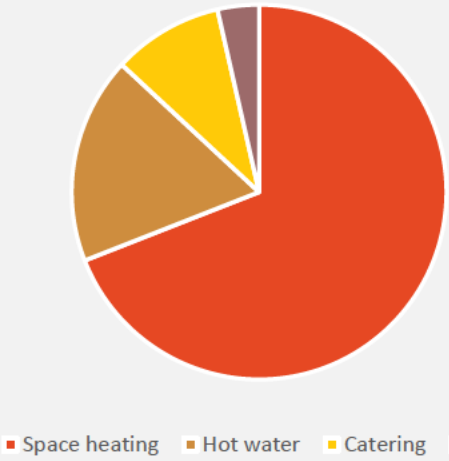
The breakdown is further divided into electricity/gas consumption and cost. Again, these are estimations only. However, the school will be able to calculate exact consumption from the boilers and hot water stores by taking regular meter reads from the gas sub-meters in the boiler room.

Electricity Consumption – Carbon Trust Estimations



	kWh	£
Lighting	29,119	8,705
Catering	14,560	4,353
Other	7,280	2,176
Space heating	7,280	2,176
Hot water	3,640	1,088

Gas Consumption – Carbon Trust Estimations



	kWh	£
Space heating	145,867	15,059
Hot water	37,724	3,895
Catering	20,120	2,077
Other	7,545	779