2022_23 Energy Review

A TRADITION OF INDEPENDENT THINKING

UCC

University College Cork, Ireland

Coláiste na hOllscoile Corcaigh

Scope of Energy review

- Review applies to 64 % of
- UCC's Energy Load.

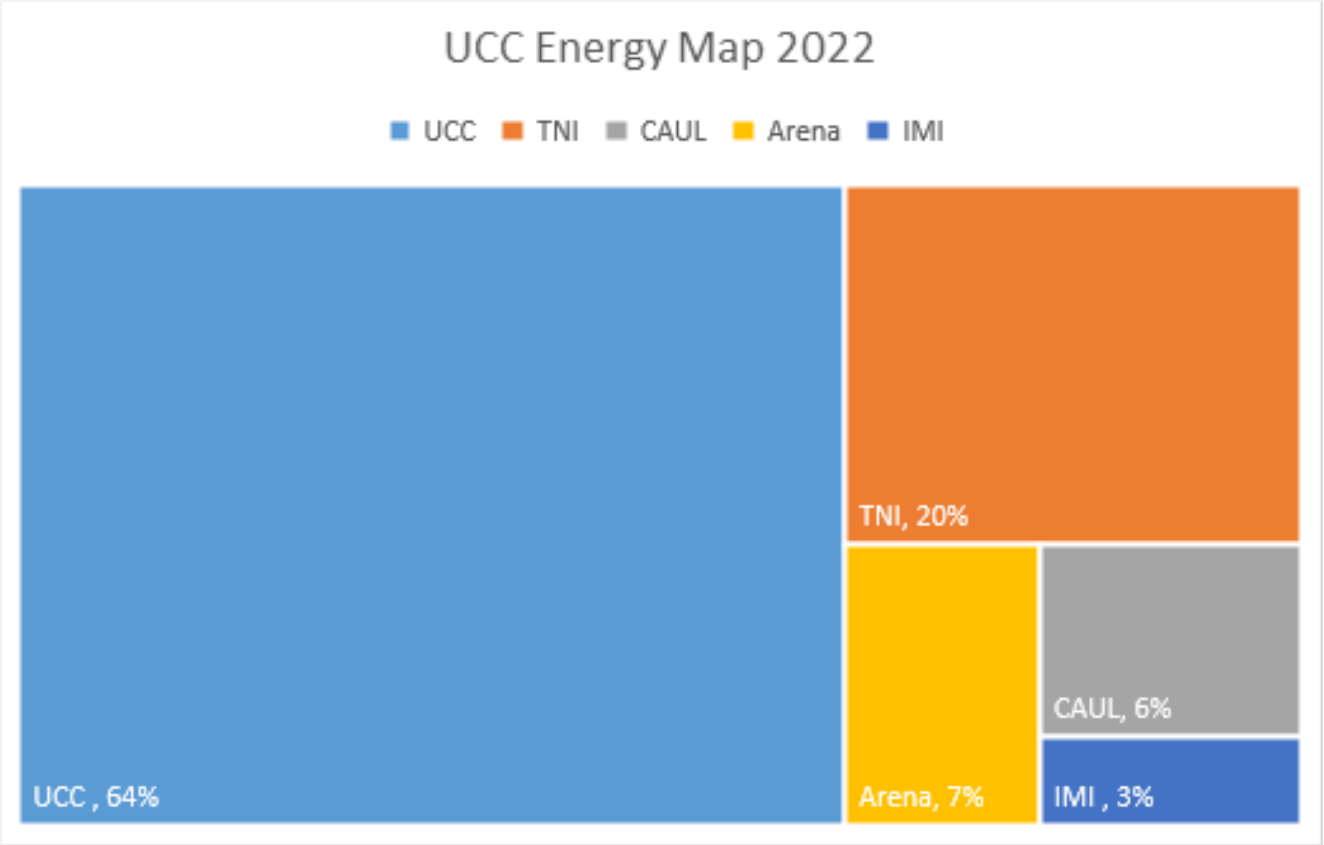
- TNI and Arena (27%)

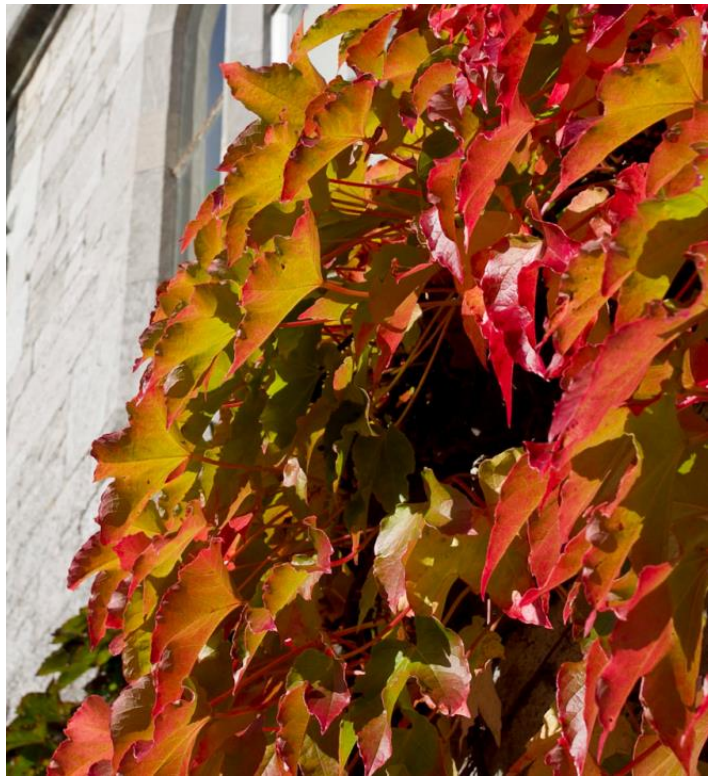
operating certified EnMS systems.

- CAUL / IMI (9%)

managed locally.

Moving to Calender Year for 2023 report.





22/23 Energy Performance Statement

Scope	22/23	21/22	18/19 Baseline
Electrical GWh	18.4	19.15	19.87
Gas GWh	18.8	19.54	19.2
Total GWh	37.2	38.69	39.07

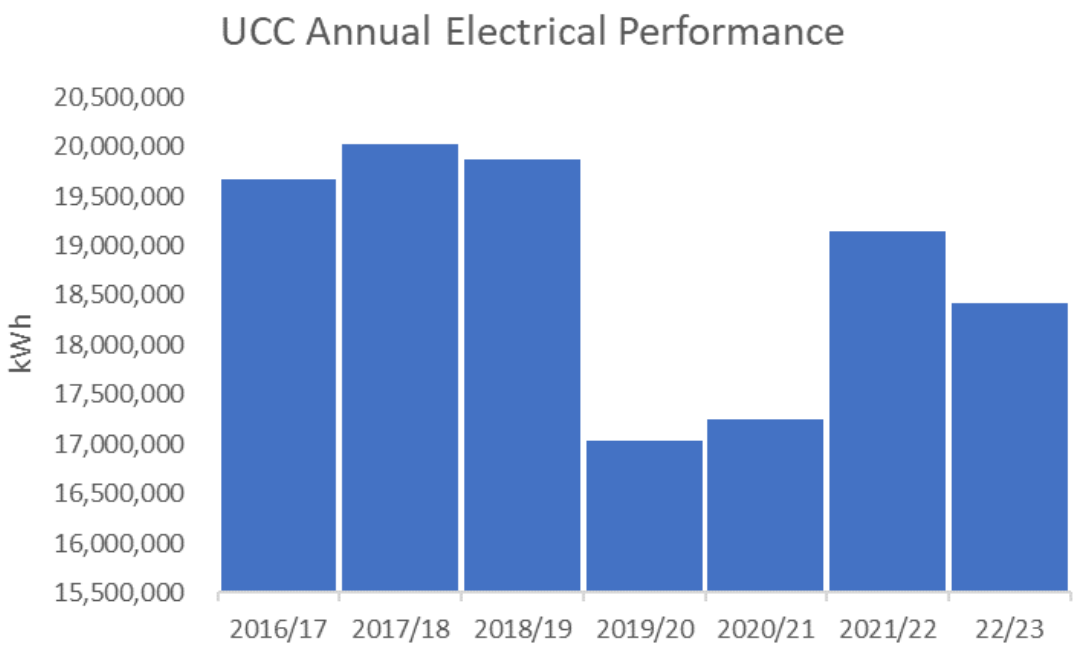
4.8 % Energy Reduction on 2018/19 Baseline.

3.8 % Energy Reduction on 21/22

UCC Electrical Performance

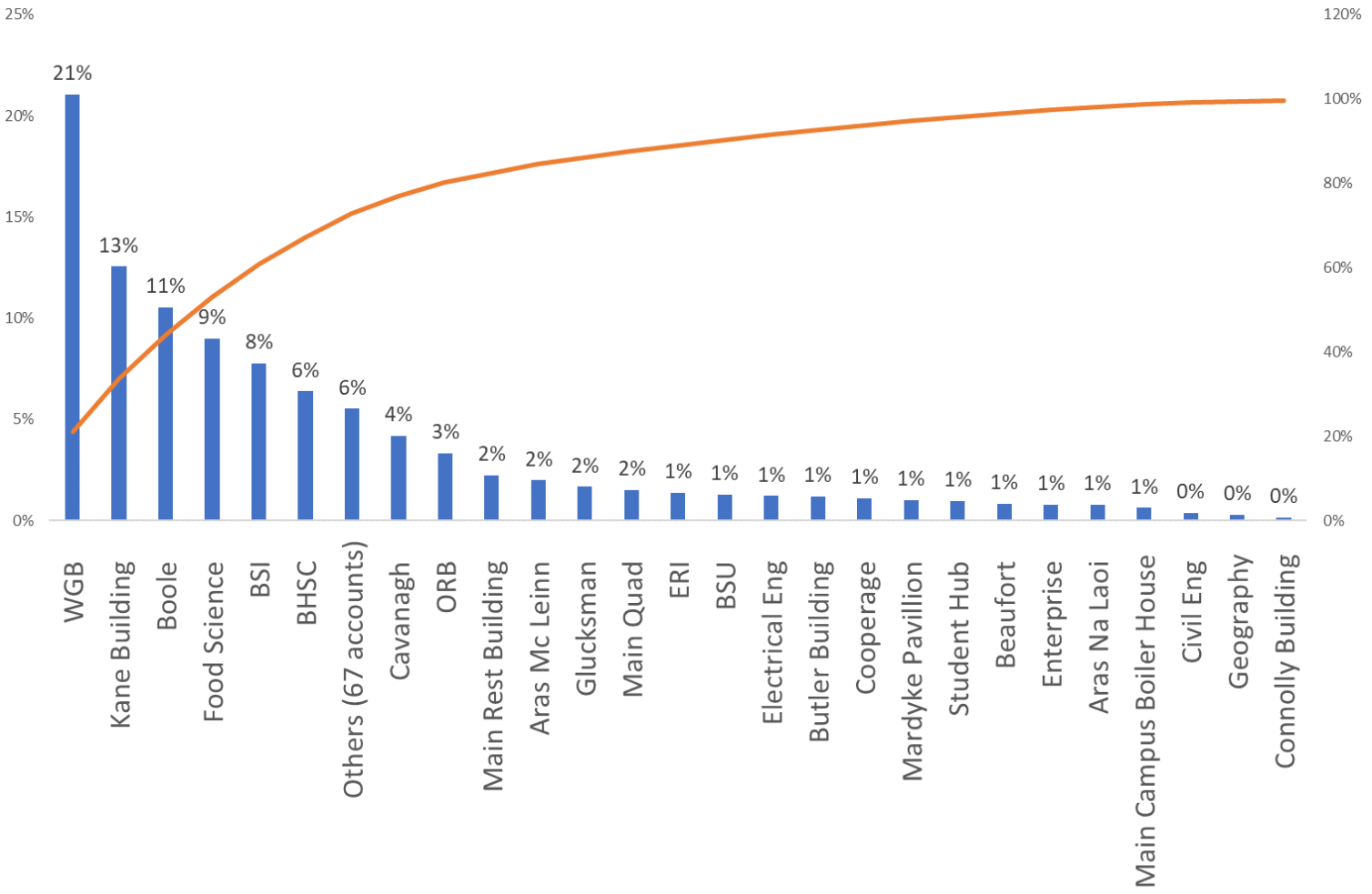
Key points

- The academic year 2022-2023 marked a complete resumption of all campus activities.
- Ventilation protocols were revised to align with Health and Safety Authority guidance.
- Electrical consumption showed a notable decrease, down by 4% compared to the 2021-2022 levels and 7% compared to the baseline of 2018-2019.



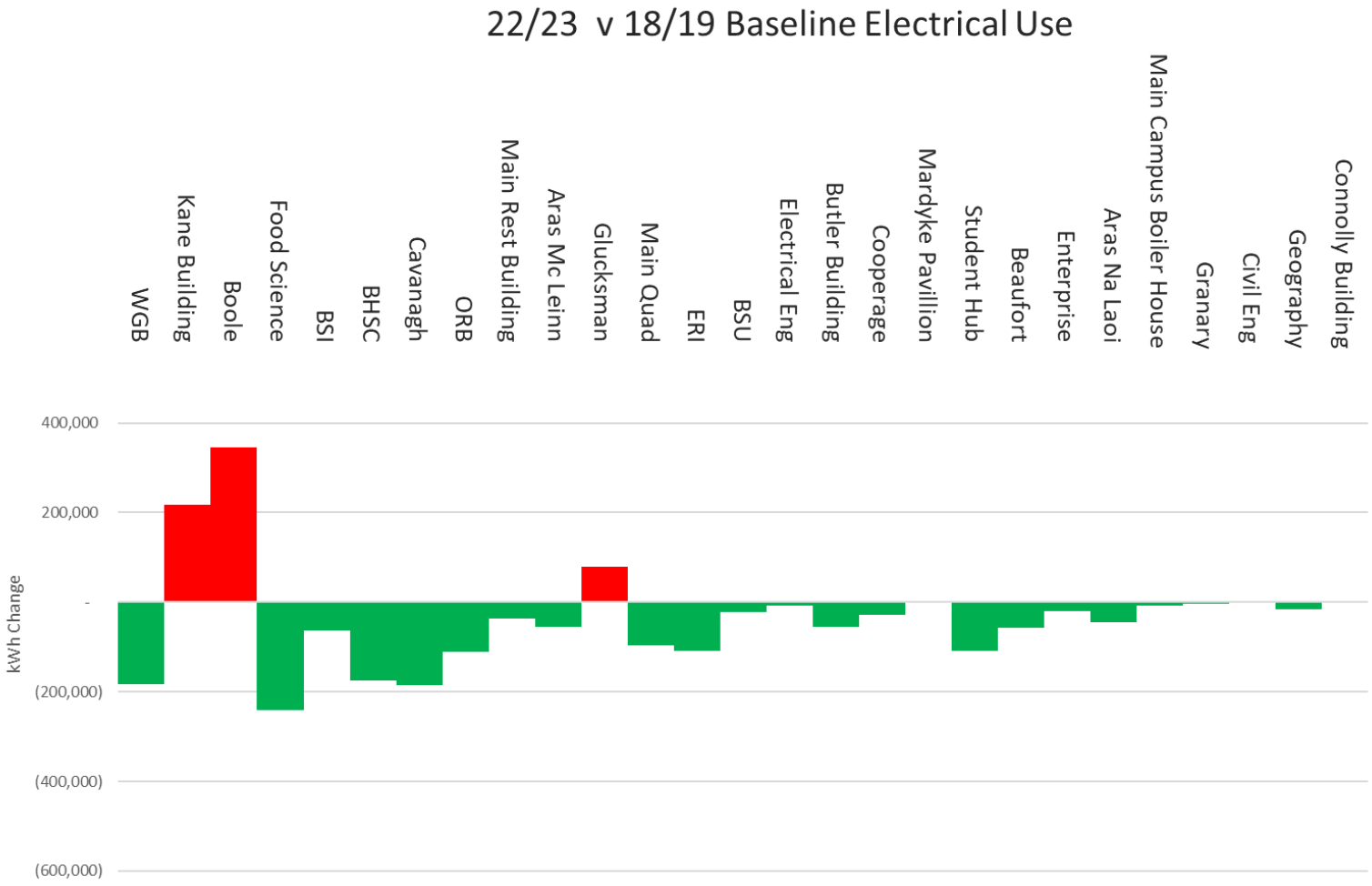
UCC Significant Electrical Users

- Twelve buildings account for 82% of our annual electrical load.
- The Kane building has risen to become the second-largest electrical consumer, moving up from its previous position as the third-largest.
- A significant 94% of the electrical load is now actively monitored through metering platforms.



UCC Significant Electrical Users Performance

- Three buildings added 640,000 kWh to our overall consumption:
  - Kane: Increase in activity.- ULV
  - Boole: Extended opening hours and additional ventilation requirements.
  - Glucksman Exhibition: Implementation of environmental controls.
- Energy efficiency and upgrade projects resulted in the avoidance of 1,737,339 kWh of consumption.



Focus on the Kane

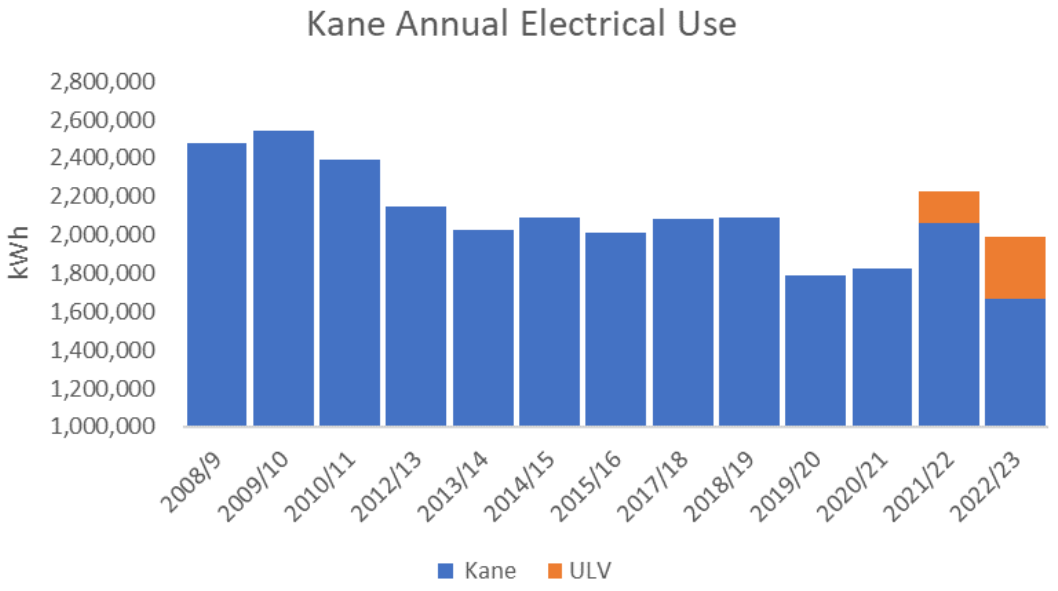
Overall consumption has increased by 218,000 kWh compared to the baseline year.

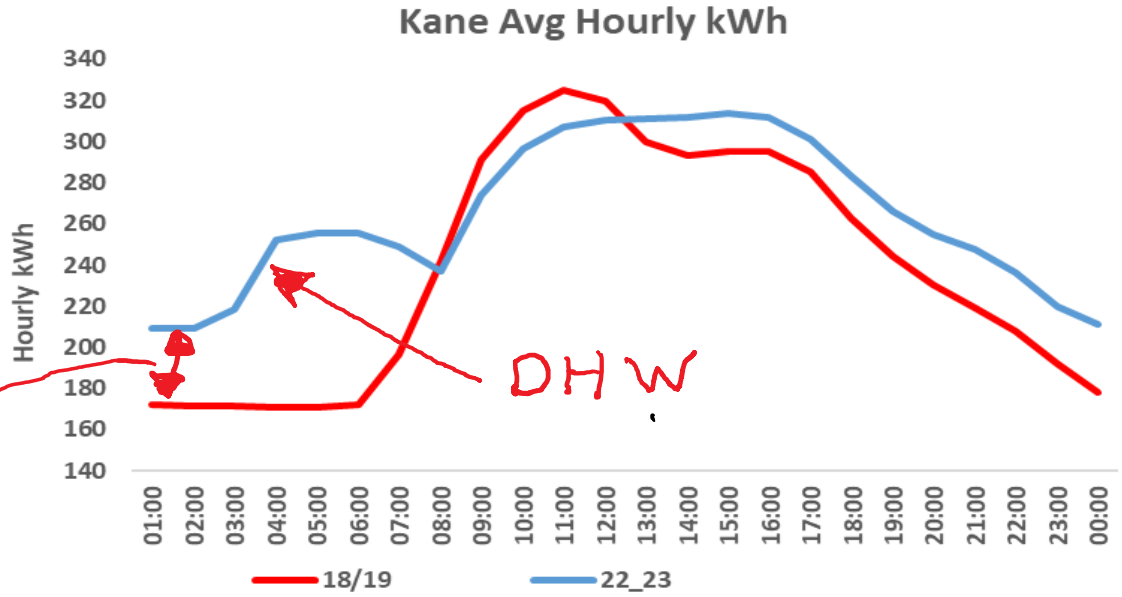
Increases in consumption are attributed to:

- ULV lab, adding 320,000 kWh.
- Changes in ventilation protocols.
- Domestic hot water generation, with a 75 kW immersion system.

Reductions in consumption were achieved through:

- IT data centre equipment upgrade, resulting in a decrease of 125,000 kWh.
- Corridor lighting upgrades.
- Compressor optimization measures.

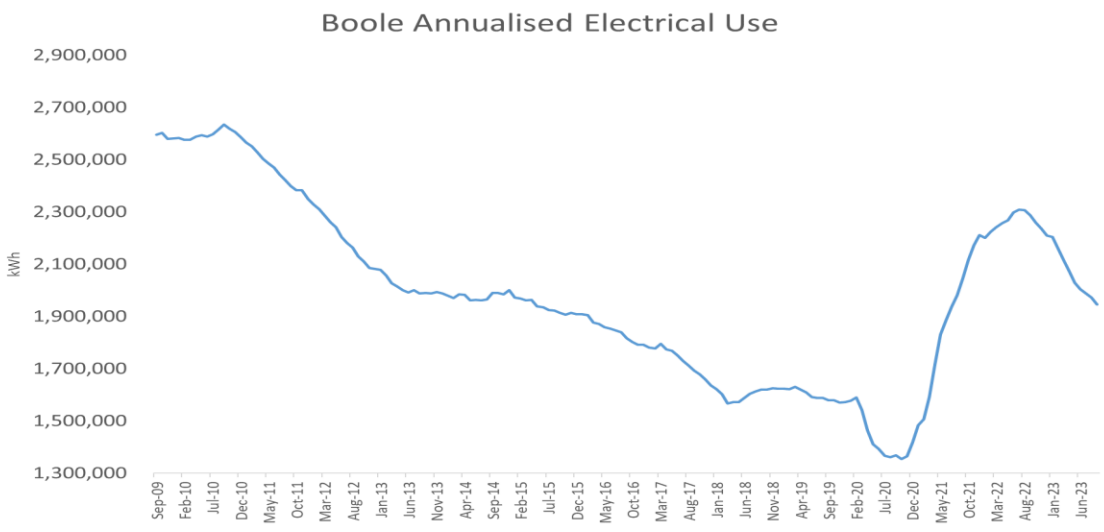


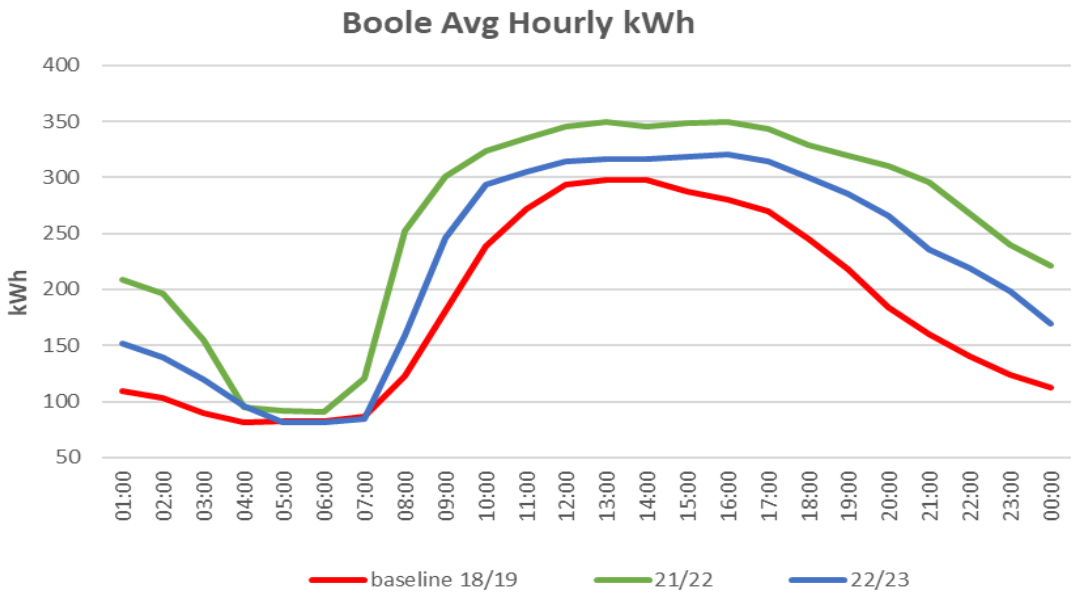


Focus on the Boole

- Overall consumption has increased by 345,000 kWh compared to the baseline year.
- Increases in consumption are attributed to:
    - Ventilation, up by 425,000 kWh.

Close management of the building services and ongoing communication and collaboration with the Boole team offset the impact of the changes in ventilation and reductions were seen in other areas of the building.



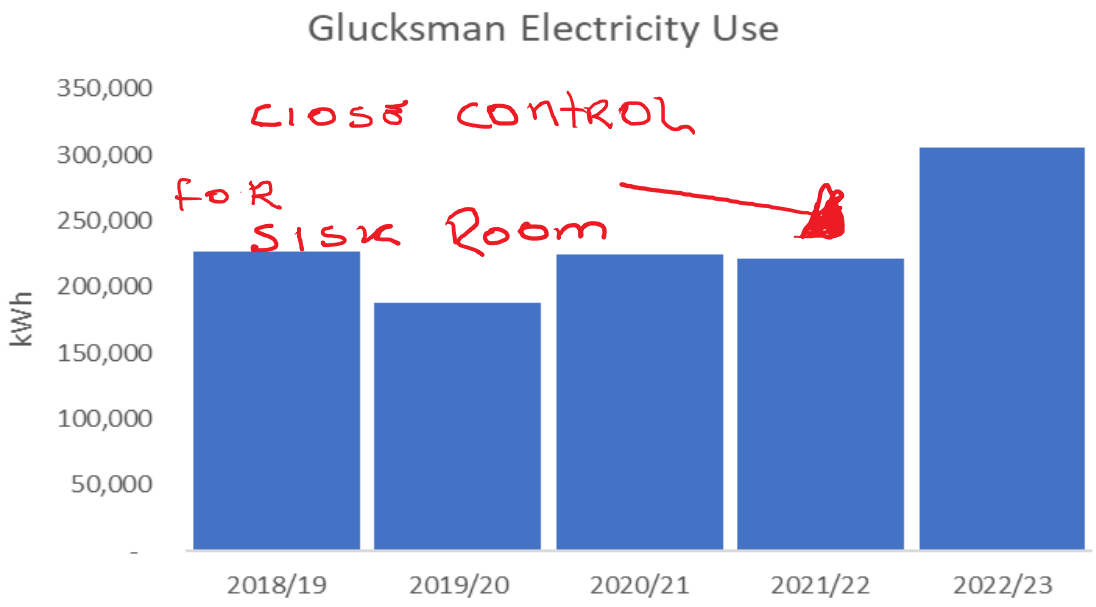


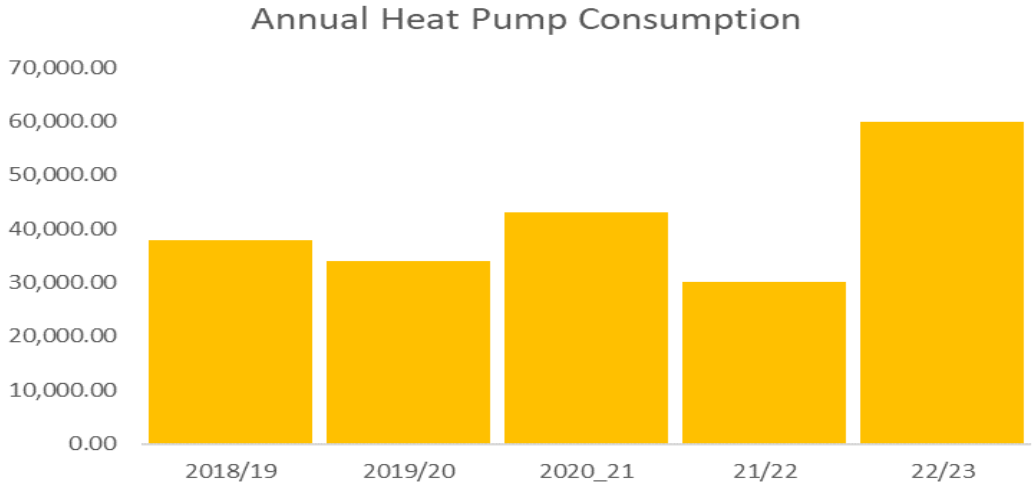
Focus on the Glucksman

Consumption Up 80,000 kWh on baseline year.

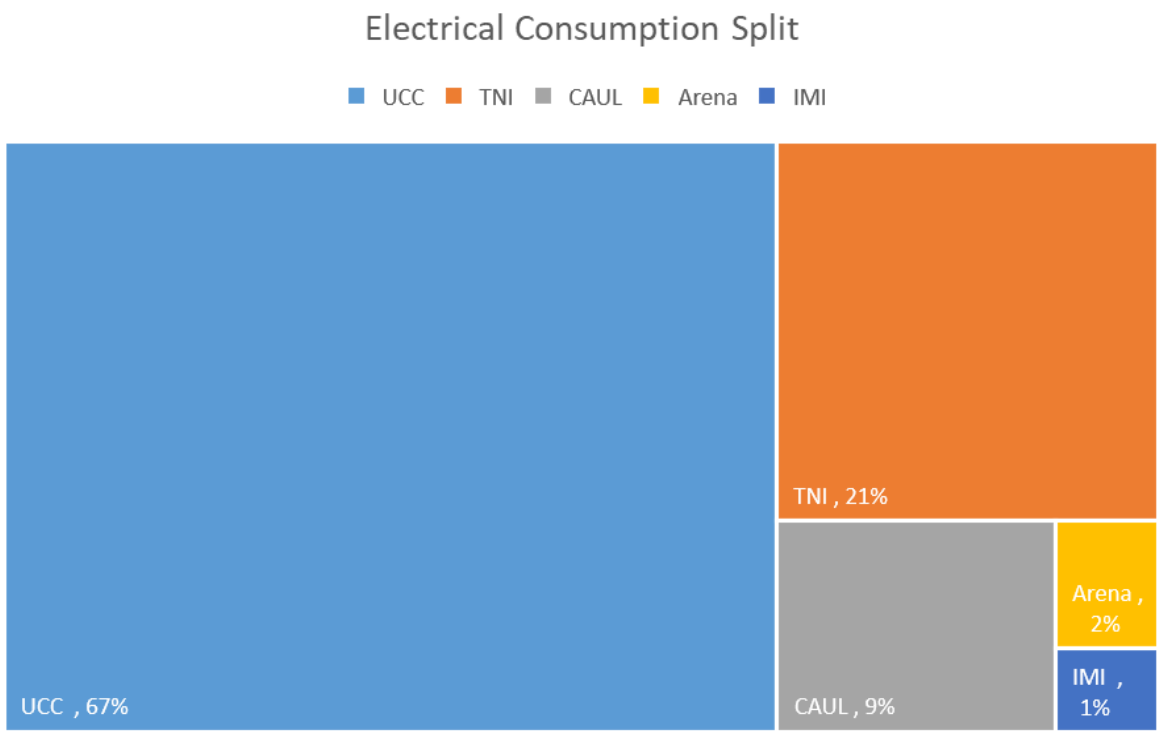
Increases seen in:

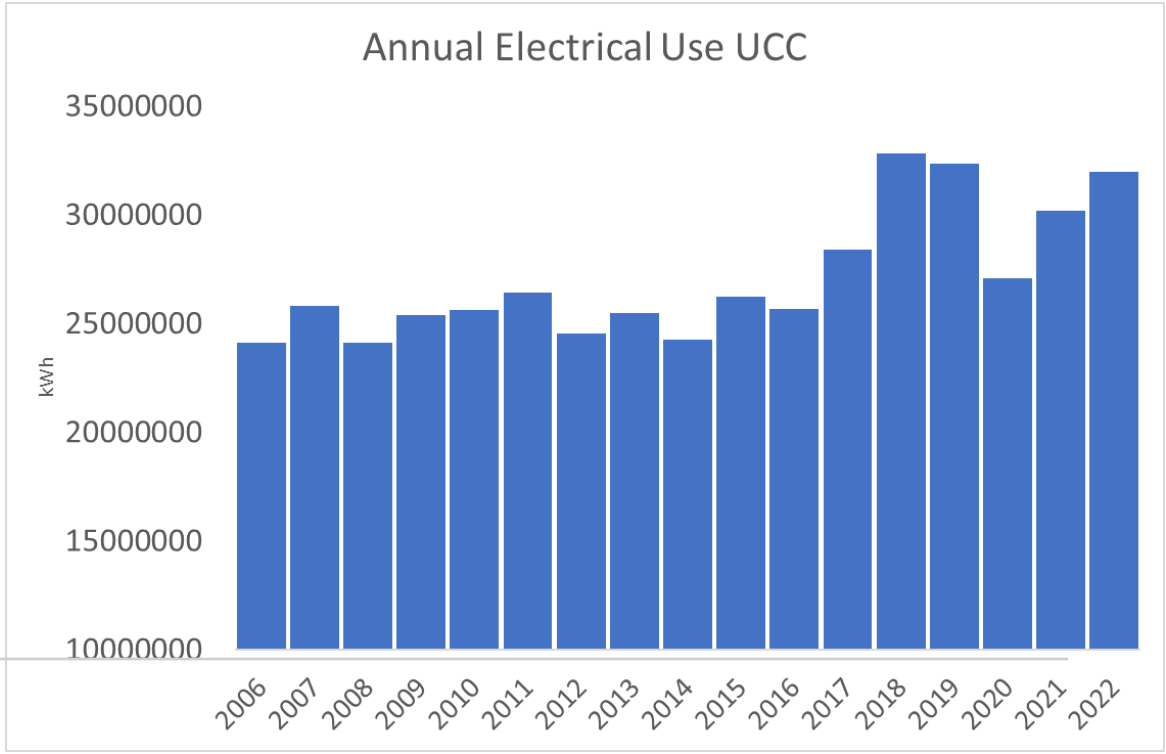
- Heat Pump added 25,000 kWh
- Ventilation for Sisk Room and environmental controls.
- Café back into use Sept 2023.





UCC Electrical (All Sites).

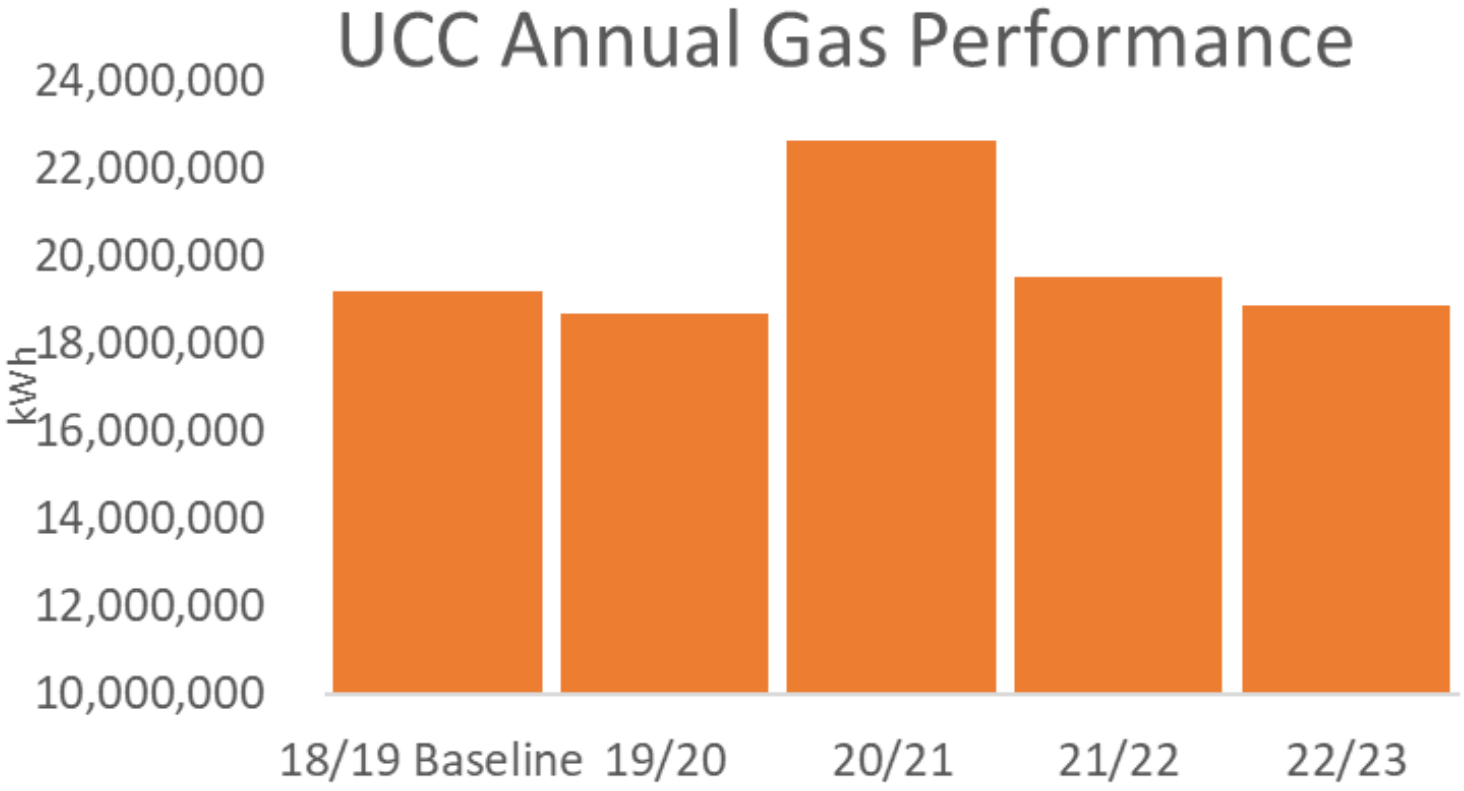




UCC Gas Performance

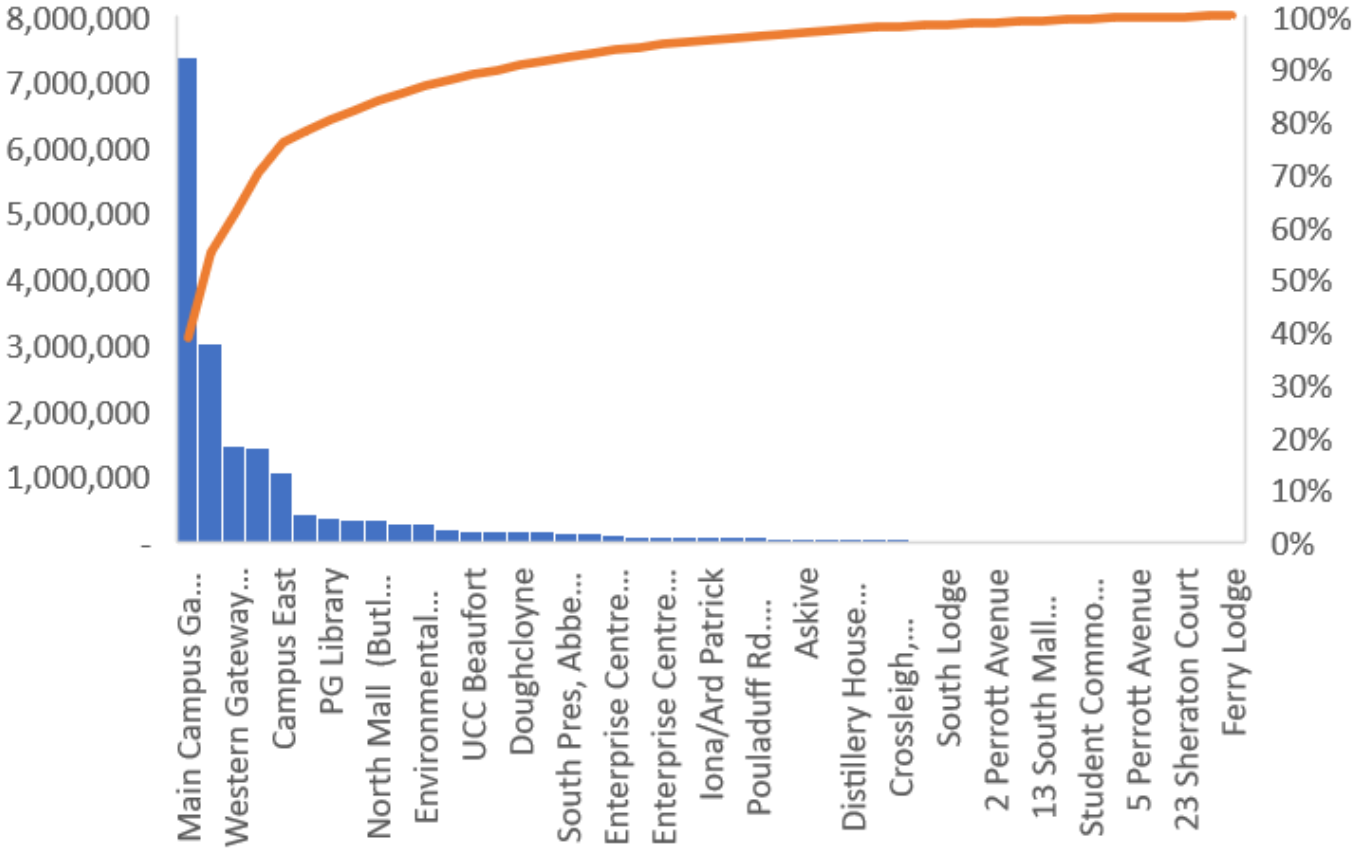
Key points

- 22/23 saw a full return of all campus activities.
- Revised ventilation protocols in line with HSA guidance.
- Gas consumption down by 3% on 21/22 levels and 2% on baseline.



UCC Significant Gas Users

- 19 Buildings use 82% of our annual gas load.
- Main Campus Steam dominates the demand.
- 84% of thermal load is now tracked via metering platform.

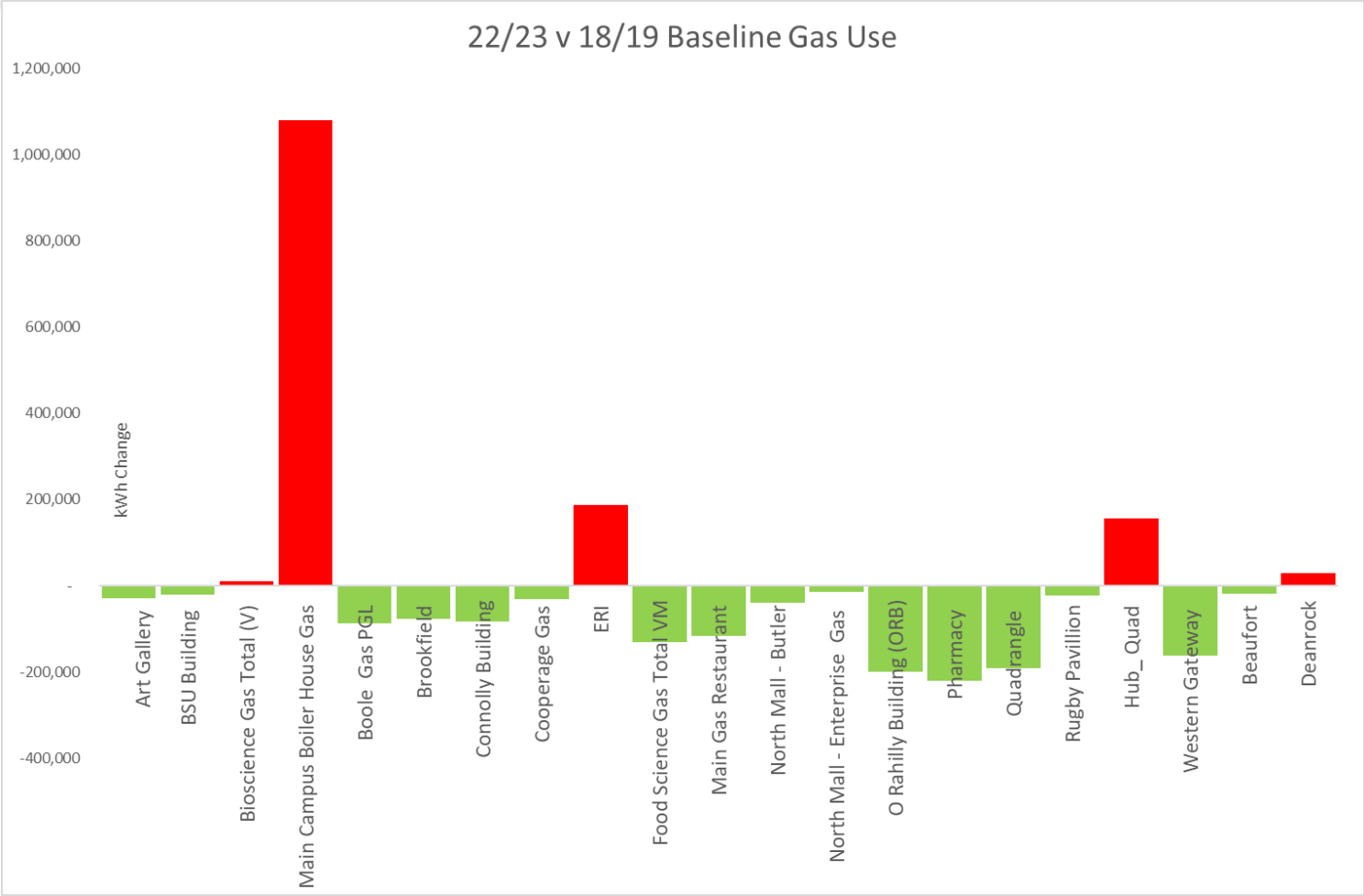


UCC Significant Gas Users Performance

4 accounts added 1, 640, 000 kWh to our consumption:

- Steam System – extended hours and ventilation load.
- ERI – GSHP out of service.
- Hub building in use.
- Deanrock online.

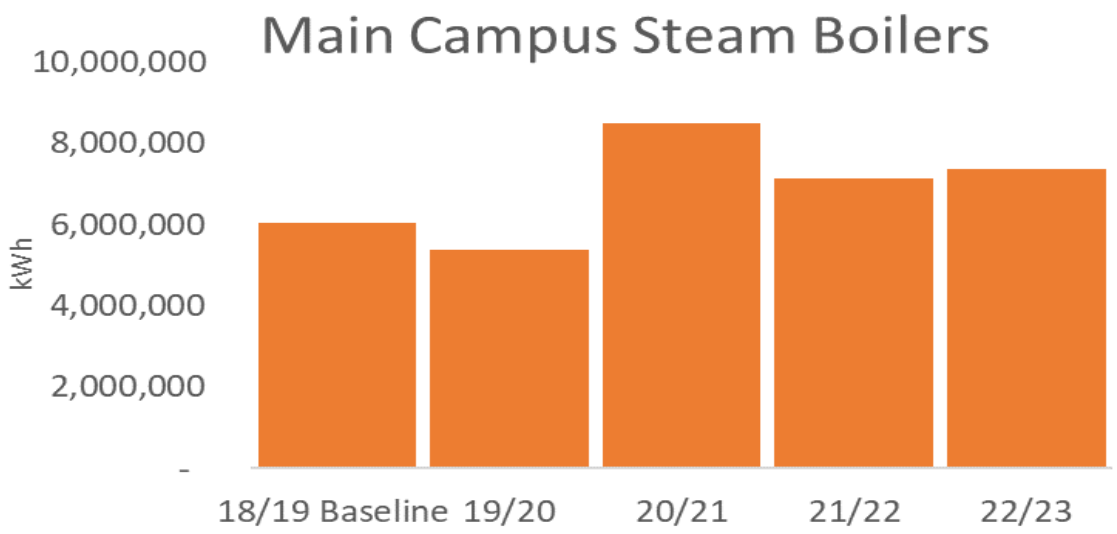
1,600,000 kWh avoided through energy efficiency projects and tight controls.

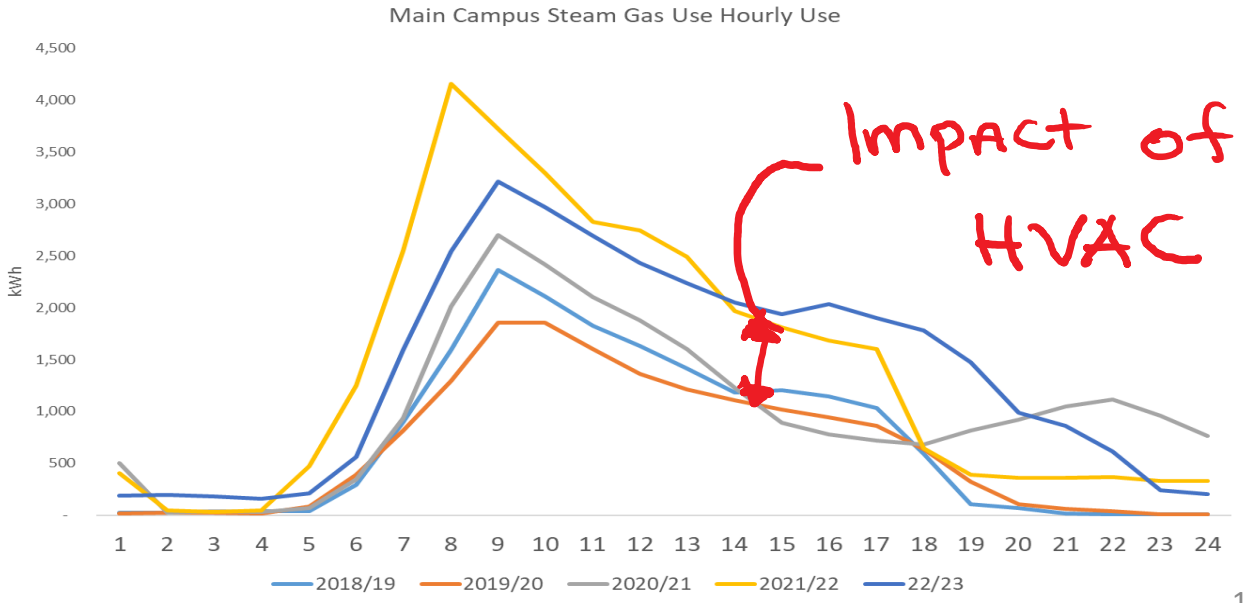


Focus on the Steam System

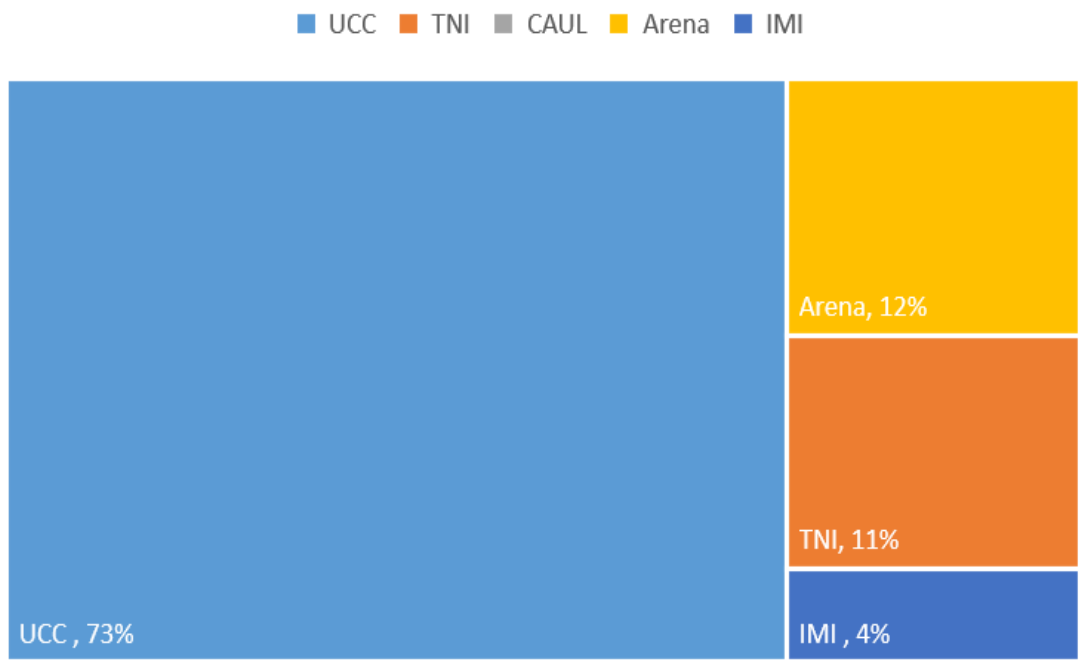
Key Points

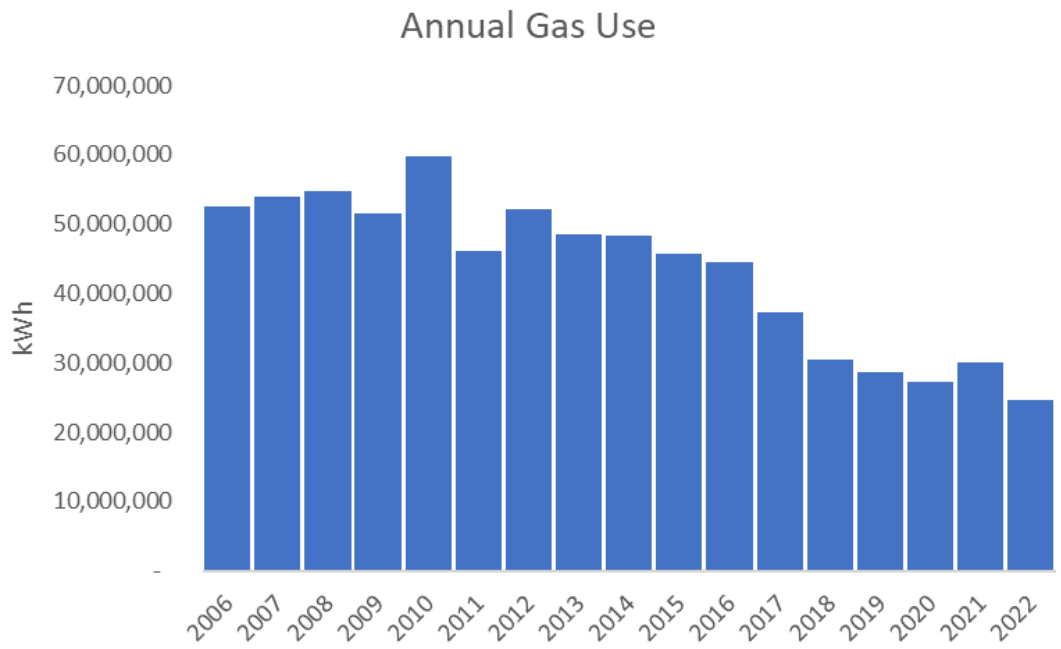
- Consumption Up 1,000,000 kWh on baseline year.
- Closing mixing boxes in Boole Library in line with ventilation protocols.
- Significant negative feedback from Boole Library on poor conditions resulted in change in time schedules in Q2.
- Operational Issues with Boiler Reliability.
- Reinstated CO2 control on Boole Ventilation resulted in a 770,000 kWh reduction on 21/22 levels.





UCC Gas (All Sites).

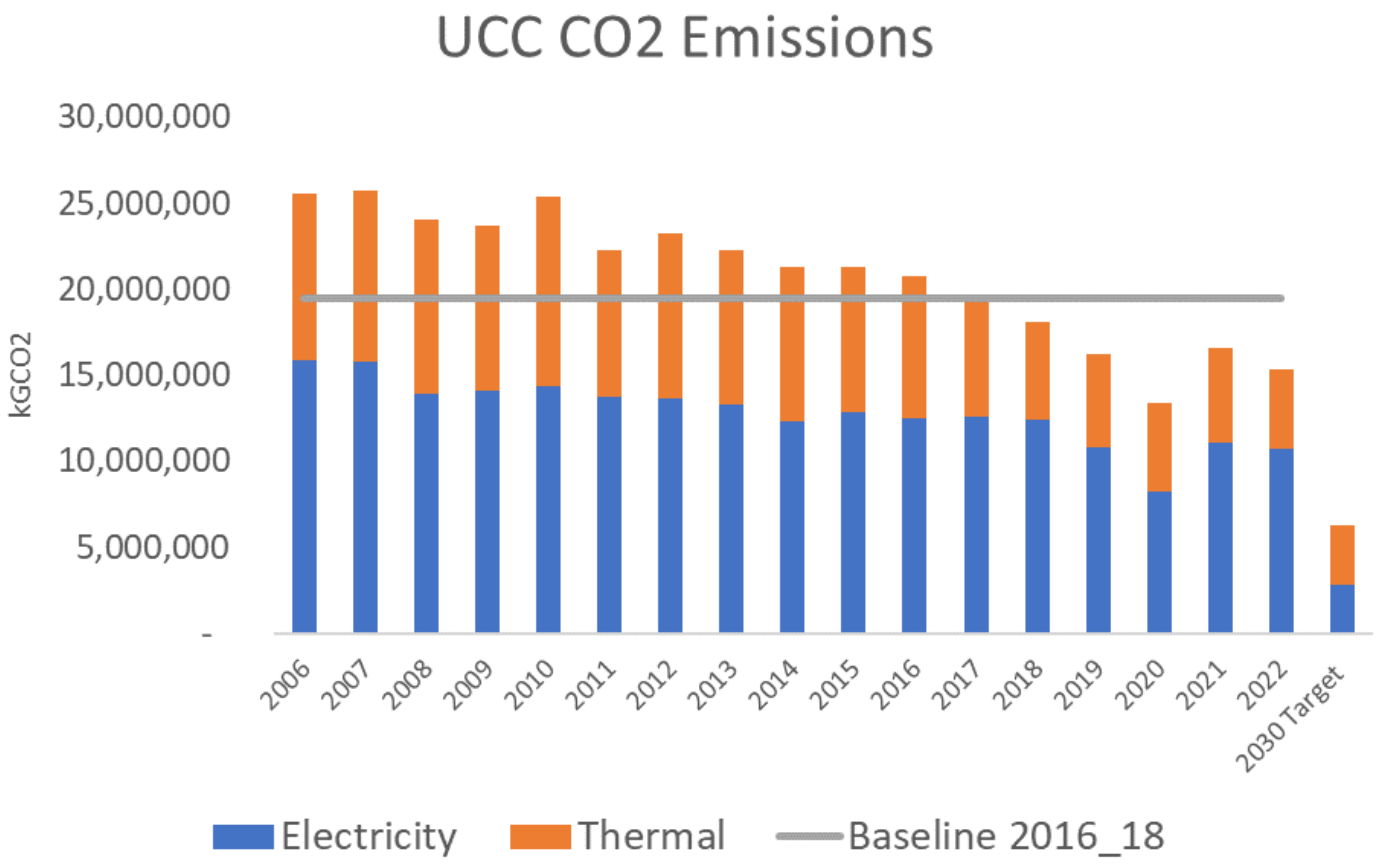




UCC Progress to 2030

Key Points

- 21% reduction in CO2 emissions against baseline 2016-18.
- 2030 Projects:
  - Pharmacy booked in for May 2024.
  - Enterprise ongoing.
  - Energy Efficiency Gains balancing growth in activities
  - Block B Food Science Retrofit. - Stage 1 approval



2022/23 Energy Performance Summary

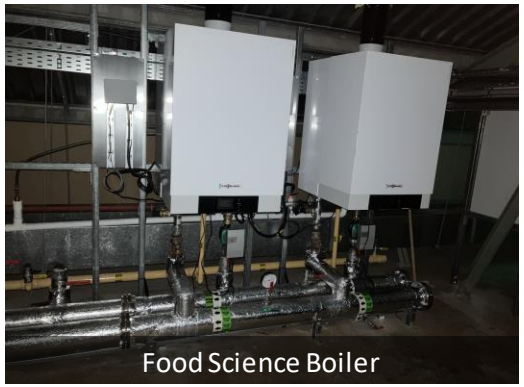
Objectives	Targets	Action Plan	Target Closeout Date
Achieve measured and verified savings of 1% of baseline year final consumption. 51% absolute carbon reduction by 2030 against a 2016-2018 baseline	Achieve measured and verified savings of 1% of 2018_19 total final consumption Map out decarbonisation plans to achieve 2030 targets	Projects identified with total annual savings if implemented successfully of 2.3% for 2022/23	31/09/2023

	Electricity (kWh)	Gas (kWh)	Site Energy (kWh)
2018/19 Total Baseline Actual	19,867,016	19,203,867	39,070,883
2020/21 Consumption	17,331,517	22,737,415	40,068,932
2021/22	19,155,850	19,533,813	38,689,663
2022/23 Target	19,222,328	19,235,593	38,457,921
2022/23 Actual	18,484,087	18,876,495	37,360,582
Increase/Decrease on Baseline	-6.96%	-1.70%	-4.38%
Increase/Decrease on 21/22	-3.51%	-3.37%	-3.44%
2022/23 Planned Reductions	362,164		
2022/23 Verified Project Savings	394,914		
Added Loads due to Activity	640,000		
2022/23 Total Savings	1,097,339		
Change from 2018/19 Baseline	1,710,301		

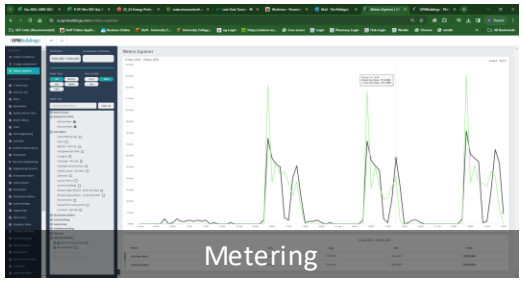
22 Energy Projects Completed

Lighting Upgrades

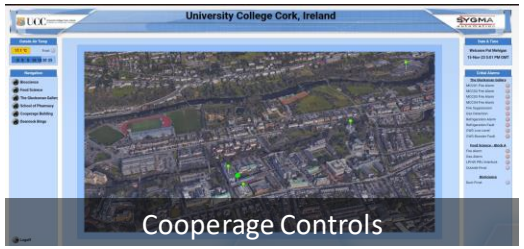
Communications



Food Science Boiler



Metering



Cooperage Controls

External Lighting Project

- **Design:**
  - Replace existing external fittings with LED units, noting the dark sky / biodiversity goals of the University.
  - Fitting of astronomical timeclocks.
- **Construction:**
  - All works undertaken by Eng Services Team.
- **Impact:**
  - Significant reduction in light pollution.
  - Annual Energy savings of 44,000 kWh

- Design and construction activities managed by in house Electrical team.

Food Science Boiler Block A

Design:

- Replace existing single 750 kW atmospheric boiler with 2 off 136 kW gas unit.
- BMS upgrade.
- Future Connection for Heat Pump.

Construction:

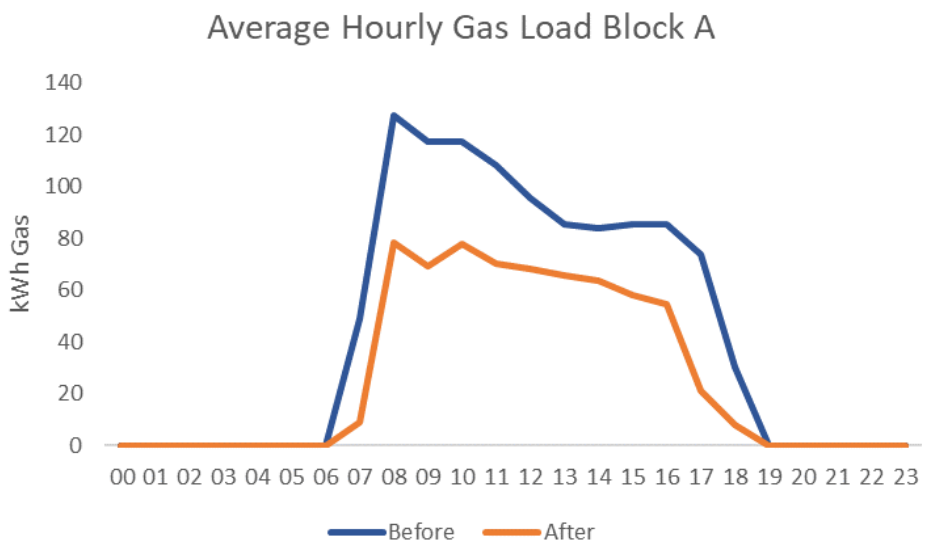
- Completed Autumn 2022

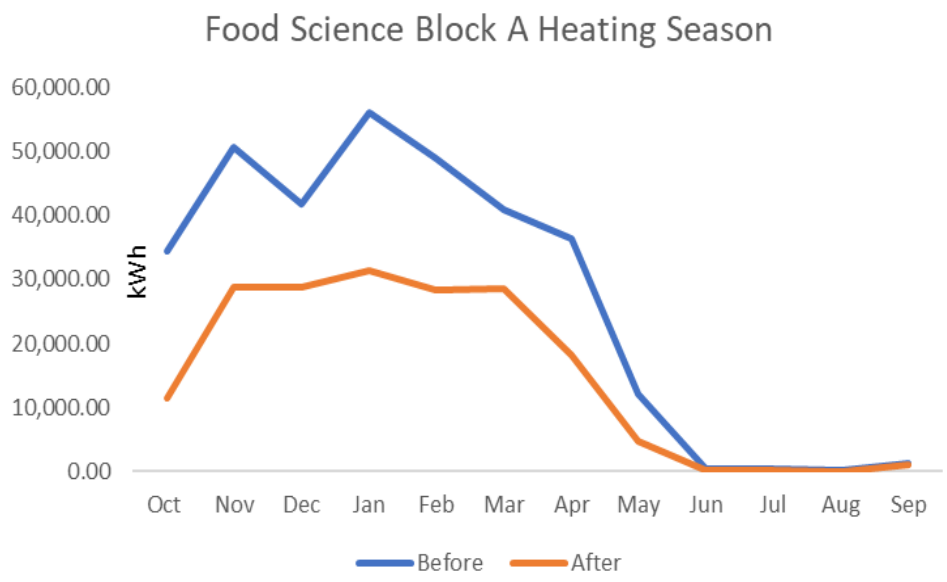
Impact:

- 41% reduction in normalised gas use (142,000 kWh)
- 465 TCO2 avoided over 15 years at a cost of €1,182 per T

Design by Powertherm under EEOS funds.

Construction by Minor Works team





Controls Upgrade

Design:

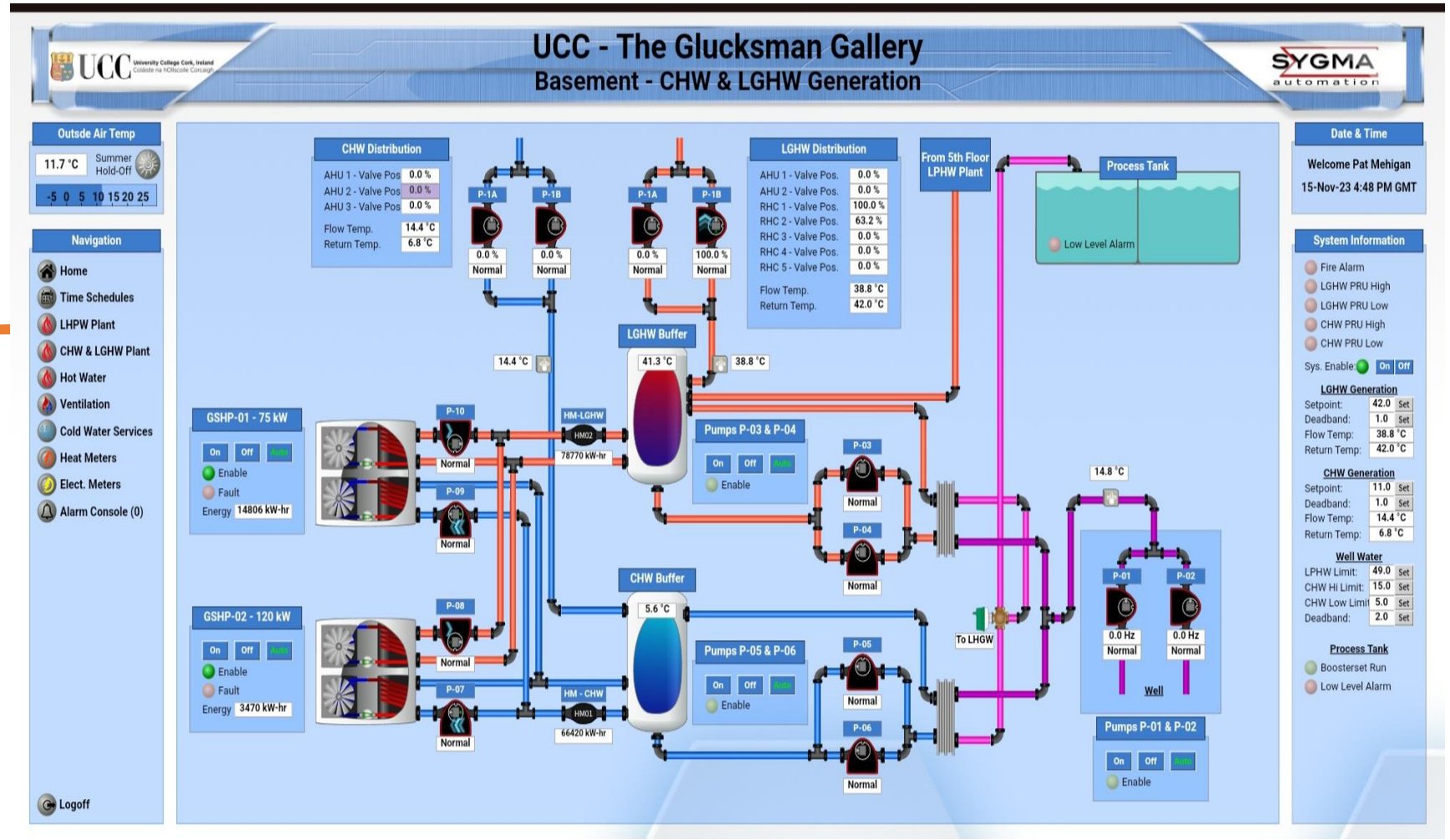
- Installation of Tridium Cloud Based BMS platform

Construction:

- Completed Spring 2023

Impact:

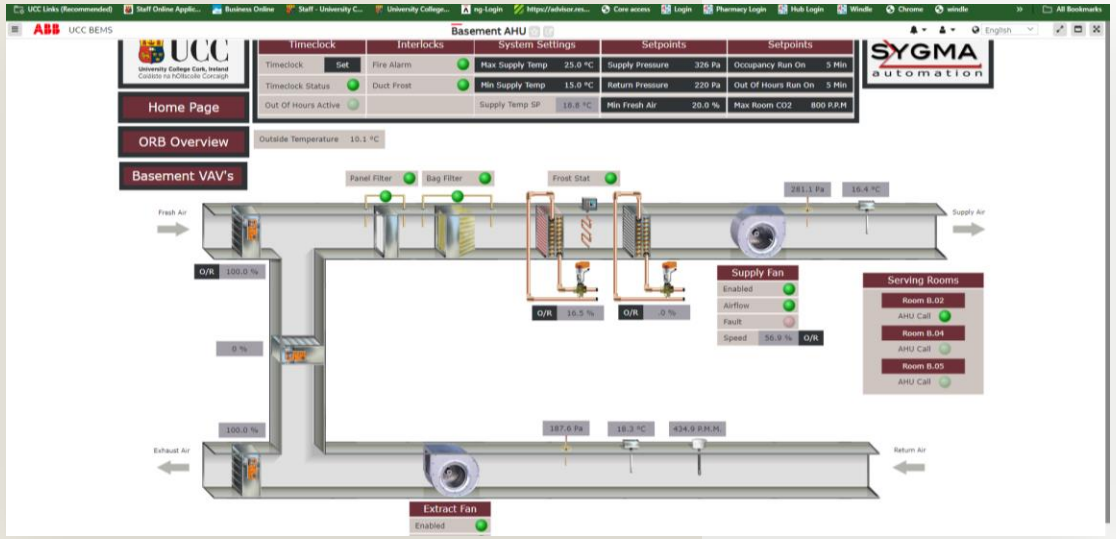
- Control and visibility of Ground Source Heat Pump
- Continuous monitoring and optimisation of environmental conditions for Gallery.
- Secure access and not connected to IT infrastructure.
- Improved indoor environment.

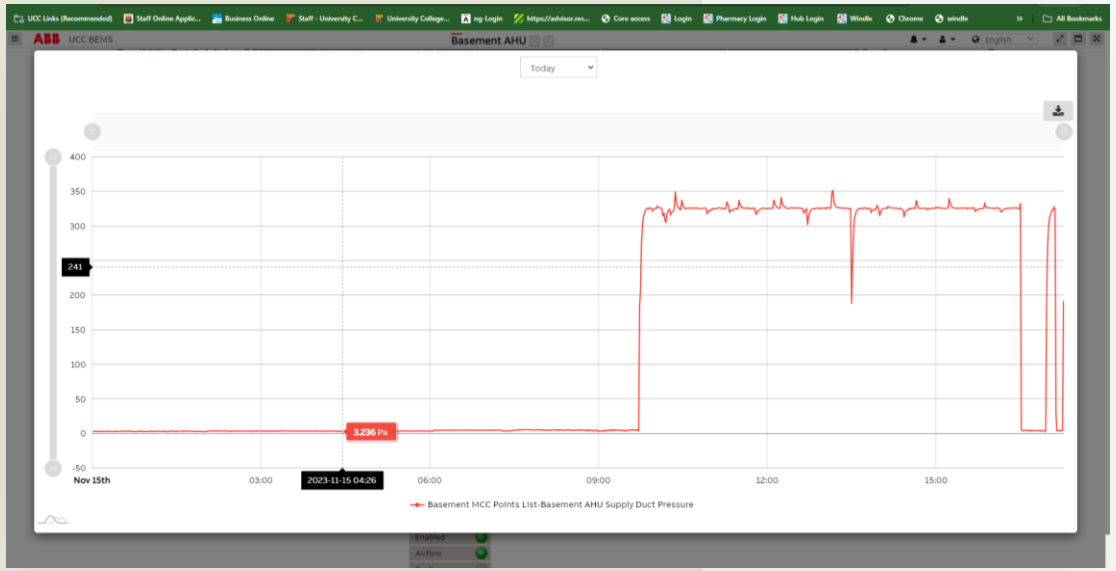


Design Internally

Construction by Sygma Automation

HVAC Upgrade





Design:

- Presence and CO2 control for ORB HVAC Units including installation of VAV flow boxes to supply tempered air when required at the right location and volume.

Construction:

- Completed Summer 2023

Impact:

- Improved indoor environment.
- Reduced heating load.
- 22,000 kWh reduction.

Design by Powertherm under EEOS funds.

Audits / Non Conformities

Technical Audits completed in

- Pharmacy

Internal Audits

- Operational Controls. - 2 NC's noted.
  - Partially addressed. Close out Dec 2023
- System Audits – 10 OFI's noted.
  - 7 closed.
  - 3 in progress.

Non Conformity.

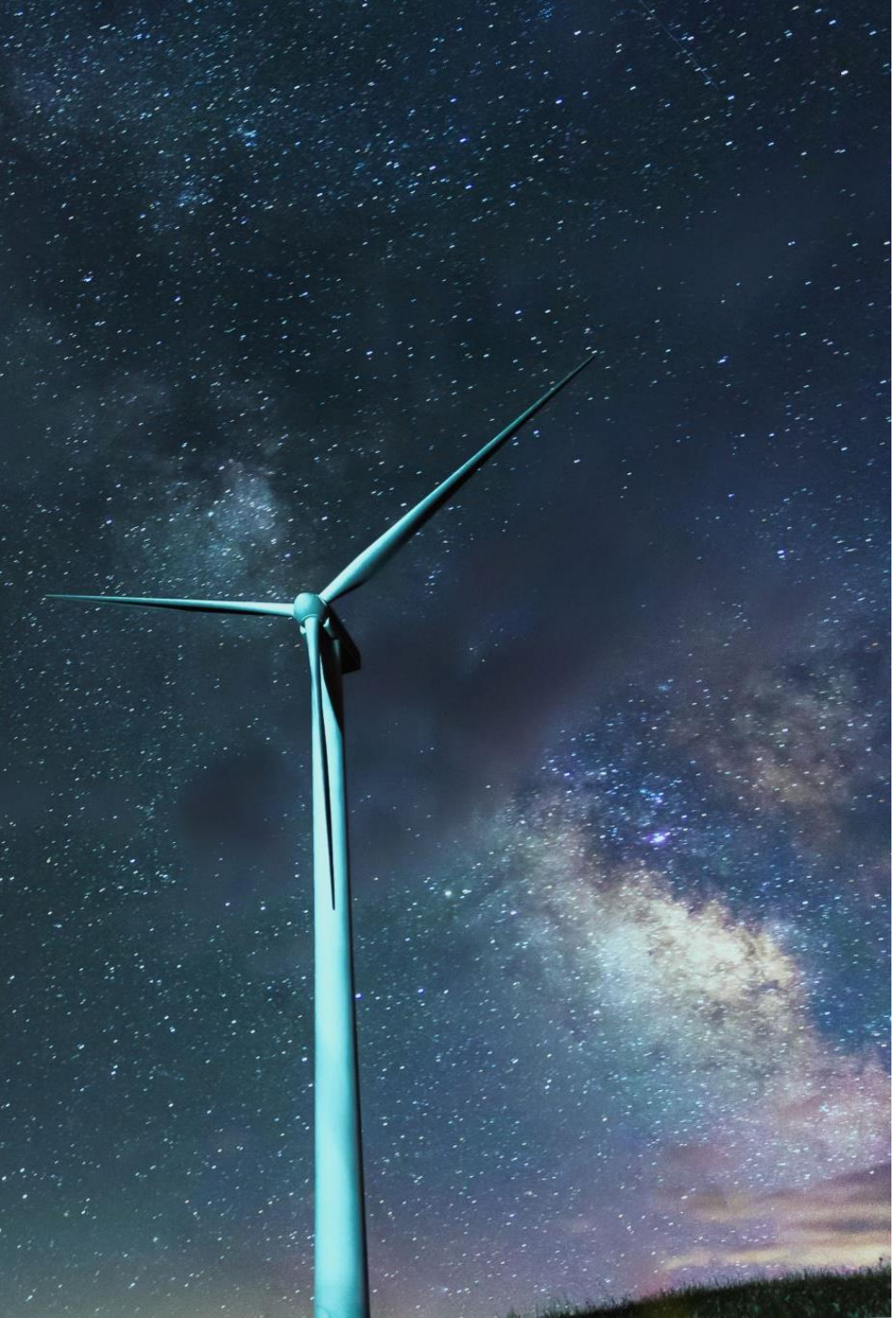
Operational Controls Finding:

'"To operate equipment and systems efficiently, it is necessary to document the operating parameters that affect energy performance. Identify critical operating parameters for all SEUs and decide on operating limits for each. Document these parameters and their limits and communicate them to operational personnel. Routinely check that actual operating conditions conform with these values and limits and document these checks. Examples of critical operating parameters include heating set points, cooling setpoints, humidification and dehumidification setpoints, air change rates, fresh air volumes, CO2 levels, boiler temperatures, boiler exhaust O2 levels, lighting levels, etc."

Response:

Thermal Comfort policy approved. - Currently working through HVAC and Boiler assets Settings. Expected outputs are (1) Boiler operating statements. (2) Lighting Control, operation, lux levels and replacements. (3) HVAC control.

Expect to close out Dec 2023.



Resources & Effectiveness

- Resources
  - Energy conservation projects continue to be supported and funded.
  - Devolved Grant - Used to replace EOL equipment with more energy efficient systems.
  - Continue to use grant aid / pathfinder programs and other innovative ways of funding projects.
    - Pathfinder €3.3 for Enterprise.
    - SEAI SSRH €105,000 grant aid.
    - Pathfinder 3 – Block B Retrofit – stage 1 approved.
  - BMS Foreperson Handover
- Effectiveness
  - Continous Improvement in Energy Performance.
  - 24% reduction in absolute energy use.(2006-2008 baseline).
  - 21% reduction in CO_2 emissions (2016-18 baseline)

UCC Total Energy Use

- 24% absolute reduction in energy use.
- 45% reduction in energy use per m^2.
- 21% reduction in CO2 emissions

75 GWh

2006	2008	2011	2015	2016 18	2021
+ 1.6 GWh	+5 GWh	+6 GWh	+1 GWh	+2 GWh	
	 	 	 	  	**60 GWh**

2024 Action Plan

Project ID	Description	SEU	Electricity Savings	Gas Savings	Total tCO_2 Savings	Total kWh Savings	Total kWh savings for reporting period	Total Cost Savings	Cost	Respons ibilities & Resourc	Target Closeout Date
EMP 2024-01	Enterprise Deep Retrofit	Enterprise	56,746	224,147	58	280,893	70,223	€ 22,272.82	€ 4,300,000.00	Capital Projects	Dec-24
EMP 2024-02	Thermal Comfort Policy	All	-	94,000	17	94,000	94,000	€ 4,700.00	€ -	B&E	Dec-24
EMP 2024-03	Reduce Your Use Campaign	All	92,000	94,000	45	186,000	186,000	€ 22,640.00	€ -	B&E	Dec-24
EMP 2024-04	Cavanagh Heat Pump Project	Pharmacy	-322000	1100000	107.6474	778000	194500	-€7,790.00	383000	B&E	Sep-24
EMP 2024-05	BHSC DHW	BHSC	- 61,000	263,000	30	202,000	84,167	€ 1,255.00	€ 110,000.00	WGB FM	Sep-24
EMP 2024-06	Baseline ISO Software	All	-	-	-	-	-	€ -	€ 8,800.00	EM	Jun-24
EMP 2024-07	New AHU Installation FSB to remove existing AHU from the steam supply.	FSB	4,800	25,000	6	29,800	29,800	€ 2,186.00	€ 55,000.00	Minor Works	Jan-24
EMP 2024-08	Extend BHSC Metering platform	BHSC	5,865	6,250	3	12,115	2,019	€ 1,456.18	€ 9,100.00	WGB FM	Sep-24
EMP 2024-09	Block E ASHP Installation	Food Science	- 241,000	909,000	96	668,000	334,000	-€ 1,545.00	€ 450,000.00	B&E	Sep-24
EMP 2024-10	Space Utlilisation (Houses closed after 18.00)	Houses	20,000	20,000	10	40,000	40,000	€ 4,900.00	€ -	B&E	Jan-24
EMP 2024-11	Rock Bingo BMS	Other	200	15600	3	15,800	7,900	€ 819.00	€ 3,500.00	B&E	Jan-24
EMP 2024-12	Requirements for BMS in buildings with 250 kW plus thermal plant (heating & cooling) - Complete Assessment	Other			-	-	-	€ -			Jun-24
EMP 2024-13	EV charging points in car parks over 20 spaces. - by Dec 2025 - Complete tender for services and install.	Other			-	-	-	€ -			Sep-24
	Projects Planned		**- 444,389**	**2,750,997**	**375.97**	**2,306,608**	**1,042,609**	**€ 50,894**	**€ 5,319,400**		
	Percentage of Site Total		**-2.4%**	**14.6%**	**4.2%**	**6.2%**	**2.8%**	**1.3%**			