

University of Greenwich 2019-2022 Carbon Management Plan

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Contents

EXECUTIVE SUMMARY	2
2. CARBON PERFORMANCE TO DATE.....	5
3. CARBON REDUCTION STRATEGY 2019-2022	8
4. CMP IMPLEMENTATION PROGRAMME	12
4.1 CONFIRMING ROLES AND RESPONSIBILITIES.....	12
4.2 GOVERNANCE AND LINES OF REPORTING.....	14
4.3 FINANCING AND INVESTMENT	15
4.4 PROCUREMENT AND SUPPLIER ENGAGEMENT	16
4.5 COMMUNICATIONS, CAPACITY-BUILDING AND TRAINING NEEDS.....	17
4.6 RISKS AND ISSUES MANAGEMENT	18
5. MONITORING AND EVALUATION.....	20
APPENDIX 1: GLOSSARY OF TERMS.....	21
APPENDIX 2: UPDATED CARBON MANAGEMENT MATRIX	23

Executive Summary

The Higher Education Funding Council for England (HEFCE) requires all universities to have a Carbon Management Plan (CMP) that includes, or is supported by, an implementation plan or set of detailed linked plans setting out exactly how carbon emission reductions will be achieved within the CMP period.

An independent review the University of Greenwich's first CMP (2010-2016) has been undertaken by external consultants. This identified that the University was on course to almost meet the 30% 2016 target although increases to the estate size and changes to its utilisation have meant that rather than a 27% carbon reduction being met an 11.5% reduction was achieved. In comparison with the HEFCE target the (against a 2005/6 baseline, the University exceeded the HEFCE 43%, 2020 reduction target in 2015/16). It must be recorded that the decarbonisation of the electricity grid has had a positive impact on these figures. The investments of the first plan included, amongst many others, an extensive metering system which will be fully utilised in the second plan to meet the 2020 target.

This new CMP covers the period 2019-2022. It provides a high level strategic plan setting out how the Estates team, Campus Services and academic faculties will aim to work with each other to ensure that co-ordinated delivery of CMP actions is integrated into existing plans, policies and strategies, in particular, the new Estates Strategy.

The new CMP prioritises energy efficiency optimisation to achieve a more cost-effective and low-carbon estate. This will be achieved by optimising the existing buildings plus a more robust specification and project management process for refurbishments and any new building projects. Energy performance will be intrinsic to all business cases relating to improvements to our estate and systems and energy using equipment proposed by all Directorates and Faculties.

Ensuring all stakeholders are aware of their roles and responsibilities to help us reduce our carbon emissions is crucial and will be addressed the delivery of this CMP. The need for stakeholders to take responsibility for carbon and therefore energy costs will be reinforced as money saved is available to improve the University and what it offers.

The table below details the baseline and target carbon emissions (CO₂e pa) for all of the University of Greenwich estate (excluding transport).

	Baseline	CMP 2015/16 Target	CMP 2019/20 Target	HEFCE 2019/20 Target
2005/6	14,531	-	-	8,341
2009/10	12,614 ^(1 note on page 5)	8,830 ⁽¹⁾	7,568 ⁽¹⁾	-

In order to meet both targets for Scope 1 (gas) and Scope 2 (electricity) emissions by 2019/20 the total estate's building carbon footprint cannot exceed 7,568 tonnes CO₂e pa. The Plan does not include actions to reduce Scope 3 (indirect) carbon emissions.

The key aim of this document is to at least meet the HEFCE (met 2016/17) & CMP carbon reduction targets by the 2020 deadline. To ensure ongoing progress beyond this date this CMP will continue following the timeframe of the University of Greenwich's Corporate Strategy and its KPI relating to energy efficiency.

KPI 20: Reducing Energy Consumption to Reduce Environmental Impact, Improve Sustainability and Minimise Cost

Baseline Final Position (2015/16):	2017/18	2018/19	2019/20	2020/21	Target (2022)
27.9m kWh	27.1m kWh	26.3m kWh	25.5m kWh	24.7m kWh	24.0m kWh

The energy consumption of each building in the University's estate is monitored for the Estates Management Record (EMR). This KPI will reflect on non-residential energy consumption [HESA EMR return 2015-16]. The preliminary position is available in February with a final figure submitted in April every year.

The CMP requires ensuring that of carbon reduction objectives are understood and enacted responsibilities across directorates and faculties. This will be particularly important in certain areas such as space optimisation which will be crucial to meeting CMP targets. Additional specialist energy management capabilities are also needed so that data collation and performance monitoring for each campus becomes a dynamic system providing verifiable data for all internal and external stakeholders.

This Plan provides a platform to enable discussions and actions that align with how the University can contribute to meeting the UK Government's 2050 net zero carbon target.

1. Introduction: Purpose of the Carbon Management Plan

The Higher Education Funding Council for England (HEFCE) requires all institutions to have a Carbon Management Plan (CMP) that contains a carbon management policy or strategy (this may be part of a wider environmental or sustainability policy), comprising:

- A carbon baseline for 2005 which covers all Scope 1 (carbon generated directly by the organisation including our fleet and gas for heating) and Scope 2 emissions (carbon generated from electricity generation). Institutions are encouraged to measure a baseline for Scope 3 emissions (carbon generated by third parties though benefitting the institution such as from flights and embedded carbon from procurement), and in the longer term HEFCE expect these to be included.
- Carbon reduction targets for Scope 1 and 2 emissions, but institutions may choose to set additional targets for Scope 3 emissions. These must be SMART (specific, measurable, achievable, realistic and time-bound) and set against a 2005 baseline. Institutions may also choose to set their reductions in context by setting additional targets against an alternative baseline year set to 2020, because this is the timescale for interim government targets. Institutions may also set interim milestones but all milestones must be publicly available.

- Clear responsibilities for carbon management.
- A formal commitment to regularly monitoring progress towards targets and to report publicly annually.
- An *implementation plan* to achieve carbon emission reductions in Scopes 1, 2 and 3 including timescales and resources. These should cover capital projects and actions to embed carbon management within the institution, for example, through corporate strategy, communication and training.
- The CMP, including targets and the implementation plan, must be signed off by the University's governing body.

Further to this organisations are expected to illustrate how they are contributing to helping meet other objectives of interest to the University's stakeholders including the UN's Paris Agreement and Sustainable Development Goals.

The Green Consultancy (TGC) was appointed to review how effectively the University of Greenwich 2010-2016 CMP had been implemented, with a specific emphasis on Scope 1 and 2 emissions reduction. The results of the review have been used to develop a new CMP for 2019-2022 that is acceptable to internal and external stakeholders. Whilst TGC's brief was to focus on Scope 1 and 2 emissions the new CMP, in compliance with HEFCE advice, also signposts opportunities for developing a Scope 3 baseline.

Section 2 onwards sets out the new CMP for 2019-2022 and as such can be lifted from this report and re-branded as a University of Greenwich document.

The primary purpose of the new CMP is to enable the University of Greenwich to achieve prioritised energy, carbon and related cost savings over the plan period 2019-2022. The new CMP enables the University to meet its commitments for carbon emissions reduction in line with government policy and sectoral priorities for HEIs. More importantly, the CMP will enable the University of Greenwich to achieve a far more cost-effective, low carbon estate and facilities to meet the needs of the institution as a leading centre of educational excellence.

The new CMP provides a high level strategic plan setting out how the Estates team, Campus Services and academic faculties will work with each other to ensure that co-ordinated delivery of CMP actions is integrated with existing plans, policies and strategies.

Funding will be sought to upgrade important energy data systems to:

- Provide a single source of verifiable data for all stakeholders
- Facilitate accurate fiscal and carbon reporting
- Provide formal quarterly reporting, including carbon emissions and progress towards emissions reduction targets.

2. Carbon performance to date

The University of Greenwich 2010-2016 CMP detailed two specific targets, one internal and one external set by the Higher Education Funding Council for England (HEFCE):

- A reduction in CO₂e Scope 1 & 2 emissions of 30% by 2015/16 and of 40% by 2019/20 based on 2009/10 baseline.
- HEFCE target of a 43% reduction in Scope 1 & 2 emissions based on 2005/6 academic year.

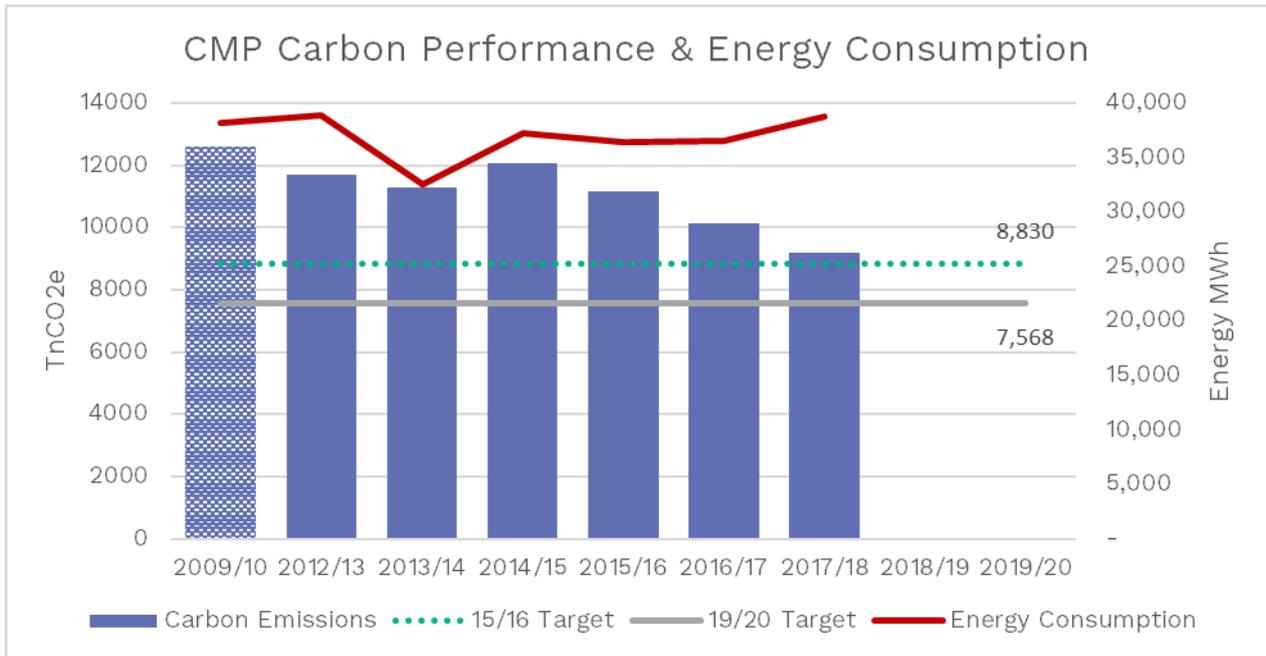
Table 2.1 details the baseline and target carbon emissions (CO₂e pa) for all of the University of Greenwich estate.

Table 2.1: UoG CO₂e emissions

	Baseline	CMP 2015/16 Target	CMP 2019/20 Target	HEFCE 2019/20 Target
2005/6	14,531	-	-	8,341
2009/10	12,614 ⁽¹⁾	8,830 ⁽¹⁾	7,568 ⁽¹⁾	-

In order to meet both targets for Scope 1 and 2 emissions by 2019/20 the building carbon footprint cannot exceed 7,568 tonnes CO₂e/annum (this compares with the target in the first CMP of 8,241 tonnes CO₂e pa). Our carbon footprint has been restated for all years in order to account for material changes to the Conversion Factors provided by DEFRA for reporting purposes. Because the HEFCE targets for emissions reduction are absolute it will be prudent to set performance measures per campus based on each building's floor area. It is possible to get this level of granularity as the University's AMR (and potentially the BMS data) can be matched to floor area per building.

⁽¹⁾ Factors for electricity were previously done on a 5 year rolling average and required updating annually. However, following a review, this was changed in 2013 and instead all Conversion Factors are now based on a single average factor for a particular year. Consequently, DEFRA stipulated that organisations should re-baseline their data in order to avoid sudden drops in carbon emissions that are not reflective of operational / behavioural changes. "Organisations should restate their carbon footprint, across each relevant historic reporting period, including the base year, to compensate for this change and make future reporting comparable. Organisations should annotate the reason for restatement to ensure transparency for stakeholders.



Between 2005/6 and 2009/10 Scope 1 transport emissions arising from vehicles owned by the University fell by 54%. By 2009/10 these transport carbon emissions stood at only 47 tonnes CO₂e per annum and so have very little impact on the overall carbon footprint. Further reductions are only be possible by switching to electric vehicles and low emission vehicles which was actively invested in during the summer of 2018.

Scope 3 carbon emissions from water use, wastewater and waste arisings, procurement (including refurbishment and new build activities), business travel and commuting by staff and students are in the process of being calculated by the University to establish a baseline and reduction strategy. Collectively, these emissions are likely to account for around 60-85% of UoG’s total annual carbon footprint.

The following analysis for Scope 1 gas and Scope 2 electricity emissions utilises fiscal kWh consumption data from 2006/7 up until the end of the academic year 2015/16.

Table 2.2 details the trend in carbon emissions and the respective tonnage between gas and electricity for the whole estate.

Table 2.2: Trend in UoG CO₂e emissions

	Gas	Electricity	Transport	Total	% below 05/06 baseline	% below 09/10 baseline
2006/7	2,812	7,753		10,566	27.3%	
2007/8	3,250	8,511		11,761	19.6%	
2008/9	3,450	8,936	44.5	12,430	14.8%	
2009/10	4,323	9,364	46.5	13,735	9.9%	
2010/11	3,535	8,748	51.2	12,334	15.5%	10.2%
2011/12	3,420	7,743	49.7	11,212	22.8%	18.4%
2012/13	4,027	7,883	45.4	11,955	18.0%	13.0%
2013/14	2,889	7,508	45.6	10,442	28.1%	24.0%
2014/15	3,453	9,185	42.2	12,680	13.0%	7.7%
2015/16	3,121	8,912	41.9	12,075	17.0%	12.0%

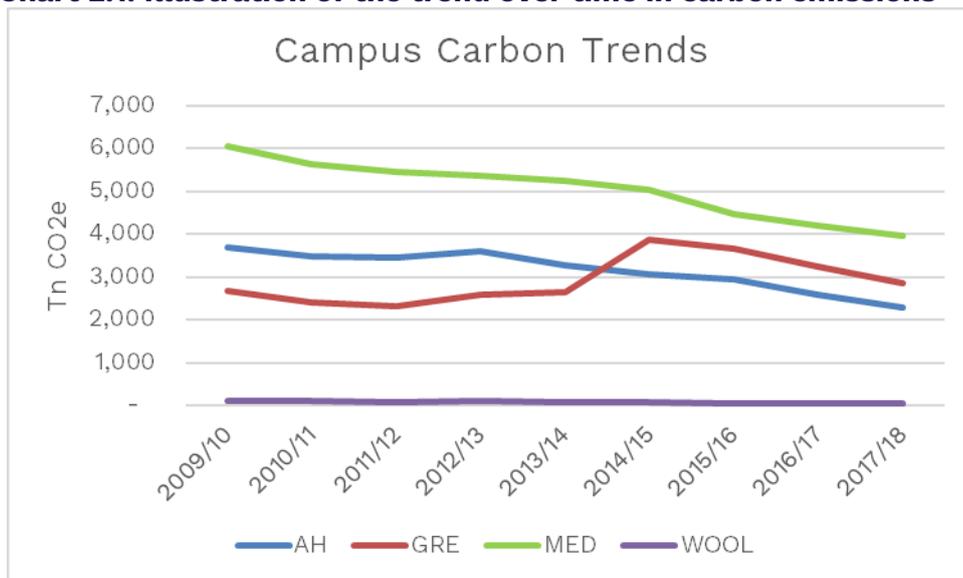
This data shows (using the data not corrected regarding updating of electricity conversion factors) that until 2013/14 the University was making excellent year on year progress in reducing carbon emissions from energy use when in 2014/5 a number of significant additions to the estate increased both Scope 1 and 2 emissions contributing to the outcome that the 30% reduction target was missed in 2015/6 (equating to 2,334 tCO₂e emitted over target).

The University has focused on implementing a range of short and medium term payback solutions to achieve this year on year carbon reduction. These include extensive building fabric works to improve thermal performance of the existing building stock, measures such as secondary glazing; pipe work insulation and draught proofing have been used to great effect. Over the longer term the planned replacement of ageing boiler plant has meant a steady roll out of high efficiency boilers in key areas of the estate with future works ready to be undertaken as plant nears the end of its operational life.

Significant carbon savings are expected with the completion of a state-of-the-art combined heat and power plant at the Medway campus. Using environmentally sensitive biofuels the CHP forms a cornerstone of UoG's carbon management plan with an estimated annual carbon saving of 2,250 tCO₂e.

The 13% increase in consumption through 2014/15 onwards is primarily due to the opening of the new Stockwell Street development. The Stockwell Street building is a highly engineered construction, with state of the art building service technology and controls systems. The University is currently going through a training phase with the building to fine tune the interaction between users, building fabric and building services to fully optimise the space. It is hoped over the coming 6-8 months the optimisation of Stockwell Street will be completed and a significant reduction in utility consumption seen. Chart 2.1 overleaf illustrates the trend in carbon footprint across the UoG estate by providing information per campus (note the carbon emission data does not take into account the recalculation of the electricity conversion factor).

Chart 2.1: Illustration of the trend over time in carbon emissions



Closer analysis of the individual campuses given on page 7 identifies a steady downward trend in gas consumption across all sites. Electricity consumption has

remained relatively stable indicating there may well be potential for substantial carbon savings through targeted measures aimed at reducing electricity usage. Electricity is more carbon intensive than mains gas, so a relatively small reduction in usage can go a long way to furthering progress towards the 2020 reduction target. Equally, any increase in electricity can cause a dramatic step backwards.

In 2014/15 the Greenwich Campus Scopes 1 and 2 carbon footprint increased by 66%, the majority of which as a direct result of the Stockwell Street development. In raw kWhs this single building was responsible for one third of the campuses' entire electricity consumption and 16% of the annual gas usage. The University of Greenwich recognises a number of lessons regarding the design and commissioning process of Stockwell Street need to be learnt. The new CMP focuses on energy optimisation for a more sustainable future. This will be achieved through a more robust specification and briefing process controlled by key gateways within project management. Energy performance will be intrinsic to business cases put forward by Estates.

Table 2.3 Progress against UoG Strategic KPI

Baseline Final Position (2015/16):	2017/18	2018/19	2019/20	2020/21	Target (2022)
27.9m kWh	27.1m kWh	26.3m kWh	25.5m kWh	24.7m kWh	24.0m kWh
Actual Energy Use.	30.2 kWh				

The underlying aim is to reduce our energy consumption will save money and carbon. This KPI is reported to senior management and the Governing Body on an annual basis. This will reinforce the demand and expectation for progress and enable cross organisational action to help ensure progress is made in all areas.

3. Carbon Reduction Strategy 2019-2022

As of 2016/17 the University of Greenwich requires a reduction in carbon emissions of 2,493 tCO₂e to meet agreed carbon reduction targets. The previous CMP focused on discrete 'quick win' projects such as the replacement of poorly performing heating plant, installation of variable speed drives and insulation works. These measures have clearly reduced utility demand as can be seen from Chart 2.1. The University estate is, however, very varied with a host of complex building related challenges, including the historic Greenwich and Medway campuses, with their Listed Building requirements. Each campus has its own varied occupant needs, experimental technology, and interlinked building services.

The existing Building Management Systems (BMS) and Automatic Meter Reading (AMR) system are good tools however resources will be required to ensure they are set up and utilised correctly.

The following phased approach now forms the core of the new CMP.

Phase 1: Quick Wins and Stockwell Street

With specific recommendations relating to eight of the most energy intensive buildings on the estate, Phase 1 comprises a programme of ‘basic optimisation’ so that systems aren’t operating in direct conflict with one another. This requires that all control outstations are functioning correctly, are properly calibrated and set-points are appropriate for the building. With over 1,300 tCO₂e savings already identified through the evaluation of a handful of buildings, the University of Greenwich will make great strides towards the reduction target by completing the full review of the entire BMS controlled estate in July 2021.

Early BMS optimisation works indicate a fall in gas intensity at Queen Anne (the second most energy intensive building at the Greenwich campus, behind Stockwell Street), of 40%. Whilst the works here are far from over, this initial “win” provides proof of concept and will help to gather momentum with carbon reduction works across the estate.

The significant adverse impact on emissions reduction progress caused by the opening of the Stockwell Street development needs to be addressed. Issues regarding both physical plant and the control strategy employed have already been identified and by working with the building design team and other key contractors these issues should be completely rectified before the end of June 2019.

A review to close the ‘performance gap’ (i.e. the difference between the energy use of a building identified in the design phase with the reality in operation) will be undertaken with learning applied in our other buildings, particularly those that have had significant changes to their spaces and systems.

Next, a review of the capabilities of data capture and analysis needs undertaking considering both the BMS and AMR which it has been identified needs validation to set up the most effective means of understanding energy use and setting out corresponding targeted efficiency programmes. This will be led by the Building Services Engineer.

Phase 2: Shifting to Dynamic Optimisation

The Phase 1 basic plant and BMS optimisation will only take matters so far; a fundamental shift in approach is required to ensure that the University of Greenwich’s built estate is performing to its full potential both in terms of energy usage and space utilisation. Space utilisation is a primary focus for the 2019-2022 CMP. The University of Greenwich, in common with many other universities, needs to focus on increasing the utilisation and efficiency of space. Significant opportunity exists in providing flexible, agile working environments and room booking. Operations need to be consolidated to make optimal use of all space available, thus enabling plant to be scheduled ‘on’ for the shortest amount of time possible. This will require a much more responsive and organised effort between academic staff, facilities management and service providers than is currently being provided together with much greater understanding within each faculty administrative team.

Effective space utilisation requires a significant investment in time and resources to conduct the audits and user surveys to identify how the University of Greenwich can consolidate the current timetable. Doing so will ensure that staff and students have

access to the highest quality learning environments by reducing the use of poorer quality spaces, enabling estate rationalisation and cost-saving reductions in carbon emissions. Administrative staff will also benefit considerably by working in more comfortable office environments. For example, a moving staff from cellular offices into open plan agile working environments will significantly increase space occupancy levels per meter squared whilst creating stimulating, inclusive working environments.

The target for Phase 2 is achieving the dynamic programming of BMS for each campus to better reflect occupancy of key spaces. This will require the development of building and campus level Action Plans for carbon emissions reduction comprising:

- A thorough review of the BMS service provider set-up for each campus, particularly reviewing service outcome-based objectives concerning energy efficient good practice directly tied to CMP objectives. Some existing services may need reviewing to ensure that meeting CMP objectives are core requirements;
- Working with academic departments and faculties, Estates and Space Management teams to aim to:
 - Reduce ‘block booking’ of teaching spaces when only used for part of the booked time period;
 - Enable timetabling to make nominated Estates team member(s) aware of vacant periods of key spaces such as lecture theatres on a weekly basis. The Space Management team will be made aware of energy efficiency issues relating to buildings and if available rooms to be able to more effectively rationalise space utilisation according to energy use. They also need to work much more closely with personnel operating the BMS;
 - Ensure that periodic reviews of student numbers and room size is undertaken with information shared between appropriate departments to ensure space needs always closely matches use;
 - Embed technology to better manage room booking at point of use via for example touchscreens for class and meeting rooms;
 - Nominated Estates team members will update time schedules of key plant servicing those spaces on a weekly basis with the aim of better matching operations with space utilisation.

Whilst these effective solutions are low cost, they can be labour intensive requiring close, effective, communication between all parties concerned and appropriate resourcing to enable the BMS updates.

An audit of the BMS infrastructure including control panels, sensors, valves and switches needs continual evaluation to ensure that the system can function efficiently. Where replacement or upgrading is required carbon saving opportunities, cost saving and payback periods are to be reviewed.

It is crucial that all involved appreciate the importance of tackling carbon emissions, the benefits in doing so and the dis-benefits of failing to take action. Building capacity about the associated risks (financial, environmental and reputational) is critical and is likely to require highly targeted training; this aspect together with communications is covered in Section 4.

Parts of the Mansion site are vacant so the aim is to further reduce operational use of this site, optimising space utilisation at the same time until the University vacates the site in April 2020. This is a priority action in the carbon strategy because the Mansion

site currently results in annual emissions of over 900 tCO₂e but optimisation of the current BMS could reduce this figure by 150 tCO₂e. The consolidation of space and the isolation of redundant buildings, keeping only key areas active, could see the site's annual carbon emissions fall significantly.

Phase 3: Achieving a low carbon estate

As part of the ongoing upgrading and redevelopment of the estates the University should identify the buildings that have high energy use and that can be adapted effectively or disposed of. One instance is the pending disposal of Mansion Site where relevant activities could be transferred to the other parts of the London campuses that could improve space utility and wider energy efficiency. It is estimated that this could deliver carbon savings of approximately 740 tonnes.

To enable a sustainable future for the University estate an ongoing improvement in the design, construction, implementation, commissioning and training process of new build and refurbishment projects is required. Energy saving measures and optimisation opportunities should be built into the business cases of all refurbishment and new build projects. Effective energy efficiency advice will be sought at the initial design stage. At key project gateways energy and sustainability criteria will be reviewed to ensure the project will deliver the expected return.

The University may wish to consider implementing a framework agreement for specialist consultancy. Often particular consultancies will have a specialisation or a particular approach, trying to engage a new contractor for each project is likely to lead to conflicting outcomes and unnecessary repetition of works. The University of Greenwich should ensure principles that form part of the brief for design teams and contractors enables every project to deliver high quality, sustainable and energy efficient results.

Carbon management will be an item on relevant board and steering group agendas including, for example, campus management boards. This will ensure that all key stakeholders understand and can help solve the carbon implications of decision-making in terms of the design, build and use of our estate.

Review of existing low carbon investments to ensure performance is met

Some large-scale investments were made in the 1st Carbon Management Plan and could be made in this plan. The intention of such investment is to deliver large carbon savings that are essential to meet the carbon reduction and energy saving targets. Where such investments are underperforming then contingency decisions will need to be made to put in place further improvements to systems or make investments that could remedy any potential carbon saving shortfall. Reviews of such past investments should be made by the departments that have been responsible to their installation and or operation and where underperformance occurs this is reported to sustainability@gre.ac.uk setting out what the actual or expected shortfall would be. The minimum shortfall threshold for reporting is 100 tonnes CO₂e per annum. Where projected carbon savings cannot be made and these are significant either individually or collectively then the contingency may require additional funding to be made available for 'shovel ready' projects to be implemented. See 4.3 Funding and Investment section for further information.

Enhancing energy efficiency expertise

Ensuring success in carbon reductions and cost savings across the University of Greenwich estate requires that specialist energy management capabilities are available to ensure energy efficiency is part of the day to day working across the institution. Whilst embedding key roles and responsibilities around carbon reduction into existing job descriptions will help, having an energy manager or utilising external support to help ensure delivery of action will ensure progress is maintained.

4. CMP Implementation Programme

4.1 Confirming roles and responsibilities

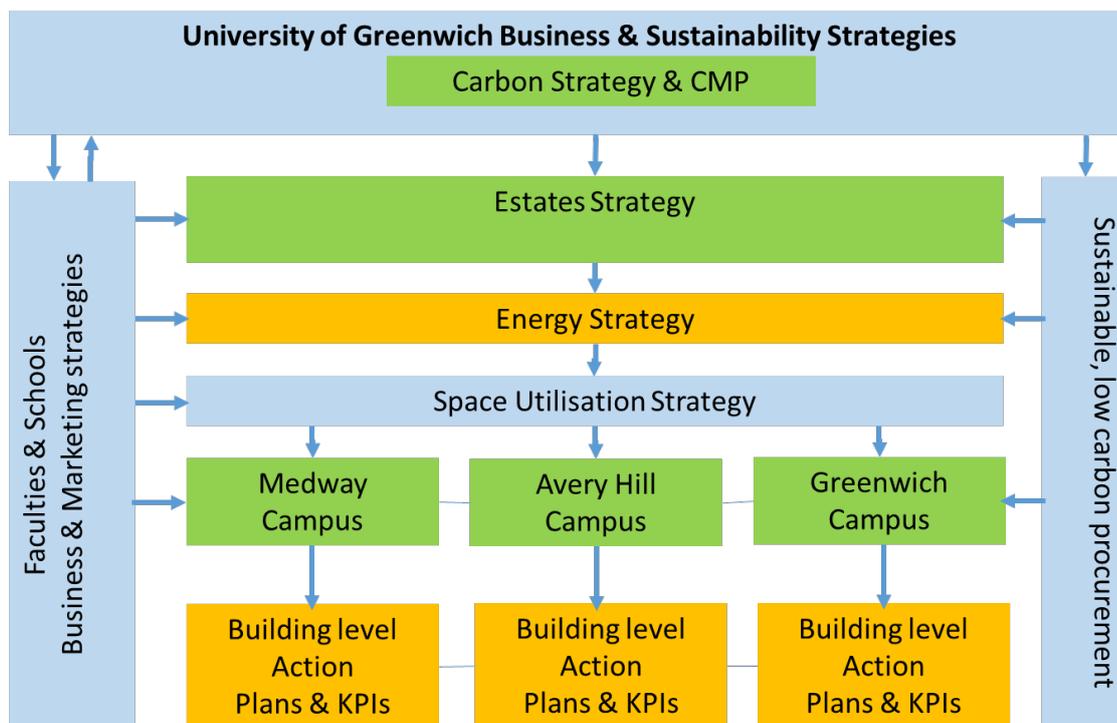
As a critical aspect of energy optimisation, responsibility for specific actions to implement the new CMP needs to ensure that awareness, responsibilities and action are clearly set out and followed. This includes Vice Chancellor, the Chief Operating Officer and the Senior Management Team in addition to staff throughout the University. As some staff have more direct influence or action in areas that can reduce energy use then some roles will be more engaged than others. The senior management responsibilities are reflected in the updated Institutional Risk Management Policy at **Appendix A** which re-assigns responsibility for climate change and carbon risks so that appropriate response measures can be put in place. In addition energy reduction is a corporate KPI that is reported annually to the Governing Body by the VC.

The Sustainability Management Board will review progress of the CMP at its meetings and provide appropriate guidance and identify areas where support may be needed.

The updated Risk Register sets out risk-reduction measures that are to be translated into actions within the University's revised Environmental Management System (EMS). This means that task procedures will be revised to help implement CMP actions to achieve good practice.

Policy and strategy implementation

The diagram below illustrates the ideal hierarchy of the University's operational strategies, showing where the carbon strategy and CMP best fit within this structure. A university's CMP has a bearing on every aspect of the institution's operations but most directly on its Estates Strategy; the two are directly linked. For this reason the CMP and Estates operational aspects are shown in green. All of the items shown in blue are those that strongly influence and impact on the UoG's total carbon footprint, i.e. Scopes 1, 2 and 3. There are direct relationships between each of these strategies that are addressed in the 2019-2022 CMP. Items shown in amber are missing strategies and plans that will be put in place through the updated implementation plans for the CMP; these detailed plans are under development and are separate to the CMP.



The Vice Chancellor (VC) is directly responsible for ensuring that the policies and related strategies are up-to-date and are being implemented effectively at all levels via the operational Directors, their section Heads and Managers. The University’s carbon strategy and CMP objectives also link directly with each of the following:

- Sustainability Policy
- Travel Policy and Plan
- Heating & Cooling Policy
- Sustainable Procurement Policy and Strategy
- Strategic Plan 2017–2022: Summary
- Institutional Risk Management Policy
- Sustainable Food Policy
- Waste Strategy.

Process and procedures for policy implementation across the University involves not only the operational teams and support services but also the Faculties, their administrative teams and the student body. The following table summarizes how the responsibility for resourcing and implementing specific CMP tasks are shared across the University and each campus:

Table 4.1: Summary of CMP roles and responsibilities

CMP Task	Lead strategic responsibility	Strategy Lead(s)	Delivery Lead(s)	Delivery & reporting on progress
Financing of carbon reduction projects	Chief Operating Officer (COO) & Finance Committee	Director of Finance	Head of Estates Strategy & Programme Delivery	Finance Manager (E&F)

Buildings and BMS maintenance (Phases 1 & 2)	COO	Director of Estates & Facilities	Head of Facilities & Operations	Campus Managers and BSE Engineers
Low carbon new build and refurbishment projects (Phase 3)	COO	Director of Estates & Facilities	Head of Estates Strategy & Programme Delivery, Building Services Manager	Building Services & Technical Projects Engineers
Low carbon transport and travel (Phases 2 and 3)	COO & Director of Estates & Facilities	Head of Facilities & Operations Heads of Faculty and HR	Transport Manager, HR Managers	Transport Team (supported by Operational & Faculty Admin teams & HR
Data collation and management systems (All Phases, but 1 and 2 especially)	COO	Directors of Estates & Facilities, Head of Facilities & Operations and Finance	Finance Manager & Heads of Estates Strategy & Programme Delivery, Facilities & Operations, Sustainability Projects Officer and HR	Campus Managers, Estate Managers, Building Services Engineer, Faculty, HR & Operational Admin Managers.
Low carbon, sustainable procurement (All Phases)	Director of Finance and Director of Estates & Facilities	Director of Procurement & Business Services	Heads of Estates Strategy & Programme Delivery, Facilities & Operations, and Catering & Events, Head of ILS,	Campus Managers, Technical Surveyor, ILS procurers, Faculty & Operational Admin Managers.
Carbon Communications strategy (All phases)	COO	Directors of Marketing & HR	Head of Sustainability & Sustainability Projects Officer	Sustainability Projects Officer (Behaviour Change) & SU, Sustainability Champions
Awareness-raising & Behaviour Change strategy and activities (All Phases, but 2 and 3 especially)	COO	Director of Estates & Head of Facilities & Operations and Director of HR	Head of Sustainability	Sustainability Projects Officer (Behaviour Change & SU, Sustainability Champions

4.2 Governance and lines of reporting

Carbon management meetings led by the Head of Estates to specifically review carbon actions and progress will be set-up to report to the SMB. Progress against CMP and related strategy objectives will in turn be reported at quarterly to the Sustainable Management Board (SMB), and annually to the Finance Committee and University Governing Body.

The reporting year will continue to run from August to July with monthly energy usage, business travel and emissions data reporting being co-ordinated by the Sustainability Team. Data collation and reporting for the CMP will be a strand of the enhanced EMS reporting process for ease of meeting ISO 14001:2015 compliance, HEFCE requirements and mandatory reporting. With the Carbon Reduction Commitment being phased out in 2019 and replaced Streamlined Energy and Carbon Reporting (SECR) system the University will be required to report on investment and carbon management progress in its annual reporting.

Keeping tight control over project delivery to meet the prioritised project schedule and objectives will obviously be critical to success. For this reason any unexpected vacancies arising at decision-making, budget allocation or plan delivery level should be filled as a matter of urgency to mitigate against any loss of momentum.

Working closely with the Estates Directorate, the Head of Sustainability continues to be responsible for co-ordinating data from each Estates, Campus, Directorate and Faculty teams. This will help to ensure timely reporting on CMP implementation progress. Progress reports will be made available to all teams, faculties and the study body via the University's web site and intranet. This will help to further raise awareness, build capacity and ownership about the scale of activities and responsibilities across each campus.

Involving each faculty in implementing the CMP will be critical to success. Faculties and Directorates will be engaged to help them understand how they can help reduce their energy use supported by energy use data relating to campus of building level if available. Opportunities will be explored to identify if carbon reduction actions can be considered as part of the annual appraisal process.

Sustainable low carbon procurement is an important factor towards achieving a number of CMP objectives. **Sub-section 4.5** covers the potentials in more detail. Progress in implementing the Sustainable Procurement Strategy including low carbon procurement opportunities should become part of the CMP reporting process. Further training to build capacity across teams to achieve the CMP's goals is covered in **Section 5.0**.

4.3 Financing and investment

The University is supportive of procurement decisions based on lower carbon options, even in some instances where the upfront purchase cost is higher but justified on lower total cost of ownership taking sustainability into account. The expectation is that lower carbon (and lower energy cost) may be particularly financially attractive when the whole life cost is calculated.

Where procurement opportunities arise, the Faculty or Directorate will be required to set out the comparative Whole Life Costs of the available options including the following cost appraisal elements:

- upfront costs
- maintenance and component replacement costs
- operational costs e.g. energy consumption costs
- environments impact costs, e.g. more efficient boilers, IT infrastructure,
- social impact costs, e.g. moving students from one location to another, student and/or staff experience

A 'Whole Life Costing Business Case' template will be compiled by Procurement & Business Services and Sustainability Unit to assist staff with the justification of their proposal. This will also include the means to calculate the carbon and cost saving as well as the 'payback period', where appropriate.

If staff are buying small consumption items, then selection can be made on a simple review of the comparative price and energy rating of the items. These items should be funded from existing budgets. If the proposed procurement require a significant investment, it would be expected that funding approval would be obtained from the Finance Committee, subject to compliance with Financial Regulations and Procurement Policy and Procedures.

Where external funding sources exist to assist with the procurement of low carbon investments then these should be reviewed closely with the Finance & Procurement Directorate to ensure that these can meet the requirements of the University and the funder.

4.4 Procurement and supplier engagement

The Sustainable Procurement Policy and Strategy will be applied to all contracts for the 2019-2022 plan period, especially the purchase of energy supplies, energy-using equipment and new build and refurbishment projects because these have the biggest potential to considerably reduce carbon impacts by 2022 for the CMP. To take pressure off the Procurement team the use of specific objectives, standard project clauses and purchasing criteria will be agreed and made mandatory for all 'buying points' within the University for specific types of goods and services. The Sustainability Team will support this activity.

Construction and refurbishment activities have a large supply chain carbon footprint. This makes it critical that the design approach is effectively scoped from the outset so that explicit carbon reduction objectives are built into the commissioning and project management processes. This will achieve both a low carbon build process and result in cost-protected low carbon, energy efficient buildings in the longer term. This will help the University to meet its mission statement as a centre of excellence.

CMP requirements will be set out explicitly in project brief and tender specifications, particularly supplier terms and conditions for construction, refurbishment and maintenance contracts. Project specific low carbon requirements will be discussed and agreed between the Procurement team and the University commissioning group or 'internal client' as a matter of routine to create CMP-protected project briefs. Estates involvement and technical advice will be critical in making the tendering process more efficient. By tightening up these procedures it will be possible to successfully achieve low carbon buildings that will be highly thermally efficient and cost-effective to run. The campus management teams, as well as Estates, must also be involved at the heart of the specification process because of their in-depth knowledge of existing systems and issues. Lastly, bringing building users into the design process at an early stage will ensure that their needs, ideas and concerns are fully taken into account also whilst meeting building performance objectives for sustainable, low to zero carbon buildings.

Levels of supplier engagement will be increased by reviewing contractual arrangements with the Procurement team to agree how to improve or enhance the achievement of specific CMP objectives through the procurement process during 2019-2022. It is important that the carbon impacts of supplier deliveries (covered in Section 9 of the University's Travel Plan) are fully considered as part of the procurement process. This is a next area for action, requiring an investigation into how deliveries could be made more carbon effective, reducing road mileage and building on efforts made to date, for example arrangements agreed with building contractors and catering suppliers. Low level orders outside of procurement are

routinely raised by each department, so there is potential for much greater co-ordination of deliveries for catering, waste collection and office supplies by agreeing an ordering strategy with each team. This will be jointly investigated by Campus Services, the faculties and Procurement as part of ongoing contract performance meetings with contractors.

Future facilities delivery models

Carbon reduction has to be at the heart of how the University operates and how we deliver our many services, not just in Estates and Facilities. In respect to Estates and Facilities any changes in the facilities delivery model the University will ensure carbon reduction is integral to the delivery of the services provided by its supply chain, working in collaboration and creating appropriate mechanisms to enable effective and lasting carbon reduction.

4.5 Communications, capacity-building and training needs

Establishing clearly visible carbon targets for each campus, and in time, each building will raise awareness and create a spirit of healthy competition between staff, contractors and students. Having a much more visible and coherent summary of campus performance on a quarterly basis will help to raise awareness about the CMP and the responsibility everyone has for meeting their faculty, directorate, campus and building targets. As carbon performance improves this can be used as a marketing tool to continue attracting high quality students looking for a University and campus that demonstrate commitment to quality of performance in terms of not only course content and teaching quality but also the learning environment, i.e. the management of high quality educational facilities and accommodation.

Carbon performance for each building, faculty, directorate and campus and for the University as whole needs to be ‘dash-boarded’ in open view so that issues can be communicated as they arise, e.g. an unexpected spike in energy use as a result of failure to manage usage. Good news will also be communicated in this way by celebrating improved building performance with the successful refurbishment of specific buildings. Carbon intensity data for building floor area and per student as well as absolute carbon emissions reduction will be regularly communicated. The development of the University’s carbon dashboard will be web-based and make use of “info-graphics” to rapidly communicate progress on objectives and targets. This information can also be promoted to existing and potential suppliers, investors and other stakeholders.

All staff across the University will be made aware of their role in meeting CMP objectives and targets. Acknowledging that the CMP as presented may not be in the format that engages effectively with many of our stakeholders an ‘*Action on Carbon at the University of Greenwich*’ document has been produced that makes directly relevant the responsibilities and actions that we can all take. This will accompany this CMP to reinforce the message that success can only be achieved with buy-in across the University and with its stakeholders.

Suitable cost-effective mass-training measures such as tailored video training for groups and for induction of new staff members and students will be investigated. Training requirements of a more specialist nature such as low carbon sustainable

procurement will also be investigated so the risks to CMP delivery can be avoided or much reduced.

The Sustainability Team will scope and agree a training and communications plan in partnership with a proposed Energy Manager and HR team so that fully costed measures are put in place to compliment and support the technical management of energy and building systems. This approach also supports the enhanced approach to Environmental Management System (EMS) task procedures to meet compliance with ISO14001:2015.

4.6 Risks and issues management

In addition to updating the Institutional Risk Management Register, the phased approach to BMS and AMR optimisation outlined in Section 3 presents a number of risks and issues that need to be mitigated and managed. The following risks to CMP delivery have been identified with the aim of putting measures in place to avoid or reduce these risk for the duration of the plan:

Table 4.2: CMP 2019-2022 Risk Register

Risk to CMP delivery	Magnitude	Likelihood	Actions and mitigations needed
Failure to secure budget	High	Low	SMB to confirm budget and secure Finance Committee and Governing Body approval
Failure to get VC, COO & SMB buy-in	High	Low	Roles and responsibilities agreed by SMB and COO as part of plan approval process in Autumn 2019. HR revise post-holder objectives to formalise responsibilities for plan delivery.
Carbon risks not recognised	High	Moderate to high	The new institutional risks register sets out strategic risks more explicitly, sharing these out across the University in accordance with good practice. The CMP's register of risks will be shared with all operational teams and faculties, with each responding to these with specific tasks and measures they will need to undertake to avoid or mitigate risks they are responsible for.
Metering system not adequate for building level reporting	Moderate to high	Low	The scheduled AMR and BMS reviews will determine how the existing systems needs to be enhanced and optimised to avoid or at least reduce this risk to a minimum.
Data management systems not adequate for weekly and monthly exceptions monitoring and wider progress reporting.	Very high	Moderate to high	See above. Providing the AMR system with a user-friendly interface will greatly improve its utility. The Estates data tool and use of the Resource Efficient Scotland Carbon Excel tools will greatly enhance CMP monitoring and reporting. The results will need to be actively communicated via the UoG web site and other means (see below)
Major carbon reduction initiatives not meeting planned	High	Moderate to high	Review processes to identify performance with plans put in place to identify how to rectify performance

performance			expectations or where this is not possible to be ready to invest in and deliver projects that can meet the shortfall.
CMP not effectively communicated and owned by all staff	High	High	A communications plan with a timetable of activities and actions will be developed by the Sustainability team, who will work closely with other directorates and the faculties to co-ordinate its delivery.
Suppliers don't have CMP objectives written into contracts	Moderate to high	High	All university wide procurement decisions and services contracts with a will be reviewed and action taken to ensure the carbon reduction objectives of the CMP are met. New and renewed contracts will have CMP contractual obligations written into them. These will also be explicit in upcoming tendering processes.
Specialist energy management skills not available	Very high	Very high	It is strongly recommended that the UoG should appoint an Energy Manager, either an in-house member of the Estates team, or outsourced as part of a dedicated FM contract. The Energy Manager will ensure that each campus has a dedicated BMS specialist to ensure optimal effectiveness in line with CMP objectives
Critical delivery posts become vacant/left unfilled	High	Moderate to high	Task critical posts will be filled immediately they become vacant, i.e. recruitment prioritised as soon as notice is given. This will greatly reduce negative impacts on CMP delivery.
Faculties and directorates do not buy-into the CMP or its objectives	Moderate to high	Very high	Each faculty will receive a briefing on the new CMP from the Estates team and Head of Sustainability. The briefing will set out ways in which faculties can meet specific CMP objectives and invite faculties to respond as part of a Living Lab initiative that will be set-up by the Sustainability team.
Administrative staff have low awareness of the CMP	Moderate to high	Very high	Similar to the above, all administrative teams will be briefed on the new CMP and their part in its delivery. Team training will be developed for existing staff and new staff will receive similar training as part of their induction.
Students have low awareness of the CMP	Low	Moderate	The student body will be briefed on the new CMP via the SU and Faculties in accordance with the CMP communications plan.

5. Monitoring and evaluation

The existing BMS and AMR systems should be improved otherwise energy measurement and management will be difficult.

Data and information need to be generated and collected within an integrated strategic framework supported by effective tools and systems. Such a framework needs to be understood by everyone involved in its management. This means that all budget-holders and buying points within the University need to be aware of their role in the carbon measurement and management process.

A live web-based data system and dashboard of information showing how each campus is meeting its specified carbon emissions reduction targets should be developed. This would be open to view on the University's intranet and web site by all CMP stakeholders.

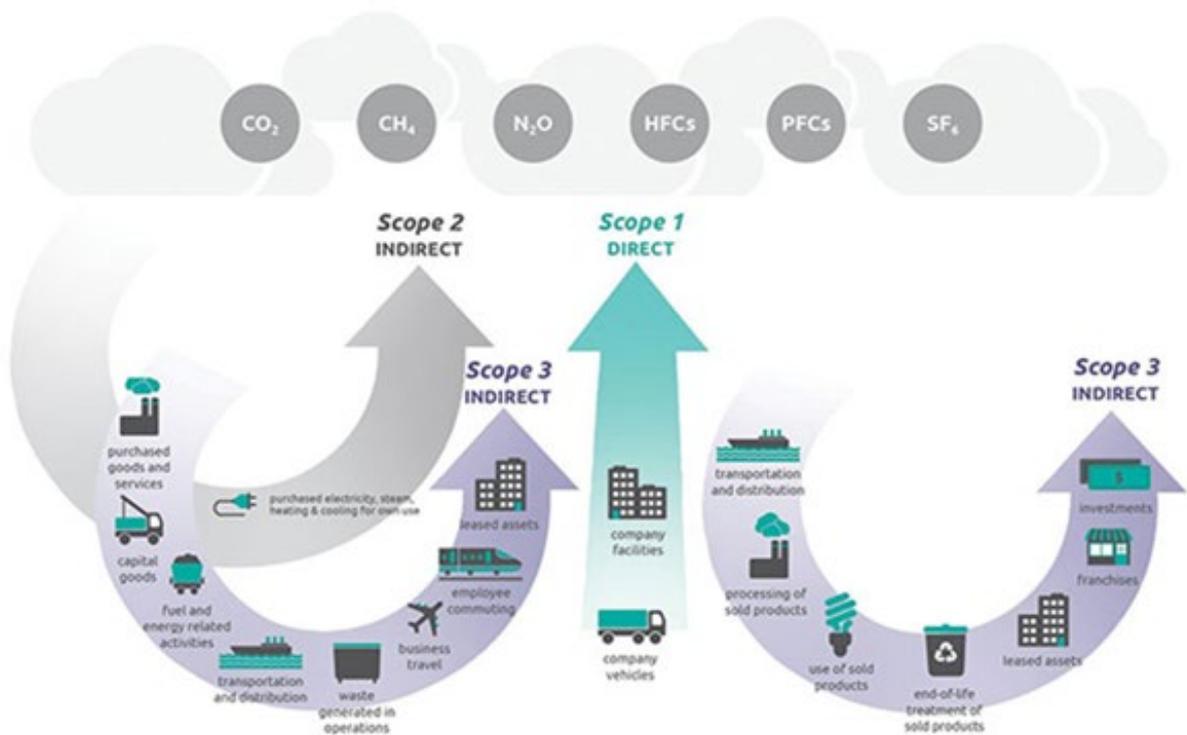
By setting emissions reduction targets for each campus it will be possible to tie emissions performance to specific individuals responsible for measuring and monitoring, i.e. more easily hold people to account. It will also be possible to set targets per building and campus that will help to encourage a more competitive management regime, i.e. whilst each campus is different the campus-specific targets make it possible to 'compare' levels of emissions reduction.

An Energy Manager role and clarifying energy management activities that should be delivered through Campus FM teams will be important to ensure BMS and AMR's are understood and used to help drive down energy use. Monitoring and reporting systems will be set up to understand what adaptations are being made and what impact these have. Campus FM staff would report to Campus Managers and Central E&F team members will help identify progress and support needs.

Appendix 1: Glossary of Terms

AMR	Automatic Meter Reading system. The University has an extensive AMR system used for automatically collecting daily, weekly and monthly diagnostic data on energy consumption. An AMR is designed to enable data transfer to a central database for billing, troubleshooting, and analysing so that billing can be based on near real-time consumption rather than on estimates based on past or predicted consumption.
BMS	Buildings energy Management Systems (BEMS or BMS) are computer-based systems that help to manage, control and monitor building technical services (HVAC, lighting etc.) and the energy consumption of devices used by the building.
Carbon	Shorthand to describe the 6 main greenhouse gases in the earth's atmosphere of which carbon dioxide is the most abundant and persistent over time. These gases, mainly produced from burning fossil fuels for energy production, are responsible for causing global warming which results in climate change and the damaging impacts this brings.
Emissions reduction	The goal of carbon management is to reduce the amount of carbon emissions resulting from burning fossil fuels for energy generation. Emissions reduction is achieved through improvements in energy efficiency to reduce usage and by switching to sources of carbon-free energy production. Emissions carbon-rich gases like methane can also be reduced by diverting waste to landfill through the application of sustainable procurement measures and effective recycling.
Carbon foot print	The total Scope 1, 2 and 3 emissions created by an organisation as the result of its day-to-day activities, capital investments and projects (<i>see description of Scopes below</i>).
CO₂e	Greenhouse gas emissions, expressed in kilograms or tonnes of carbon dioxide equivalents.
Dynamic control	An innovative approach to managing energy demand by merging conventional energy use management principles (demand-side management, demand response, and distributed energy resource programs) within an integrated framework that simultaneously addresses permanent energy savings, permanent demand reductions, and temporary peak load reductions.
HVAC	Heating, ventilation, air-conditioning and cooling equipment - usually controlled by a BMS.
kWh	Kilowatt hour. This is the most commonly used unit of energy for measuring all types of energy usage and demand from which related carbon emissions can be derived.
Scope	Greenhouse gas emissions are categorised into three groups or 'Scopes' by the most widely-used international accounting tool, the Greenhouse Gas (GHG) Protocol.

Scope 1	Direct GHG emissions from fuel sources that are directly owned or controlled by the University. They include emissions from fossil fuels burned on site, e.g. gas for space heating and catering, emissions from entity-owned or entity-leased vehicles using petrol or diesel fuel, and other combustible fuel sources.
Scope 2	Indirect GHG emissions from the generation of electricity, heating and cooling, or steam generated off-site but purchased by the University, and the transmission and distribution (T&D) losses associated with these purchased utilities, e.g. grid electricity, chilled water, steam, and high temperature hot water.
Scope 3	Indirect GHG emissions from sources not owned or directly controlled by the University but related to essential activities including: employee business travel and commuting; contracted solid waste disposal; contracted water supplies and wastewater treatment; purchases of goods and services, ranging from periodic capital purchases such as building refurbishment to more frequent purchases such as office supplies, catering, ICT and so on; corporate investments and similar assets. Measuring Scope 3 emissions can be difficult, requiring the co-operation of primary suppliers and their own supply chains. Scope 3 emissions come from an organisation's supply chain and can often exceed its Scope 1 and 2 emissions. It is critical to investigate Scope 3 supply chain impacts by working closely with primary suppliers because there is often much that can be done to reduce these carbon impacts.



Appendix 2: Updated Carbon Management Matrix

	POLICY	RESPONSIBILITY	DATA MANAGEMENT	COMMUNICATION & TRAINING	FINANCE & INVESTMENT	PROCUREMENT	MONITORING & EVALUATION
<p>5</p> <p>BEST</p> 	<ul style="list-style-type: none"> • SMART Targets signed off and implemented • Action Plan contains clear goals enabling regular progress reviews • Strategy launched internally and to external stakeholder community 	<ul style="list-style-type: none"> • Accountability for carbon management and climate change is set at senior level, i.e. VC and COO. • Carbon management is formally integrated in responsibilities of Directors and section and Faculty Heads • CMP objectives are a part of all post-holder descriptions 	<p>Appropriate data granularity for monthly and quarterly analysis and reporting for all HEI sources</p> <ul style="list-style-type: none"> • Emissions data externally verified 	<ul style="list-style-type: none"> • Training strategy & comms plan for all staff & students being fully implemented. This covers: <ul style="list-style-type: none"> • Induction • ongoing training • Communications • Carbon management matters regularly communicated internally and to external stakeholders & partners 	<ul style="list-style-type: none"> • CMP has granular & effective financing mechanisms utilised for carbon management projects. • Finance Director representation on SMB's carbon strategy team. • Ring-fenced fund for carbon reduction initiatives. 	<ul style="list-style-type: none"> • All purchasing points trained to adhere to internal sustainable procurement criteria and ICLEI's Procura manual. • Sustainability comprehensively integrated in all PQQ & tendering criteria. • Whole life cycle impact and costing taken into account 	<ul style="list-style-type: none"> • Board members and Senior Management review carbon management progress at least quarterly. • SMB, Estates & Campus services review CMP progress at least monthly • Intranet has 'live' dashboard of CMP progress for all staff & students. • Performance and analysis published externally on web site
4	<ul style="list-style-type: none"> • SMART Targets developed but not signed off and implemented 	<ul style="list-style-type: none"> • Carbon management is full-time responsibility of a few individuals • carbon management integrated into responsibilities of some departmental managers, but not all staff 	<p>Annual collation of CO₂ emissions for all main HEI sources:</p> <ul style="list-style-type: none"> • Buildings • Transport • Water supply <p>Waste & wastewater</p> <ul style="list-style-type: none"> • Data internally reviewed 	<p>Formalised CMP communication & training plan in place for all staff on CMP carbon and energy matters. This includes induction on on-going training. Student body regularly given CMP updates</p>	<ul style="list-style-type: none"> • Regular financing for carbon management projects • Some external financing • Sufficient task management mechanism 	<ul style="list-style-type: none"> • Environmental requirements, including CMP objectives incorporated in tendering • Purchasing staff familiar with Procura • Joint procuring between HEIs or with LAs • Supply chain engagement well underway with targets set. 	<ul style="list-style-type: none"> • Senior management and core teams regularly review CMP progress on: <ul style="list-style-type: none"> • Actions • Profile & Targets • New opportunities quantification • Quarterly and annual reports made available.

3	<ul style="list-style-type: none"> • Specific Sustainability policy with a Climate change reference 	<ul style="list-style-type: none"> • Carbon management is part time responsibility of a few people of moderate ranking personnel • Carbon management is the responsibility of department 'champions', i.e. not a formal responsibility. 	<ul style="list-style-type: none"> • Collation of CO₂ emissions for limited scope i.e. buildings and transport 	<ul style="list-style-type: none"> • Environmental energy group(s) give staff and students ad hoc: <ul style="list-style-type: none"> • Training • Communications 	<ul style="list-style-type: none"> • Ad hoc financing for carbon management projects • Limited task management • Resources not allocated strategically 	<ul style="list-style-type: none"> • Carbon requirements covered in selected PQQ and tender criteria but not in sufficient detail • Ad hoc internal purchasing approach so not all suppliers fully checked for carbon credentials • Developing engagement with key suppliers 	<ul style="list-style-type: none"> • Regular CMP reviews by Managers including: <ul style="list-style-type: none"> • Policies & Strategies • Targets • Action Plans • Periodic reports to Directors and Board members.
2	<ul style="list-style-type: none"> • No Policy • Climate Change aspiration 	<ul style="list-style-type: none"> • Carbon management is part time responsibility of an individual • No departmental champions 	<ul style="list-style-type: none"> • No CO₂ emissions data compiled • Energy data compiled on a regular basis 	<ul style="list-style-type: none"> • Periodic poster / awareness campaigns • Staff given ad hoc carbon management communications • Low levels of CMP awareness. 	<ul style="list-style-type: none"> • Some internal financing for carbon management related projects • Limited task coordination of resources 	<ul style="list-style-type: none"> • Low carbon criteria occasionally considered • Products & services considered in isolation from supply chain issues. • Little engagement with suppliers 	<ul style="list-style-type: none"> • Ad hoc reviews of carbon management actions / and progress against targets
1 WORST	<ul style="list-style-type: none"> • No Policy • No Climate Change aspiration 	<ul style="list-style-type: none"> • No individual responsibility for carbon management 	<ul style="list-style-type: none"> • Not Compiled: <ul style="list-style-type: none"> • Carbon emissions 	<ul style="list-style-type: none"> • No communication or training 	<ul style="list-style-type: none"> • No internal financing or funding for carbon management related projects 	<ul style="list-style-type: none"> • No climate or carbon related consideration • No life cycle impacts assessment or costing 	<ul style="list-style-type: none"> • No carbon management monitoring

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