Carbon Management Plan

(2020/21 -2030/31)

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Executive Summary

- **The University of Glasgow declared a climate emergency in May 2019 and has since published a Climate Change Strategy, that commits the University to 'net zero' for greenhouse gas (GHG) emissions by 2030.**
- **Furthermore, the University has committed to setting a GHG reduction target that aligns with the UNEP Emissions Gap Report (to prevent global warming greater than 1.5^{o}C); currently a 7.6% reduction in GHG emissions per year, for the next decade.**
- **Over the period 2020/21 to 2030/31 this translates to a reduction in GHG emissions from 60,358 to 27,000 tonne CO_2e per annum.**
- **Our carbon footprint has decreased significantly over the past six years.**
- **The most significant reduction in our carbon footprint can be attributed to the huge impact of the coronavirus pandemic on both staff/student commuting and business travel.**
- **As we move on from pandemic-related restrictions on our day-to-day activities we must minimise the possible rebound in emissions from staff/student commuting and business travel. We must**
    - **Continue to make it easier for staff and students to access the campus using active travel or via public transport**
    - **Support more agile/flexible working patterns.**
    - **Ensure that emissions from flight-related business travel are minimised.**
- **We have now reached the point where the electricity supplied by the grid is less carbon intensive than that supplied by our gas-fired CHP engine. Thus, we must consider how to supply our estate with low carbon heat in the future.**
- **This Carbon Management Plan highlights various and often challenging interventions around the University, that we will need to take if we are to reach our stated emissions target of 27,000 tonne CO_2e by 2030/31.**

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1.0 Introduction

This Carbon Management Plan (CMP) follows on from both our declaration of climate emergency in May 2019 and our recently published Climate Change Strategy, which commits the University to 'net zero' for greenhouse gas (GHG) emissions by 2030. Furthermore, we have committed to setting ourselves a GHG reduction target, which aligns with guidance in the UNEP Emissions Gap Report, aimed to prevent global warming greater than 1.5°C; currently an average 7.6% reduction in GHG emissions per year, for the next decade. This CMP will act as a focal document, highlighting activity around the University which will deliver emissions reductions, making it clear how we will reach our emissions target of ~27,000 tonne CO_2e by 2030/31.

Note: The University reports its annual carbon footprint in tonne CO_2e. This means that we account for our production of a range of GHGs, beyond just CO_2. Therefore, to be clear, when we refer to our carbon emissions or our carbon footprint, this will also include the impact of methane, nitrous oxide, sulphur hexafluoride, HFC and PFC production.

1.1 Global Context

- The Paris Climate agreement, drafted in 2015, saw 195 countries reach consensus on the need to keep global temperature rises this century to well below 2°C, while pursuing efforts to limit the increase to 1.5°C[1].

- The Intergovernmental Panel for Climate Change (IPCC) has published a special report which indicated that limiting global warming to 1.5°C would require 'net zero' carbon emissions by around 2050 (IPCC, 2018); any additional warming above 1.5°C would significantly worsen the risk of drought, floods, extreme heat and poverty for hundreds of millions of people, globally[2].

- More recently, the United Nations Environment Programme (UNEP) Emissions Gap Report stated that to meet the 1.5°C temperature goal of the Paris Agreement, GHG emissions would need to be cut by 7.6% a year, each year, for the next decade[3].

- COP26 has just been hosted in Glasgow (November 2021), with the ambition of keeping the 1.5°C temperature goal of the Paris agreement alive. However, Nationally determined contributions (NDCs) or emissions reductions currently pledged are estimated to have us on a trajectory for 2.4°C of warming by 2050[4].

[1] https://unfccc.int/sites/default/files/english_paris_agreement.pdf
[2] https://www.ipcc.ch/sr15/
[3] https://www.unep.org/news-and-stories/press-release/cut-global-emissions-76-percent-every-year-next-decade-meet-15degc

[4] https://climateactiontracker.org/

1.2 Organisational Profile

- The University of Glasgow was founded in 1451 and is a world-class learning and research higher education institution. The University's mission is: "to bring a community of world changers together" (University of Glasgow, 2021).

- The University currently has 30,465 FTE students, 6829 FTE staff and is located in the West End of Glasgow. The University estate includes over 335 buildings ranging from 19th to 21st century.

- Currently expansion of the University estate is taking place, with a £1.6 billion redevelopment underway at the former Western Infirmary site, adjacent to the Gilmorehill campus.

- Both student/staff numbers and the size of the estate will continue to increase in the coming years, adding further pressure to the organisation's carbon footprint.

1.3 Legislative Context

- The UK Climate Change Act 2008 commits the UK government to reducing greenhouse gas (GHG) emissions by at least 80% of 1990 levels be 2050[5]. This has been put into Scottish law through the Climate Change (Scotland) Act 2009 which commits Scotland to a 42% reduction in emissions by 2020, and 80% reductions by 2050[6].

- Section 44 of the Climate Change (Scotland) Act 2009 also places duties on public bodies such as UofG to: contribute to carbon emissions reduction targets; contribute to climate change adaption; and to act sustainably.

- In 2015, the Scottish Government introduced an order requiring all public bodies from the Major Player list (including UofG) to report annually to Scottish Ministers on their compliance with the climate change duties.

- In April 2019, the Scottish Government declared a global climate emergency.

- In May 2019, the Committee on Climate Change published their report 'Net Zero – The UK's contribution to stopping global warming'. This report recommended that Scotland adopt a target of reaching net-zero greenhouse gas emissions (GHGs) by 2045[7]. Subsequently, the

[5] http://www.legislation.gov.uk/ukpga/2008/27/pdfs/ukpga_20080027_en.pdf
[6] http://www.legislation.gov.uk/asp/2009/12/pdfs/asp_20090012_en.pdf
[7] https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/

Scottish Government amended the Climate Change Bill to set a target of net-zero emissions by 2045 at the latest.

1.4 University Context

1.4.1 University Strategy

The University strategy states that we will:

- Actively adopt and advance the United Nations' Sustainability Development Goals
- Create greener, healthier and more sustainable campuses within our communities
- Evolve our operations and ways of working to meet our commitment of being a carbon neutral organisation by 2030.

1.4.2 Climate Change Strategy (2020)

This document sets out how the University will deliver our climate change commitments, which are to:

- Engage and empower our community; we will ensure that the climate emergency is placed at the heart of what we do over the next 20 years. We will strive ensure a whole-of-institution approach to sustainability

- Promoting efficiency; our estate and infrastructure will be optimally organised to reduce our carbon footprint and minimise harm to the environment.

- Improve governance and policy; we will structure our governance and management and allocate appropriate resource under both capital and revenue to initiatives that make a significant impact on our carbon footprint.

- Undertake continuous improvement initiatives; we will take forward a range of initiatives which help us reduce waste and contribute to the wider sustainability agenda.

- Build resilience through partnerships; we will lead or contribute to a range of initiatives which help prepare us for the effects of climate change over the decades to come

1.4.3 Estates five-year Business Plan (2021-2026)

We will:

- ensure sustainability is at the centre of all our projects
- engage staff and students in our environmental actions
- strengthen the GUEST (student intern) network
- plan future energy use and generation in line with our sustainability goals
- implement a Travel & Transport Plan which aligns our operational needs and sustainability goals

1.4.4 Carbon Management Plan in relation to other University environmental strategies

The Carbon Management Plan is not a stand-alone document but works in unison with other University plans and strategies, to help deliver our Climate Change Strategy, as shown in Figure 1 below.

Figure 1 – Environmental strategies, in relation to our Climate Change Strategy

2.0 Carbon Management

2.1 Carbon Reporting

In line with our Environmental Communications Strategy, UofG will be transparent in the reporting of its environmental performance data, with relevant information readily accessible via our sustainability webpages. We will continue to return data on an annual basis, to both the Scottish Government (in line with requirements under the Public Sector Climate Change Reporting Duty) and the Higher Education Statistics Agency (HESA).

2.2 Carbon Footprint Data

Figure 2 below summarises the annual carbon footprint data for the University of Glasgow, over the period 2015/16 to 2020/21. The footprint includes Scope 1 emissions (gas consumption, fugitive emissions, fleet vehicles), Scope 2 emissions (electricity consumption) and Scope 3 emissions (water consumption, waste production, business travel, staff/student commuting).

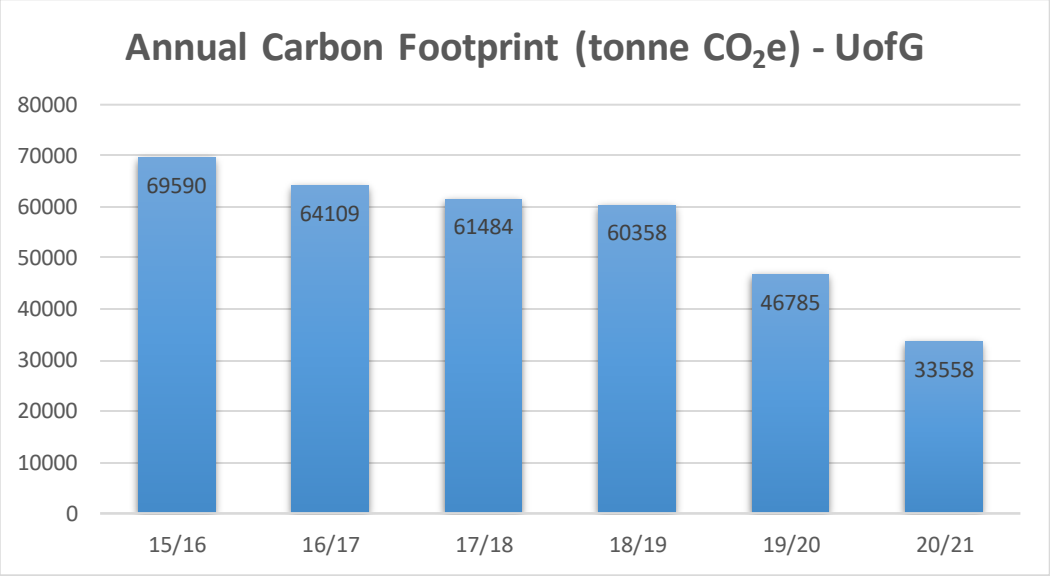

Figure 2 – Historical Carbon Footprint Data for the University of Glasgow

2.3 Carbon Footprint Breakdown

Table 1 below shows a breakdown of the UofG carbon footprint, based on our data returns to Scottish Government, under the Public Sector Climate Change Reporting Duty over the past six years.

Scope 1 emissions have generally increased over this period, due to the installation of a gas-fired CHP engine. At the same time, **Scope 2** emissions have significantly decreased, in part, because we are now generating some of our own electricity via CHP and in part because of the continued decarbonisation of the national grid. However, it should be noted that ongoing decarbonisation of the national grid means that we have now reached the point where the electricity supplied by the grid is less carbon intensive than that supplied by our gas-fired CHP engine. As such, ongoing use of our CHP engine will incur a carbon cost each year.

Scope 3 emissions from flight-related business travel increased significantly over the period 2015/16 to 2018/19, with the exception being 2019/20 and 2020/21 when coronavirus-related travel restrictions prevented business travel for a significant proportion of the reporting years. Similarly, emissions due to staff/student commuting were also significantly reduced during 2019/20 and 2020/21.

	2015/16 emissions (tonne CO_2e)	**2016/17 emissions (tonne CO_2e)**	**2017/18 emissions (tonne CO_2e)**	**2018/19 emissions (tonne CO_2e)**	**2019/20 emissions (tonne CO_2e)**	**2020/21 emissions (tonne CO_2e)**
Gas Consumption	17,825	19,576	20,492	17,500	19,779	18,652
Fleet Vehicles	266	154	215	430	130	104
Refrigerant Emissions	443	556	523	1265	333	207
Electricity Consumption	29,223	22,445	15,926	16,990	12,185	11,253
Business Travel (Flight Related)	9,473 (8,765)	9,430 (9,120)	12,616 (12,346)	13,194 (13,009)	7,322 (7,111)	245 (220)
Staff/Student Commuting (Car Related)	10,829 (6,265)	11,082 (6,644)	10,847 (6,542)	10,021 (6,015)	6,216 (3,780)	948 (582)
Waste Production	1,181	567	535	685	505	304
Water Consumption	350	299	330	273	315	1
Home Working	-	-	-	-	-	1,845
Annual Total	**69,591**	**64,109**	**61,484**	**60,358**	**46,785**	**33,558**

Table 1- Carbon Footprint Breakdown for years 2015/16 through to 2020/21

2.4 Future Carbon Footprint Projections

The ARUP consultancy carried out a projection study in January 2020, to gain an understanding of what the University's annual carbon footprint might look like in 2045, taking into consideration growth in staff/student numbers, the campus redevelopment and the impact of future grid electricity decarbonisation. Two different scenarios were considered: business as usual and an intervention scenario where significant investment was made across the estate (in energy efficiency improvements, low carbon heating and renewable energy technologies) and reductions in both commuting and business travel-related emissions were delivered.

According to the consultants, if the University maintained its pre Covid-19 trajectory, **our carbon footprint would rise to 64,940 tonne CO_2e by 2035 and to 75,366 tonne CO_2e by 2045**. In contrast, the actions described in the intervention scenario, taken together, would **reduce our carbon footprint to ca. 32,000 tonne CO_2e by 2035.**

2.5 Carbon Reduction and Net Zero Targets

Over the period 2020/21 to 2030/31 we plan to reduce our organisational carbon footprint to 27,000 tonne CO_2e per annum.

We will set ourselves an interim carbon reduction target of 47,000 tonne CO_2e per annum, by 2025/26

In addition, the University has also committed to being net zero for GHG emissions by 2030. As such, we will focus on reducing our carbon footprint as much as possible over the coming decade, but we will phase in the use of offsetting during the 2020s to achieve net carbon neutrality by 2030.

All targets have been rounded to the nearest 100 tonne CO_2e.

Note: We have used the 2018/19 footprint, as a proxy baseline from which to calculate our targeted emissions reductions over the next decade. This is because the actual 2019/20 footprint was markedly affected by the coronavirus pandemic and not representative of normal business operations.

2.6 Carbon Offsetting Strategy

The University will focus on reducing its carbon footprint as much as possible over the next 10-15 years. We will phase in the use of offsetting, where required, to help reduce our net carbon footprint during the 2020s and achieve net carbon neutrality by 2030. In addition, we have also committed to address the carbon impact of international student travel by offsetting one return flight a year for every student from outside Europe, from 2025 onwards.

We appreciate that carbon offsetting, if done well, has the potential to deliver other co-benefits, in addition to the removal of CO_2 from the atmosphere. For example, reforested land or restored peatland in Scotland could provide research and learning opportunities for academics and students, help to enhance climate resilience, and benefit both biodiversity and local communities. We are also aware that offsetting projects involving carbon capture with long term secure storage are currently

in very early stages of development and that these types of projects may become an additional option for us in the future.

The University's carbon offsetting strategy will be two-pronged. We will identify partners to develop a scheme, or schemes, that generate nature-based carbon offsets (either tree planting or peatland restoration) and deliver co-benefits that align with our objectives. In this regard, we have also committed to participating in the newly launched Clyde Climate Forest initiative. Any requirement to purchase additional carbon offsets will be carried out via collaboration across the higher education sector and mediated by the EAUC. A joint approach with other HEIs/FEIs should harness additional benefits; the combined purchasing power of a collective, the use of experts and significant existing knowledge from within the sector, additional assurance that projects were robust and credible and reduced duplication of effort.

Beyond 2030, as we decrease our emissions further, we will in turn reduce our use of offsets.

2.7 Engaging with our community

To better facilitate a 'whole institution' approach to tackling the climate emergency, the University has recently established a Centre for Sustainable Solutions which aims to **c**onnect services and disciplines across the University and create a single point of contact for strategy, policy, research, teaching, estates and other services (https://www.gla.ac.uk/research/az/sustainablesolutions/). The Centre will help to link the creative energy and expertise within the University to the wider sustainability agenda and provide resources and networks to help staff and students progress towards sustainable practices.

The Centre for Sustainable Solutions works in partnership to develop and deliver short courses around Sustainability, Climate Change and Carbon Literacy, currently:

Climate Change and Carbon Literacy and Systems Thinking; Climate Change and Sustainable Decision Making – online upskilling Microcredential courses, open to both UofG staff and external learners (https://www.gla.ac.uk/study/microcredentials/climatechangecarbonliteracy/).

Introduction to Climate Change and Sustainability (GEOG1015) - 10-week accredited course, developed with two students from the University's Green New Deal movement, to provide an interdisciplinary introduction to climate change, using approaches from both the social and natural sciences. It includes a strong focus on potential solutions, leaving students with a broad knowledge base on the context of the climate crisis, and current theories on how to act (https://www.gla.ac.uk/coursecatalogue/course/?code=GEOG1015).

The Centre for Sustainable Solutions has also recently launched a Community of Practice at the University, which aims to be a hub of multi-disciplinary connections that lead to learning and teaching collaboration for developing activities and practice that transforms the University from the inside out (https://www.gla.ac.uk/research/az/sustainablesolutions/ourprojects/community-of-practice/).

Finally, the Centre, working in collaboration with colleagues in Estates has developed sustainable laboratory training to help laboratories around the University of Glasgow implement the Laboratory Efficiency Assessment Framework (LEAF).
(https://www.gla.ac.uk/research/az/sustainablesolutions/oureventsandcourses/courses/sustainablelaboratoriescourses/).

2.8 Environmental Communications

The Environmental Communications Strategy seeks to deliver clear and coherent communication, with respect to both environmental performance and action at UofG. Communication activities will showcase progress and highlight the commitment and contributions of staff and students involved with environmental issues, thus encouraging others to increase their own involvement.

3.0 Carbon Reduction Plans

3.1 Electricity Consumption

If grid decarbonisation over the coming decade proceeds as projected under the National Grid 'Steady Progression' Future Energy Scenario[8], then based on an annual electricity consumption of 60 million kWh, **we would expect to see carbon emissions savings of ~ 11,600 tonne CO_2e per annum**.

In addition, we plan to reduce our electricity consumption and make carbon emissions savings by investing in energy efficiency projects, as detailed in Table 2, below.

Finally, we will investigate the potential for the University to purchase all of its electricity from a green tariff, prioritising suppliers that offer either investment tariffs (money from customer bills is used to directly invest in new renewable generation sites) or partnership tariffs (power is bought directly from renewable generators at a fair price - helping to create a market for green energy production)[9]. It should be noted that purchase of electricity from a green tariff will not allow us to claim a reduction in our government reported carbon footprint. The only occasion such reductions for reporting may be claimed is where renewable electricity generation is on site or connected via direct wire[10].

Project Description	**Emissions savings per annum in 2030 (based on projected grid carbon intensity) (tonne CO_2e)**	**Emissions savings per annum in 2040 (based on projected grid carbon intensity) (tonne CO_2e)**
Lighting upgrades (LED)	85	63
Lighting sensors	4	3
Frazer Building (Solar PV)	4	
Total	93	66

Table 2 – Planned energy efficiency projects to 2030 (electricity consumption)

Thus, we believe we will be able to realise total carbon emissions savings of ~11,700 tonne CO_2e, relating to our electricity consumption, by 2030.

[8] https://www.nationalgrideso.com/future-energy/future-energy-scenarios/fes-2021
[9] https://www.goodenergy.co.uk/media/18782/the-problem-of-greenwashing-october-2020.pdf
[10] https://www.gov.scot/publications/public-sector-leadership-global-climate-emergency/

3.2 Gas Consumption

Decarbonising the supply of heat to our complex estate in the coming years will be very challenging. Currently, heat pump technology or hydrogen look like the most suitable candidates for meeting our future heat demand.

However, heat pumps work most efficiently at lower flow and return temperatures than we currently operate on. Furthermore, green hydrogen is unlikely to be available on a commercial basis until the 2030's and there is also debate around its efficiency and suitability for space heating, in comparison to heat pumps[11].

Thus, until we are clear on the likely heat source we must concentrate on improving our buildings' energy efficiency over the next decade.

We plan to reduce our gas consumption and make carbon emissions savings by investing in the identified energy efficiency projects, as detailed in Table 3, below. We also plan to survey our buildings , in tranches, over the next 3 years to identify further opportunities; the c^6000t reduction should thus be regarded as a minimum.

Project Type	**Project Description**	**Emissions savings per annum (tonne CO_2e) to 2030**	**Emissions savings per annum (tonne CO_2e) to 2040**
Maintenance	Planned preventative maintenance changes	200	200
	BMS annual assessment	20	
	Replacement at end of life, not run to fail	800	200
	BMS enhancement	520	
	Central Research Facility addition to DHN	250	
	CHP switch off	3800	
	Pipe insulation	20	
	McIntryre Building added to DHN		30
Fabric	General fabric improvements	50	50
Renewables	Maclay PV, battery and heat pump	268	
	Acre Road electrification	50	
	Saughfield/Uni Gardens heat recovery for DHN		5
	Garscube Sports Centre renewable heating	50	
	Cochno farm electrification	50	
	Small Animal Hospital heat pump		130
	Stoker Biomass replacement	80	
Heat	Renewable heat solution for Gilmorehill		5000
	Renewable heat solution for Garscube		2000
Totals		6158	7615

Table 3 – Identified energy efficiency projects to 2030 and additionally to 2040 (gas consumption)

[11] https://theconversation.com/hydrogen-uk-government-sees-future-in-low-carbon-fuel-but-whats-the-reality-166244

Thus, we believe we will be able to realise carbon emissions savings of ~6,200 tonne CO_2e per annum, relating to our gas consumption over the coming decade.

3.3 Sustainable Laboratories

As a research-intensive institution, UofG operates large numbers of laboratories (989 at the time of writing), which are amongst the most energy hungry spaces on the estate and take up a total of 41,865m^2 (7.8% of total space).

Historically there has been no co-ordinated attempt to ensure that these spaces are run in an efficient and sustainable manner. As a result, practices vary widely across the campus, sustainability of the operations is often not considered, and there is significant room for improvement.

We have recently recruited a full-time Sustainable Laboratories Advisor for the campus, who can identify operational inefficiencies across campus laboratory spaces, deliver training and ongoing support to the university research community and improve collaboration between academic and estates staff.

We believe that a programme of fume hood/cold storage/technical equipment replacement, in combination with operational efficiency savings driven via staff engagement with the Laboratory Efficiency Assessment Framework (LEAF) will enable us to realise additional emissions savings of 1,300 tonne CO_2e per annum in the coming decade.

3.4 Commuting Emissions

We estimate that there is significant potential to reduce the carbon emissions associated with staff/student commuting over the coming decade.

For this to be achieved, partnership working and behavioural change will be required to support sustainable travel modes. Many of the infrastructure improvements required out with the campus, are the responsibility of external organisations, such as the City Council. Individual level behavioural change is also needed to drive modal shifts, however changing peoples' behaviour is challenging, can take time to take effect and is often reliant on having the correct infrastructure, policies, and incentives in place.

Our analysis has shown that if staff worked from home for two days per week, and students studied from home for an extra day each week, savings of 4,000 tonne of CO_2e per annum could be realised from avoidance of commuting. Set against this saving, we estimate that emissions of 2,700 tonne CO_2e would be generated from the additional requirement to heat domestic residences during the daytime. Thus, we believe that the net carbon saving would be 1,300 tonne CO_2e, per annum.

In addition, we estimate a further emissions savings of 1,000 tonne CO_2e from increased adoption of electric vehicles for commuting travel.

Table 4 below, details a list of the priority actions that need to be taken, if we are to encourage beneficial modal shifts and achieve the required emissions reductions from commuting travel.

Actions	Total potential for emissions savings per annum (tonne CO_2e)	Emissions savings achievable by 2030 (tonne CO_2e)	Emissions savings achievable by 2040 (tonne CO_2e)
Staff work from home 2 days per week and students study from home for an additional 1 day per week	1,300	1,300	
Increased use of electric vehicles for commuting	1,000	1,000	
Work with local authorities and other partners (Living Streets, Sustrans etc) to deliver an improvement plan for key Active Travel routes to and from each campus	536	268	268
Influence public transport operators to address key issues including routes, frequency, reliability, infrastructure, ticketing and value for money.	469	235	234
Implement an Access and Egress strategy (multi-modal & mobility levels) for Gilmorehill	402	402	
Introduce Interest-free loans for season tickets.	268	268	
Improve and further develop sustainable travel information on the University webpage/UofG Life App.	201	201	
Deliver new Nextbike stations at Gilmorehill, Garscube and Murano St student residences	201	201	
Deliver regular annual engagement initiatives to promote sustainable travel	201	201	
Continue to promote and offer free/discounted membership to the Nextbike cycle hire scheme.	201	201	
Other active travel initiatives	1273	1172	101

Table 4 – Priority interventions for reducing carbon emissions associated with staff/student commuting

If the University moves to more agile/flexible working for staff, together with a slight increase in blended learning for students, further aided by beneficial transport modal shifts, then we could deliver emissions savings of ~5500 tonne CO_2e per annum, over the next 10 years.

3.5 Business Travel Emissions

During the academic year 18/19, business travel by University staff accounted for 13,194 tonne CO_2e, with the vast majority of this attributable to air travel. We need to reduce this amount by ~55% by 2030.

UofG has recently published detailed guidance for business-related travel, which highlights the need to significantly reduce the carbon impact associated with this source of emissions[12], however adherence is not currently mandatory.

We believe that the current approach is unlikely to deliver against targets and if there are to be long-term reductions in the number of flights taken for business travel, then there must be a tightening up of the travel booking process, including the need for approval to travel.

A detailed analysis carried out in conjunction with the University's travel planning consultants (Stantec) has revealed the potential to cut the carbon emissions associated with business travel over the next 20 years, with the potential for savings of ~3,591 tonne CO_2e in the coming decade.

It is uncertain how quicky levels of business travel will return to 2018/19 levels, post-pandemic, however a steady increase in demand is expected in the mid-term (2025-2030). Additional policies and interventions will be required to suppress this increase in demand, building on pandemic-driven behavioural changes, such as the continued use of software to facilitate online meetings.

Table 5 below, details a list of the priority actions that need to be taken, if we are to achieve the reductions in business travel emissions described above.

[12] https://www.gla.ac.uk/myglasgow/sustainability/travel/business/

Actions	Emissions savings achievable by 2030 (tonne CO_2e)
Expand and make mandatory the Business Travel Guidance for Staff to - include inter-campus/local business travel; - remove First Class flights - give policy guidance on when business class air travel is acceptable; - communicate mode hierarchy for travel (discourage 'grey fleet' and taxi use); - ensure business travel bookings are through Travel Agent portal -Adapt expenses procedures	6,552
Adapt University booking portal to make rail the preferred mode for domestic travel	1822
Replace all diesel and petrol fleet vehicles with EVs or cargo bikes	34
Encourage greater use of e-bike fleet use for local business travel.	25
Provide access to the city's Car Club cars for business / inter campus travel.	25
Promote cargo e-bike for small delivery/pick up/transporting goods on campus	8
Support fleet use recording and analysis of usage data	5
Provide maintenance & servicing for University e-bike fleet	3
Develop a 'safe and responsible driver' training module by Aug '22	3

Table 5 – Priority interventions for reducing carbon emissions associated with business travel

If we undertake these measures to reduce business travel at the University, then we will deliver emissions savings of 8,500 tonne CO_2e over the coming decade.

3.6 Waste Management

In addition to facilitating more efficient servicing of our buildings, the rollout of improved internal recycling facilities (pairs of general waste and mixed recycling bins at central locations in buildings, rather than individual wastepaper baskets) across the estate could deliver in the region of 200 tonne CO_2e in emissions savings per annum, should we meet our target of achieving a 50% recycling rate for operational waste.

In addition, the roll out of improved food recycling facilities across our estate could help to realise another 25 tonne CO_2e, in emissions saving per annum.

The success of the UofG WARPit asset reuse portal over the past few years should also be noted. Since its launch 6 years ago, we have been able to divert around 170 tonne of surplus furniture from landfill, accounting for around 75 tonne CO_2e in emissions savings per annum. We estimate that a re-launch of the portal, with a wider focus (i.e. not just furniture reuse) could help to realise a further 25 tonne CO_2e, in emissions saving per annum.

In total, we believe we will be able to realise carbon emissions savings of ~300 tonne CO_2e per annum, relating to improved waste management processes over the coming decade.

3.7 Information Technology

The recent construction of the Saughfield Building has delivered a welcome improvement in the quality of data centre provision on campus.

However, IT Services still host server rooms in both the James Watt North and Boyd Orr Buildings that are hugely inefficient when compared to modern standards. IT Services are about to embark on a piece of consultancy work that will advise them on the extent to which they could reliably move this outdated provision, either to the cloud or to a colocation facility. Such a move would be expected to realise significant carbon emissions savings, and these should be factored into the current projection work when they become available.

It should also be noted that there are currently almost 40 additional server rooms, spread out across the estate, under the control of Colleges and Schools. These server rooms are also incredibly inefficient in terms of their power consumption and cooling requirements. However, there is no incentive for academic staff to consider transferring over to cloud/colocation facilities as the significant utility cost for maintaining the status-quo is covered centrally by the University. As a first step, we recommend accurate monitoring of the power consumption from these locally managed server rooms, with a view to passing on the utility costs to Colleges and Schools at an agreed point in the future.

IT services have also identified several other ways that they might be able to significantly reduce energy consumption, and thus deliver carbon emissions savings over the coming decade, including:

- Introducing more modern ways of working - moving to laptops/docks, reducing the widespread use of multiple devices and enabling home working without infrastructure on campus that requires remote control.

- A network infrastructure investment programme - decommissioning obsolete and inefficient infrastructure, reducing need for duplicate services across the campus and the replacement of the printing fleet with more modern equipment.

At the time of writing, we have only been able to determine the carbon savings associated with the switch to 'on the go' computing and estimate these to be ~100 tonne CO_2e p.a. in 2030. Further detailed work will be required to understand the potential for emissions reduction, associated with the other interventions described above.

3.8 Space Utilisation

The University estate currently comprises 71,032m^2 of office space, supporting a staff complement of 6,934 FTE. Based on 100% allocation per FTE, this equates to an average of 10.2m^2 per person.

We anticipate that increased agile working over the next decade (on average, 2 days per week working from home or 60% allocation), will reduce our requirement for staff office space to 42,432 m^2.

However, current growth projections for both PGR students and staff over the next decade will require us to provide an additional 17,400m^2 of office space (again assuming that both groups will also work from home 2 days per week) over the period.

Therefore, by 2030, we anticipate that our requirement for office space on the estate will be reduced by around 10,000m^2, equating to a carbon saving of ~1,000 tonne CO_2e per annum.

3.9 Property Divestment

The UofG estate has a diverse mix of buildings, some of which are less energy efficient than others. A programme of divesting from buildings that have the worst performance from an energy perspective, could also help us to deliver carbon emissions reductions.

The projected disposal of buildings by 2030 will reduce our carbon emissions by ~500 tonne CO_2e per annum.

3.10 New Build, Refurbishment & Asset Maintenance

The University currently has detailed design standards (V2 March 2020) which include targets as follows:

- BREEAM Excellent for all new build and refurbishment projects >£500k
- EPC 'A' rating for all new build projects
- Compliance with Section 6 Building Regulations (Scotland)
- BREEAM ENE – 5 points minimum
- BREEAM ENE 04 passive design measures to reduce energy consumption by 5%
- BREEAM ENE 04 LZC measures to reduce CO2 by 5%
- Air infiltration max 5.0m3/hr @ 50Pa for naturally ventilated building and 3.0m3/hr @ 50Pa for mechanically ventilated buildings

In addition to carbon reduction, the Design Standards also address:

- Water efficiency
- Health & Wellbeing
- Waste Reduction, re-use and recycling
- Land-use & Biodiversity
- Sustainable Transport
- Climate Change Adaption

The Scottish Government have recently (November 2021) published a voluntary standard, **the Net Zero Public Buildings Scotland Documentation Suite (NZPBS)**[13].

Initial review suggests that the University has already put in place many of the processes set out in the Standards and has already achieved partial alignment with the methodologies and processes set out therein. It is proposed that the University adopt the standard in full, including the appointment of an 'Inclusive Net Zero Champion' or 'Sustainability Guardian'

The role of the Sustainability Guardian will include the setting of project specific targets and in doing so a full review of the carbon reduction and wider sustainability targets within the Design Standards will be undertaken.

This review will align itself to the NZPBS in addressing the following objectives:

- Construction Embodied Carbon
- Operational Energy Carbon
- Other Whole Life Carbon
- Indoor Environmental Quality
- Wider Environmental Aspects

Embodied carbon reduction is not currently a specific target within our Design Standards and the intention is to have a progressive approach to the reduction of embodied carbon by setting a stretched maximum kg CO_2e/m^2 cap in advance of commencing the design of the next major project.

Metering & Verification strategies embedded within our Design & Soft Landings processes will support our approach to management of operational energy use and their availability will be increased by installing additional metering across the existing estate wherever possible.

Both the Design Standards and the Soft Landings Process should help to minimise the carbon impact of our growing estate, but will not deliver emissions reductions, per se.

3.11 Carbon Accounting

The Governance and Policy section of our Climate Change Strategy requires that papers to Court, its subcommittees and Senior Management Group need to include a sustainability impact section.

The carbon impact of our future strategic and investment decisions needs to be quantified and then accounted for in any future projections of our carbon footprint. There is currently a lack of joined up thinking in this regard.

[13] https://www.scottishfuturestrust.org.uk/page/net-zero-public-sector-buildings-standard

3.12 Summary

To conclude with, Table 6 below summarises the carbon emissions savings that we can expect to achieve, from each of the different interventions described previously.

Intervention	**Emissions savings achievable by 2030 (tonne CO_2e)**	**Emissions savings achievable by 2040 (tonne CO_2e)**
Grid decarbonisation to 2030	11,600	
Energy efficiency (electricity)	100	66
Energy efficiency (gas)	6200	7615
Commuting reductions	5500	603
Business Travel reductions	8500	
Waste Management improvements	300	
Space utilisation improvements	1000	
Property divestment	500	
IT infrastructure	100	
Sustainable laboratories	1300	
Total savings to 2030 (tonne CO_2e)	35,100	
Remaining emissions in 2030 (tonne CO_2e)	25,846	

Table 6 – potential carbon emissions savings by intervention, to 2030 and 2040

Not all these interventions will be straightforward to deliver, and each comes with its own set of challenges with respect to implementation:

- Financial – how much investment is required?
- Cultural – what is the institutional readiness for change?
- Control – are the changes within our gift to deliver, or are they dependant on external forces?
- Technological – does the technology exist?
- Strategic – does it align with our wider strategic ambition?

Table 7 below, summarises the level of difficultly associated with the various interventions described in this carbon management plan, using red, amber and green signifiers. Broadly speaking, the wider strategic alignment of the proposed interventions is strong. Conversely, cultural readiness for change may be somewhat weaker.

	Financial	Cultural	Control	Technological	Strategic
Electricity Consumption					
Gas Consumption					
Sustainable Laboratories					
Commuting Emissions					
Business Travel Emissions					
Waste Management					
Information Technology					
Space Utilisation					
Property Divestment					
New Build, Refurbishment & Asset Maintenance					
Carbon Accounting					
Carbon Offsetting					

Table 7 – Ease of implementation for interventions described in this Carbon Management Plan

Figure 3 below, projects what our carbon footprint might look like in 2030/31, if we were successful in implementing all of the changes that have been described in this section of the Carbon Management Plan. The projected outtake position in 30/31 is 25,846 tonne CO_2e and is below our current target of 27,000 tonne CO_2e, per annum.

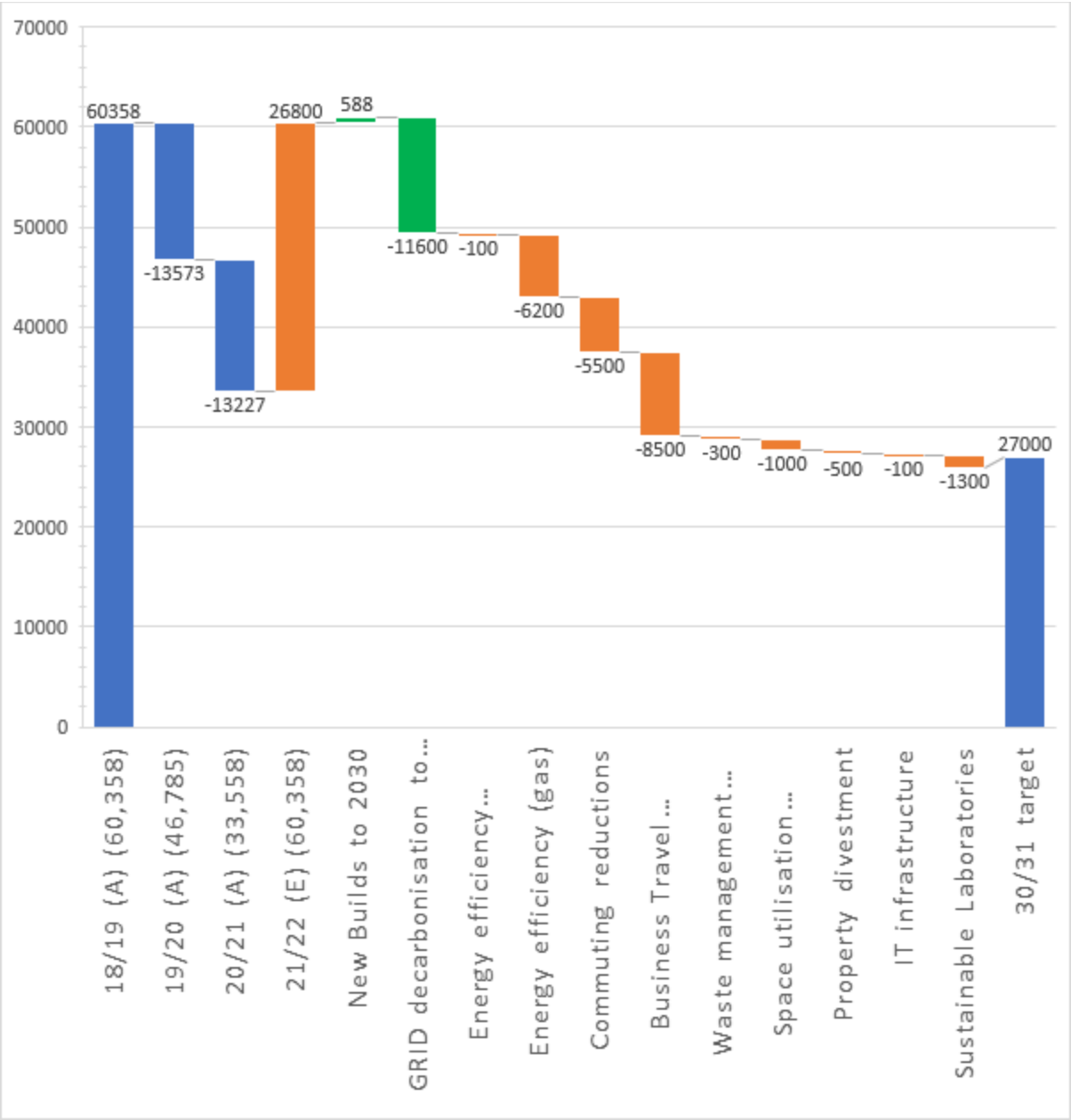

Figure 3 – Pathway to University of Glasgow 30/31 carbon footprint target

4.0 Governance and Delivery of the CMP

Oversight of the CMP will be carried out by members of our Sustainability Working Group, which has the following remit:

- To oversee implementation of the University's Climate Change Strategy and Action Plan, of which the CMP is an integral part
- To raise awareness of and engagement with the Strategy and Action Plan across the University community
- To make recommendations about future amendments or revisions to the Strategy and Action Plan
- To enhance the University's reputation and profile as an institution that is committed to the sustainability agenda
- To provide reports periodically to SMG and to Court via the Estates Committee.

and the following membership:

- Two co-chairs, one of whom is the Chief Operating Officer
- College Sustainability Champions
- University Services Sustainability Champion
- Two representatives of the SRC, along with GUEST co-ordinators
- One senior officer from Estates
- Head of Procurement

In attendance:

- Sustainability Manager
- Communications and Public Affairs Officer (as required)

Responsibility for the delivery of our various emissions reduction strategies is outlined as follows:

Energy Strategy and Action Plan	Director Facilities Services
Strategic Transport and Travel Plan and Action Plan	Chief Operating Officer
Waste Management Strategy and Action Plan	Director Facilities Services
Soft Landings Policy, Process and Procedures	Director of Construction
Design Standards	Director of Construction
Environmental Communications Strategy	Director of Communications and Public Affairs