

JANUARY 2020

**Carbon Management Plan Annual Report**

**For Information and Approval**

**1. Background**

In January 2010 the Board approved the University’s first Carbon Management Plan (CMP). This included a challenging target to reduce the carbon footprint of the University by 30% (in absolute terms) by the end of the 2015/16 academic year and an aspirational reduction target of 40% by 2020/21, against a baseline year of 2005/6. In 2015 it was recognised, as a result of the growth in the estate/our workforce and our student numbers, the 30% reduction target would not be met and the 40% target 2020/21 was endorsed by ULT and the Board. As part of BU2025, BU endorsed a 50% reduction target by 2025/26 against a 2005/06 baseline. Work has now started on developing the third CMP, based on a Climate and Ecological Crisis and a net zero carbon emissions target by 2030.

The calculated 2005/06 carbon emissions included those associated with gas, electricity, and water use, fleet transport, BU buses (on designated routes), and waste sent to landfill. The breakdown of BU’s carbon emissions is shown in Appendix 1. These emission sources are classified as Scope 1, 2 or 3, as defined in **Table 1**. Energy use (Scopes 1 & 2) accounted for 93% of the 2005/06 emissions, with transport accounting for 5% and the remainder 2%. This paper reports progress against the 2005/06 carbon emissions and also focuses on progress with reducing carbon emissions associated with energy use.

**Table 1 Carbon Scope**

| Scope   | Direct/Indirect emissions | Source of emissions   |
|---------|---------------------------|---|
| Scope 1 | Direct                    | Emissions associated with sources that are owned or controlled by BU. Examples include gas consumption and fleet vehicle fuel use.    |
| Scope 2 | Indirect                  | Emissions from the generation of purchased electricity  |
| Scope 3 | Indirect                  | Emissions from BU activities that occur from sources not owned or controlled by BU, such as procurement and water supply and disposal |

**2. Carbon Reduction Target and Current Projections**

The challenging nature of the carbon target should not be under-estimated; an absolute reduction of 40% from a baseline of 8,275 tCO<sub>2</sub>e (tonnes of carbon dioxide equivalent) in 2005/06 to 4,965 tCO<sub>2</sub>e in 2020/21 in the context of an expected increase in the floor area of the Estate of 7.8% by 2020/21.

**Table 2** shows the 2018/19 carbon emissions compared to the 2005/06 baseline and 40% emission reduction target:

**Table 2 - 2018/19 Carbon Update**

| 2005/06 Carbon emissions (tCO <sub>2</sub> e) | 2020/21 40% Reduction target emissions (tCO <sub>2</sub> e) | 2018/19 Actual emissions (tCO <sub>2</sub> e) | Difference between 2018/19 and 2005/06 emissions (tCO <sub>2</sub> e) | Percentage reduction comparing emissions in 2018/19 to 2005/06 (%) | Difference between 2018/19 emissions and 2020/21 target (tCO <sub>2</sub> e) |
|---|---|---|---|--|--|
| 8,275   | 4,965   | 4,505   | -3,770  | -45.6%   | -460   |

**Figure 1** shows the progress to date with reducing carbon emissions. In 2018/19 emissions reduced by 14% from 2017/18 and from the 2005/6 baseline by 45.6%. This reduction is mainly due to the installation of energy

conservation measures, staff and student engagement and a marked decline in recent years of the national grid electricity carbon factors (25%), reflecting the de-carbonisation of the grid (See **Appendix 2** for annual DEFRA conversion factors for UK purchased electricity (including transmission and distribution and natural gas). It should be noted the estate Gross Internal Area (GIA) increased by 7.8% over the same period (See Table 3).

During 2018/19 carbon emissions were estimated for the life of the current plan (2020/21) to provide some indication of whether the 40% carbon reduction target is achievable. These estimates for the remaining life of the CMP take account of the identified ECM projects, the University’s planned changes to the estate and the DEFRA carbon conversion factors (See Appendix 2). These estimates show a reduction of 41.4% by 2020/21 is possible (See Figure 1).

Changes to the estate, such as the MRI scanner, handover of the Bournemouth and Poole Gateway Buildings, retention of UCY and the addition of Chapel Gate Sports facility have been accounted for in this reduction figure. These changes are expected to have a marked impact on energy consumption and will increase the risk of not meeting the 40% reduction target for 2020/21. As a result there is some uncertainty whether the 40% reduction target will be met in 2020/21.

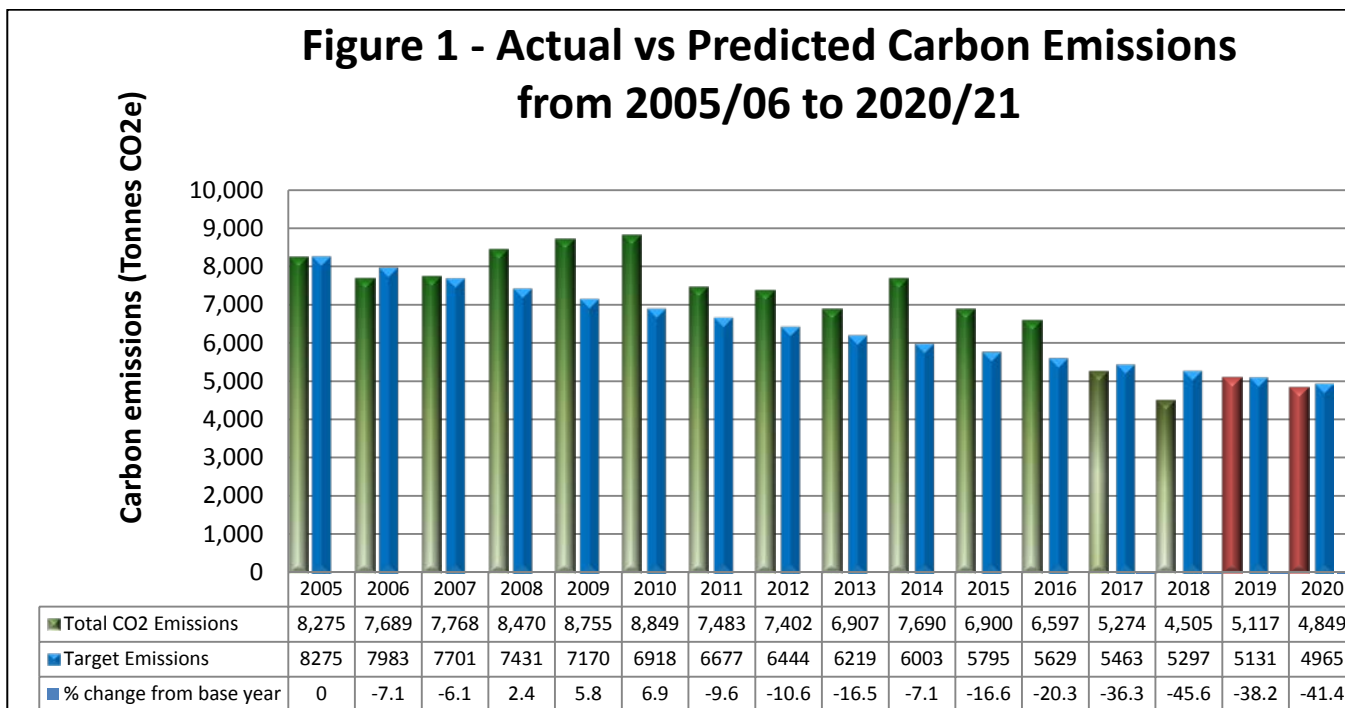
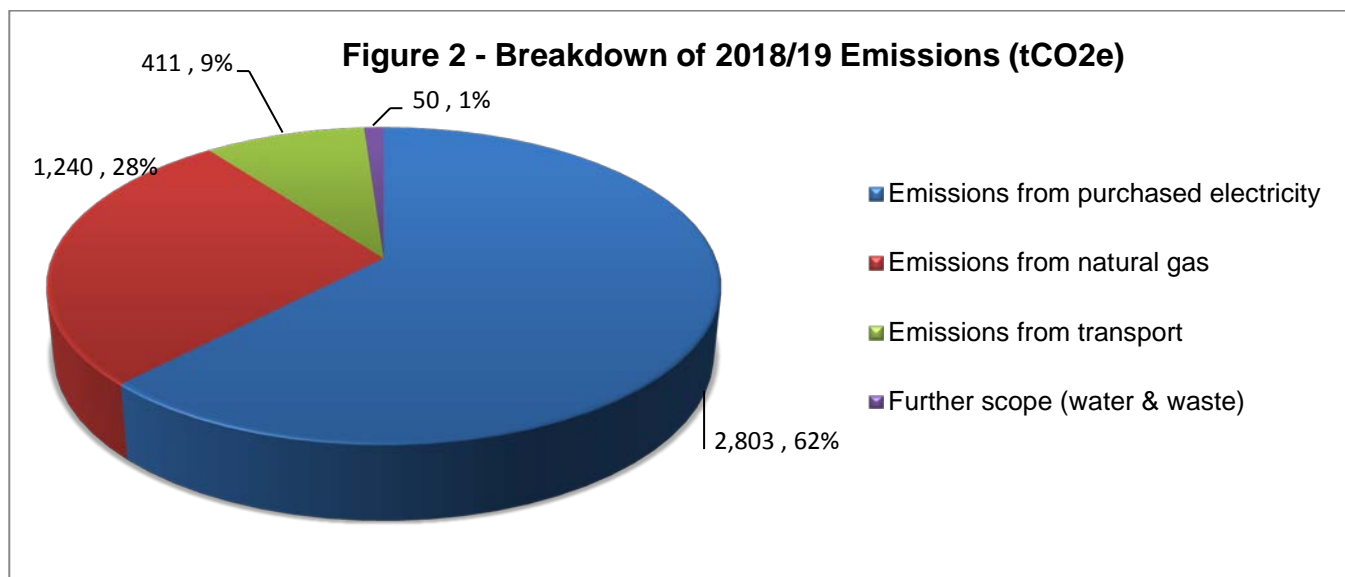


Figure 2 details the breakdown of emissions for 2018/19 in tonnes of CO<sub>2</sub> and shows Buildings account for 91% of the total. Of this, the majority (2,803 tonnes) are from electricity.



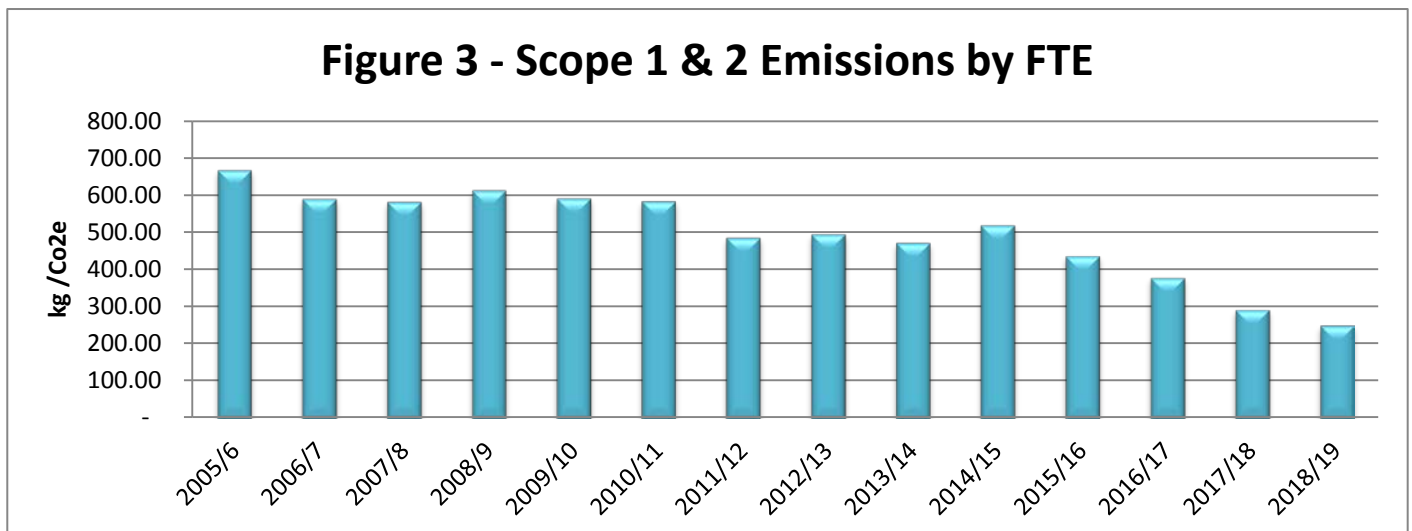
## Carbon metrics

The following figures show carbon emissions (Scope 1 & 2) expressed as metrics using staff and student numbers (FTE), gross internal floor area (m<sup>2</sup>) and turnover (£) to demonstrate progress in tackling energy and carbon emissions against a back drop of an increasing University population, estate size and activity (as measured by University turnover) since 2005/6 (See **Table 3**).

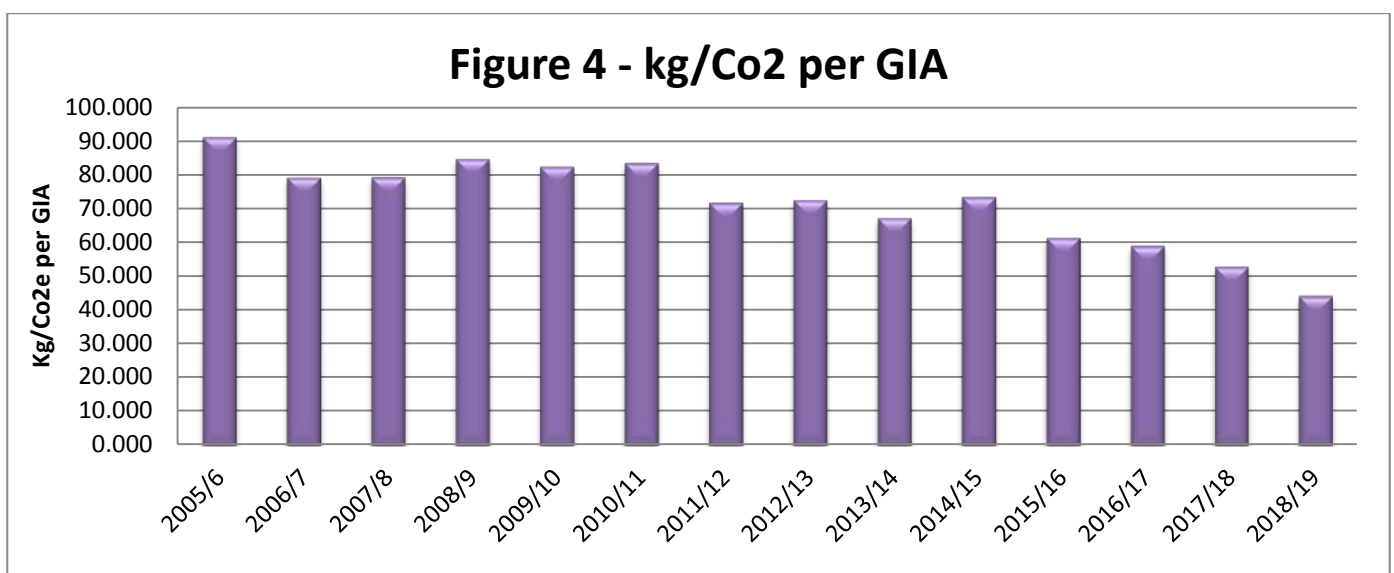
**Table 3 Carbon Metrics Data**

| Metric                                 | Data Source   | Dates when data used or provided | 2005/06 | 2018/19 | % change between 2005/06 and 2018/19 |
|--|---------------|----------------------------------|---------|---------|--------------------------------------|
| Student and Staff FTE                  | PRIME         | November 2019                    | 11,643  | 16,218  | 39.3%                                |
| University Space GIA (m <sup>2</sup> ) | Estates (EMR) | January 2020                     | 85,313  | 91,967  | 7.8%                                 |
| Total Income £M                        | PRIME         | November 2019                    | £81.2   | £160.18 | 97.2%                                |

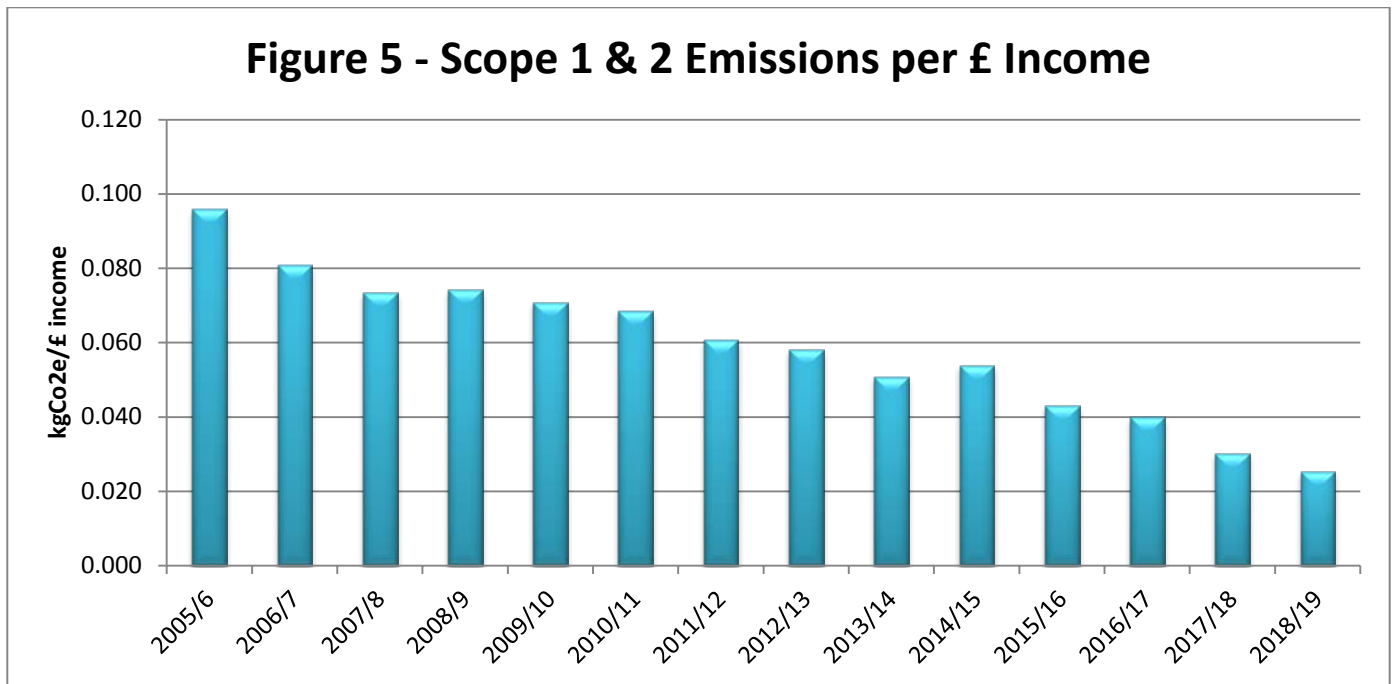
**Figure 3** shows that in 2018/19 carbon emissions per FTE have decreased by 1.9% from 2017/18, demonstrating continued efficiency of running the University estate and operations. Emissions per FTE have more than halved since 2005/06, from 670 kgCO<sub>2</sub> per FTE to 251 kgCo<sub>2</sub> per FTE, despite the increase in University population by 4,575 over this period.



**Figure 4** shows that carbon emissions per gross internal area (GIA) in 2018/19 decreased from 2017/18 by 16%. Since 2005/06 there has been a decline in emissions per GIA of 51% (down from 91 kgCO<sub>2</sub>/GIA to 44 kg Co<sub>2</sub>/GIA), indicating a much lower energy intensive use of the estate. Since 2005 the estate has increased by 6,714m<sup>2</sup>, from 85,313m<sup>2</sup> in 2005/6 to 91,967m<sup>2</sup> in 2018/19, representing a 7.8% increase.



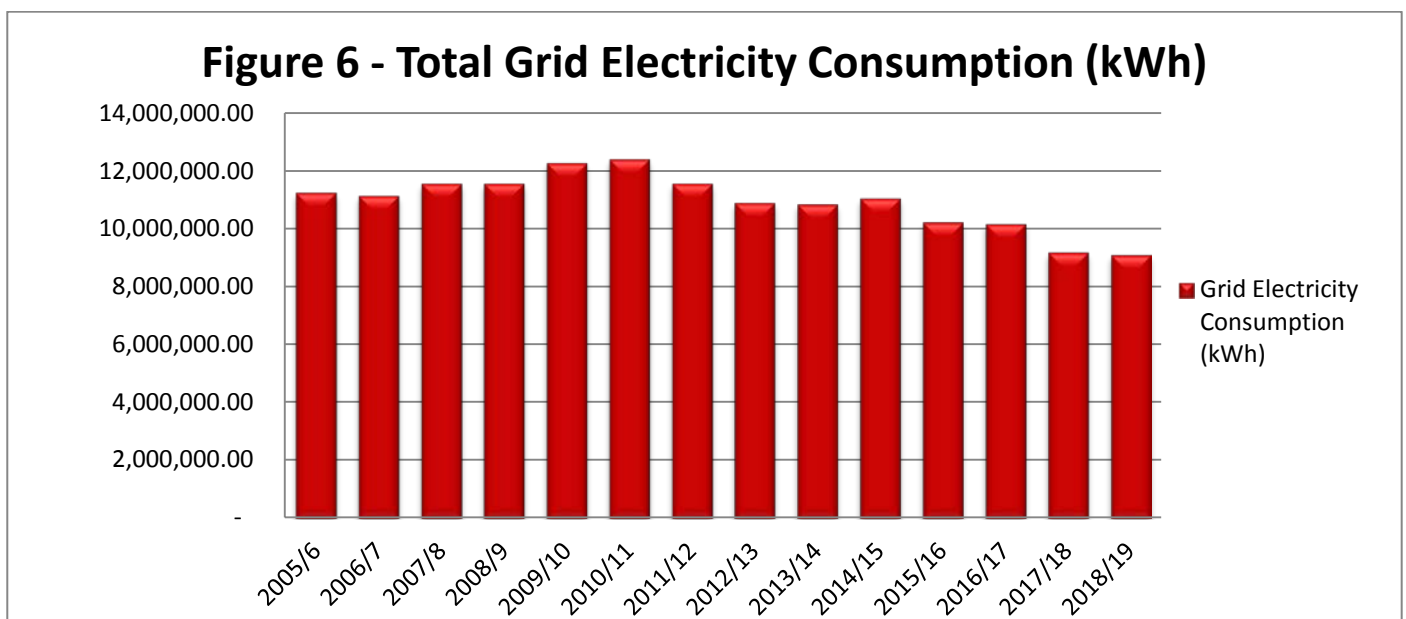
**Figure 5** shows carbon emissions per £ turnover declined between 2005/06 and 2018/19 (0.096 to 0.025 kgCO<sub>2</sub>/£), reflecting BU's increased income and activity (an increase of 97.2%) over this period.



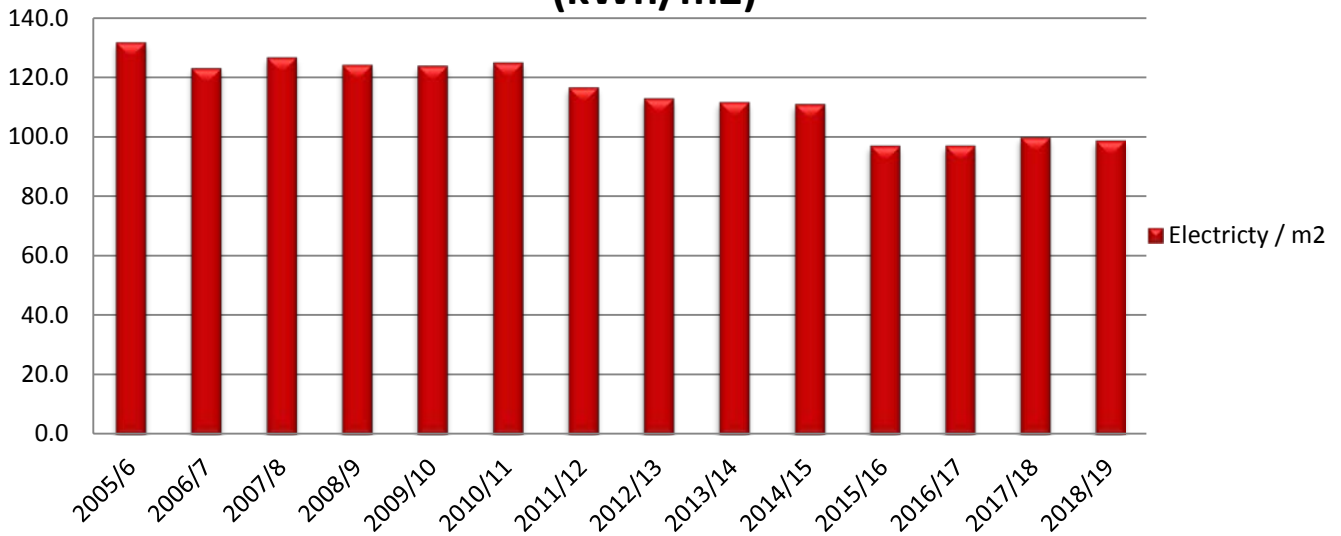
### 3. Energy consumption

#### 3.1 National Grid Electricity consumption

**Figure 6 & 6a** shows that Grid Electricity consumption decreased by 1% in 2018/19 compared to 2017/18. Overall electricity consumption from the national grid has reduced by 19.2% between 2005/06 and 2018/19 and is the second consecutive time since the 2005/06 baseline year BU have been below 10 million kWh for the consumption of grid electricity. The reasons for the decline in grid electricity are as described for the decline in carbon emissions together with the increase in on-campus electricity generation from photovoltaics (Poole House array came on line in January 2019 – see below) and despite the loss of on-site Combined Heat and Power (CHP) electrical production for most of the year. There has also been a slight decrease (1.2%) in the total grid electricity per m<sup>2</sup> consumption (Figure 6a) reflecting the reduction in grid electricity consumption.



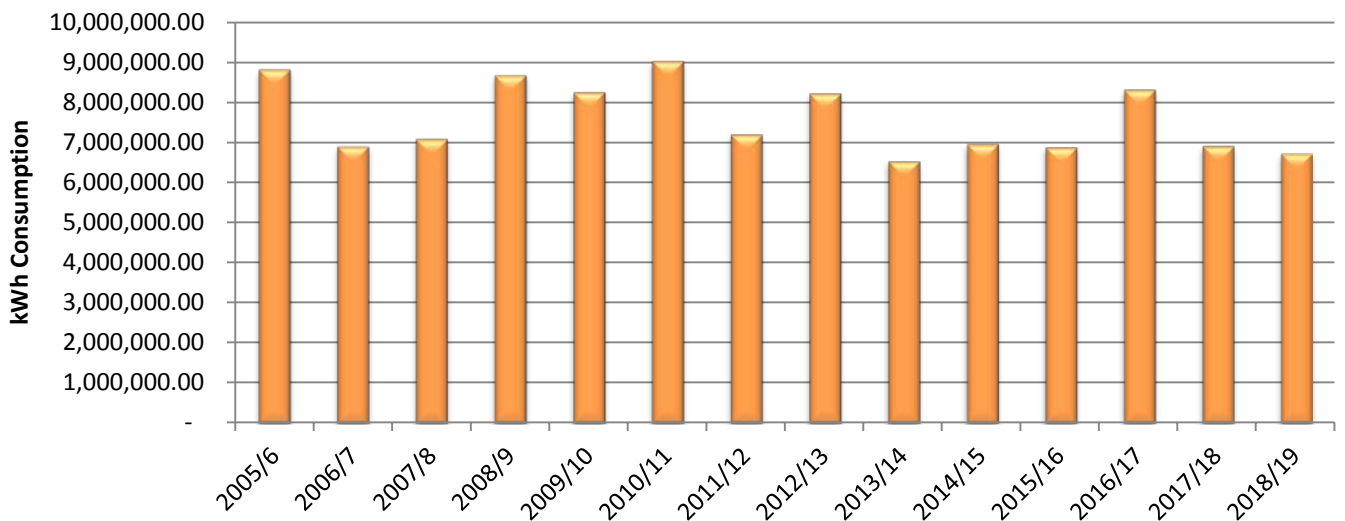
**Figure 6a - Total Grid Electricity Consumption (kWh/m<sup>2</sup>)**



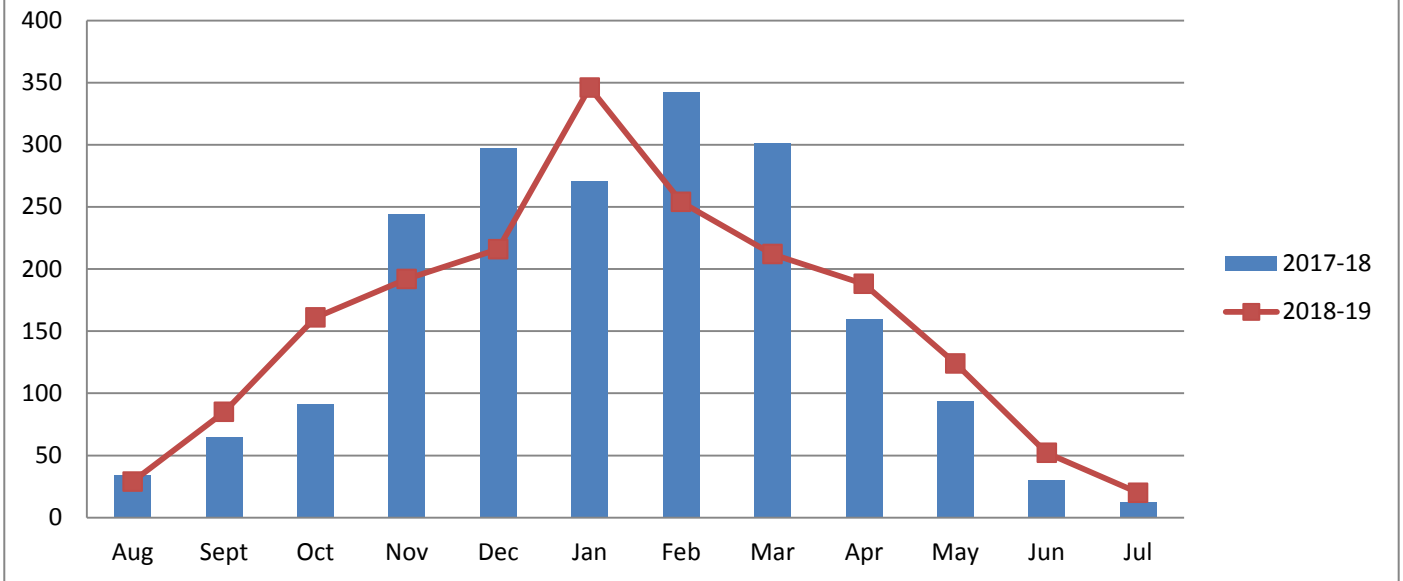
**3.2 Natural Gas consumption**

Figure 7 shows natural gas consumption decreased by 2.7% in 2018/19 compared to 2017/18 consumption. This decrease was a combination of a warmer winter period with the degree day data for Bournemouth (Figure 7a) being 60 degree day's warmer (1,941 – 1,879) compared to 2017/18 and replacement boiler plant across various buildings with more energy efficient models. Also it should be noted that the operational loss of the biomass for the period between November and December 2018 meant that the reductions were lower than could have been achieved. Overall gas consumption has declined by 23.7% between 2005/06 and 2018/19.

**Figure 7 - Total Gas Consumption (kWh)**



**Figure 7a - Degree Day data**



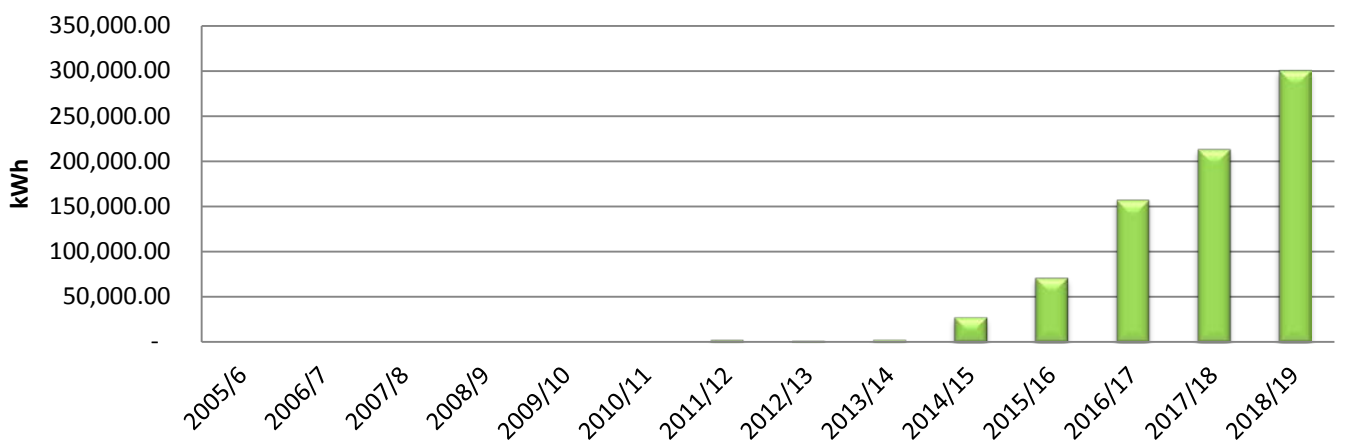
**3.3 On-site Low and Zero Carbon (LZC) Technologies**

Figures 8, 9 & 10 shows onsite renewable energy production has decreased by 8% to 1,084,341 kWh from 2017/18. Onsite electrical generation output increased by 41.1% from 2017/18 as a result of the new PV array on Poole House facilities block, noting that this has only been operational since the end of January 2019. Output from the CHP decreased due to a major failure of the plant which has reduced the generation for this period by 55%.

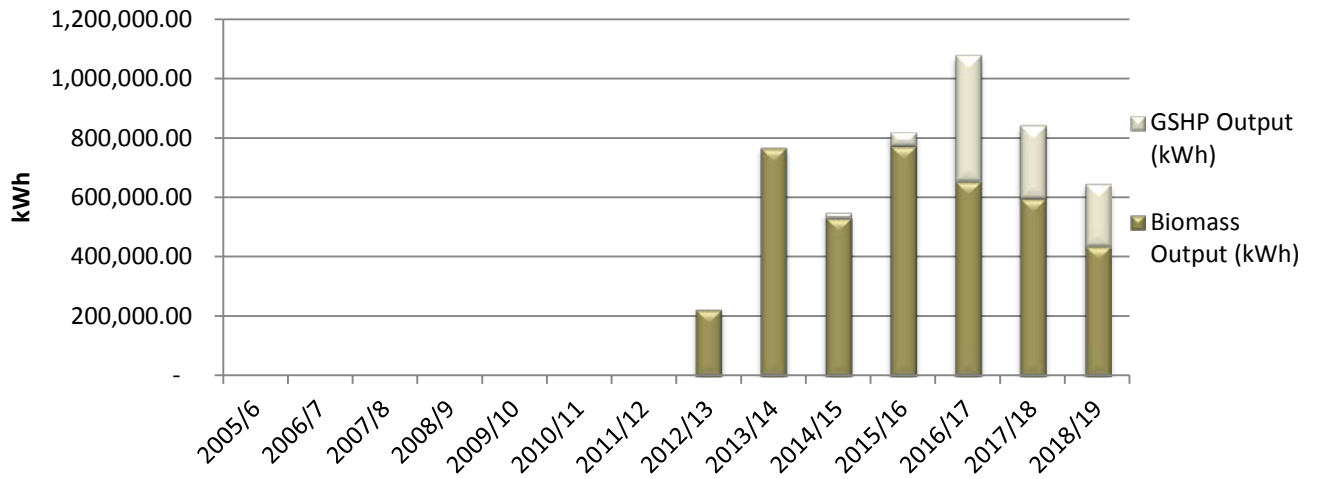
Heat generation from the Biomass Boiler and Ground Source Heat Pumps (GSHP) declined by 20% between 2018/19 and 2017/18 due to operational problems with the Biomass Boiler and is the main cause for the 8% reduction in the total onsite renewable energy generation.

On-site and LZC sources accounted for 6.4% of the 16.82 million kWh of total energy used in 2018/19.

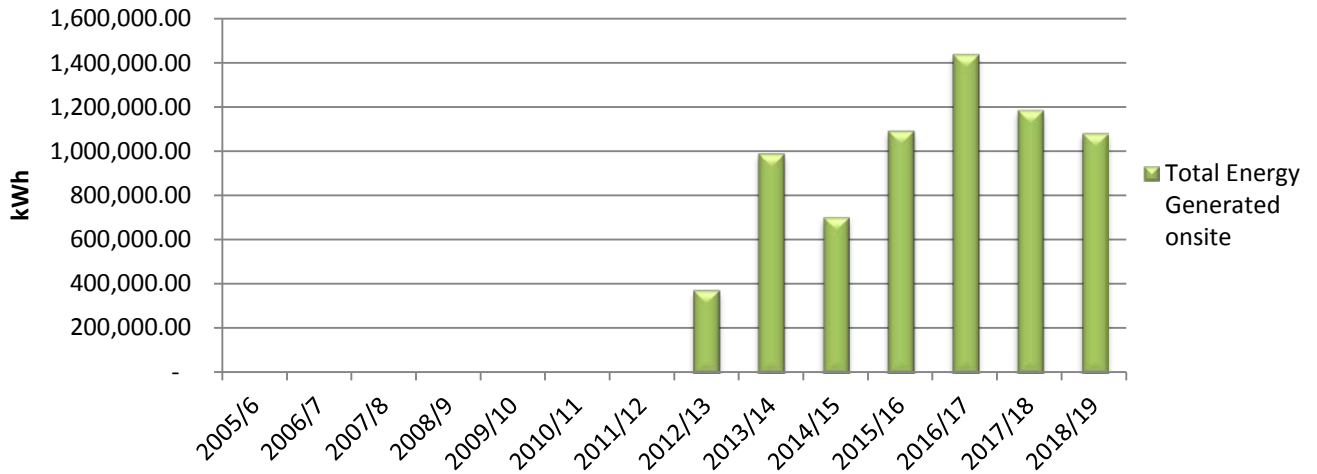
**Figure 8 - Electricity Generated Onsite (kWh)**



**Figure 9 - Total Renewable Heat Output (kWh)**

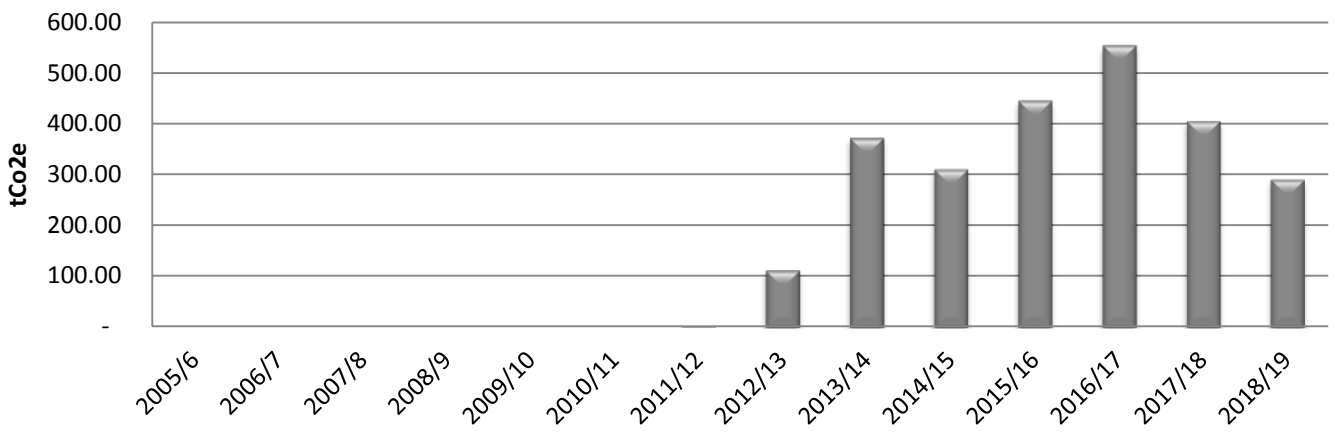


**Figure 10 - Total Onsite Renewable Energy (kWh)**



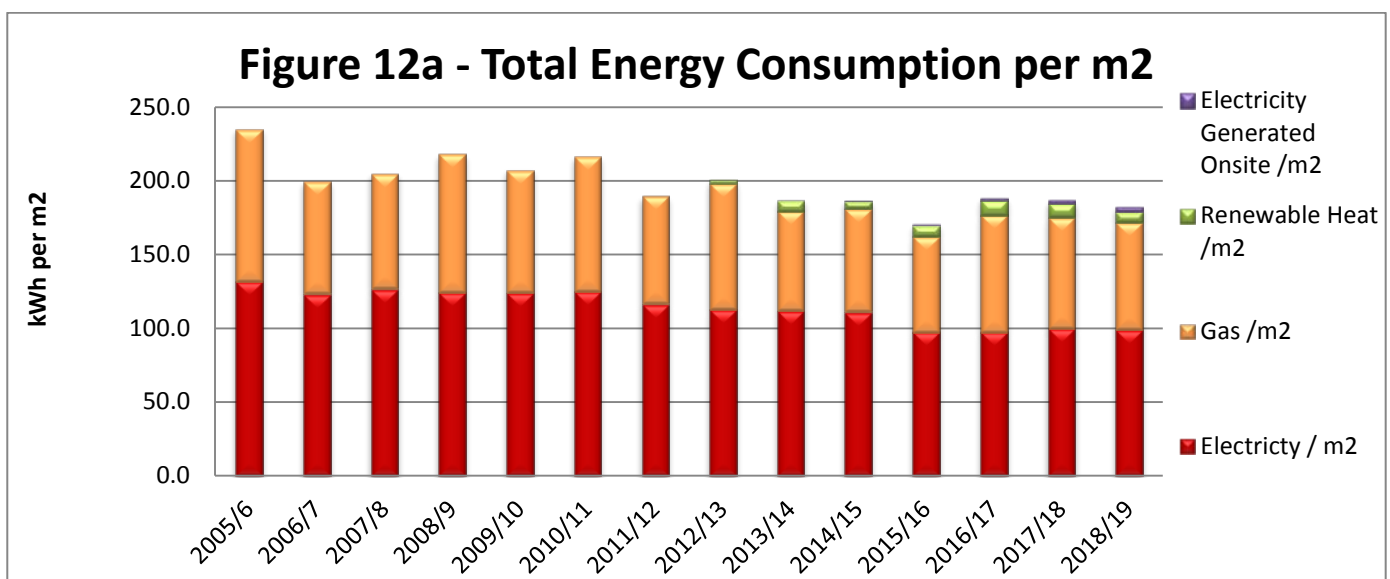
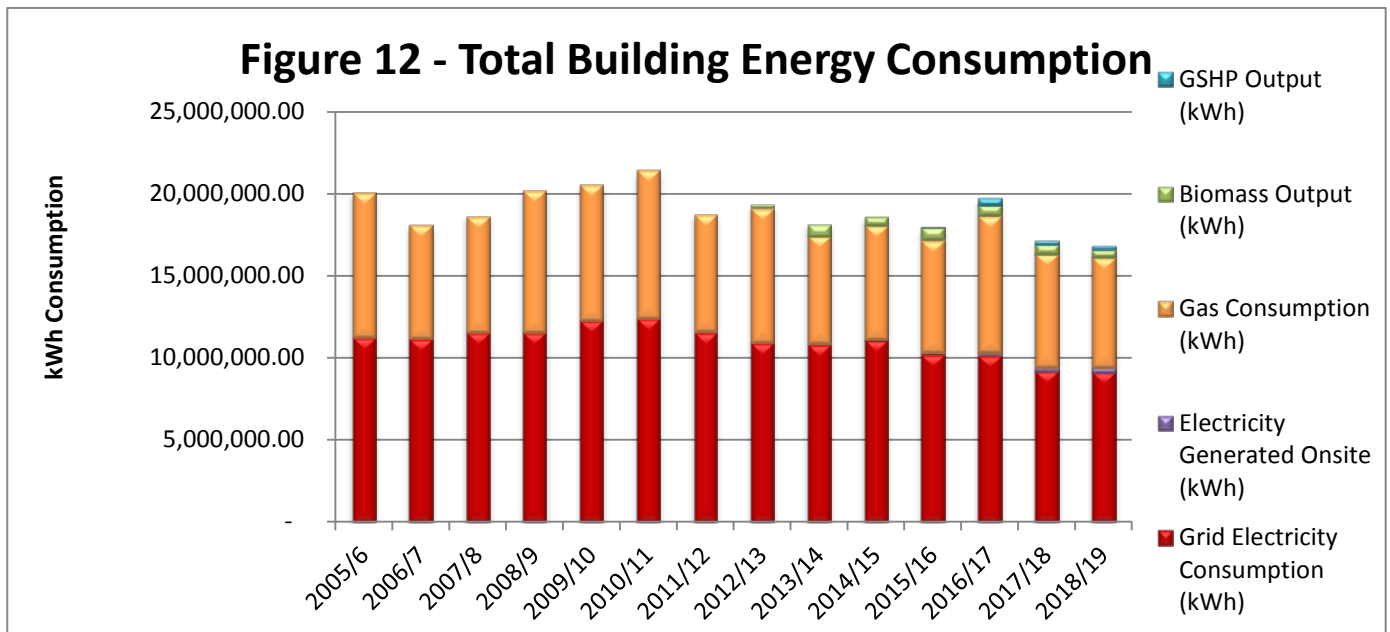
**Figure 11** shows that the LZC technologies saved 291.58 tCo2e during 2018/19 down from the previous year of 406 tCo2e. This was due to the reduction in the grid electricity carbon factors and reduced outputs from the CHP, Biomass Boiler and GSHP's. This graph highlights the impact the decarbonisation of the grid is having on carbon reductions from onsite renewables and LZC technologies.

**Figure 11 - tCo2e Saved from LZC's**



### 3.4 Total energy consumption

Figure 12 & 12a shows the total energy (grid & LZC sources) used across BU in 2018/19 was 16.792 million kWh. It is the first time since 2005/06 that BU has been below 17 million kWh for total energy consumption. This equates to a reduction of 2% from 2017/18 and 16.3% from the 2005/06 baseline year.



### 4. Financial matters

The cost of meeting our Carbon Reduction Commitment Energy Efficiency (CRCEE) obligations for 2018/19 was £69,058.50, a reduction from £82,836 in 2017/18. This reduction was a result of energy reductions and decreased carbon emissions from the energy used (due to the reduction in grid electricity emission factor). In 2017/18 additional allowances had been purchased to the value of £60,000 which was used for 2018/19 requirements under the CRCEE. This meant the total spend for allowances for the CRCEE in 2018/19 was £9,058.50. This was the final year of the CRCEE scheme which ended on 31<sup>st</sup> March 2019 UK government has increased the Climate Change Levy (CCL) rates on electricity and gas bills to generate carbon tax revenues.

### 5. Progress to Date

The 2014/15 Carbon Strategy Review by external consultants AECOM investigated the impact of the Estates Development Framework (EDF) on the 2020/21 40% reduction target and identified a number of key strategic themes to achieve the reduction target. Five potential work streams and the associated potential carbon savings were identified. The five work streams were; Building a more efficient estate, installing Energy conservation measures (ECM's), optimising IT services, upgrading the Talbot Campus HV network and improving the Soft Landing process (to optimise the energy performance of new buildings).



During 2018/19 work continued in all these key themes.

**i) Estate Development**

In 2018/19, BU completed the installation of its largest PV array on Poole House. The system was switched on at the end of January 2019 and has been fully operational since. By 31<sup>st</sup> July 2019, The PV array generated 97,544 kWh of renewable energy. This equates to a saving of 29.9 tonnes of Co2e over the 6 month period.

**ii) Energy Conservation Measures (ECM)**

Now into its 11<sup>th</sup> year the University continues to operate the HEFCE/Salix Revolving Green Fund (RGF) for energy efficiency projects. Investment of £759,846 to date has identified forecast savings of 1092 tonnes of carbon and £204,109 per annum. In 2018, RGF funded projects have included installation of LED lighting to various internal spaces including but not limited to: Sir Michael Cobham Library, Kimmeridge House and the Executive Business Centre. RGF also part funded the boiler replacement in Talbot House and the BMS upgrades to PH. These projects are expected to save 142,442 kWh and 53 tonnes Co2e per annum. A combined project with the Maintenance Team has standardised all external lighting on Talbot Campus to LED.

**iii) IT Efficiencies**

Feasibility study has been completed by Key Source to look into improving the efficiency of the cooling systems for the University Data Centres (Studland & Jurassic). The report highlighted that although the cooling equipment is not the best for energy efficiency compared to newer systems available these are operating very efficiently. The cooling systems can be upgraded with newer systems, but due to the ages of the equipment this should be phased when the equipment reaches end of life. Jurassic House is the newer of the two systems and should be considered for replacement in 4 years and Studland House to be considered over the next 2 years.

**iv) Solar Photovoltaic (PV) Projects**

BU has set an on-site electricity generation target of 500kW by 2020/21. In 2018/19, BU installed its largest PV array on Poole House and the commencement of the 3 new PV systems for SH, PGB and BGB which are due to become operational during 2019/20. The addition of these systems is expected to take the onsite electrical generation to 525kW exceeding the 500 kW target. Based on the 2019 DEFRA carbon factor this is expected to save approximately 161 tonnes CO2e.

**v) Soft Landings**

During 2017/18 a project was started to optimise the energy and water performance of the Student Centre. The twelve month project looked at all key systems of the building to see how it has been performing since opening in 2015 and explored potential improvements. Changes were made to the GSHP to enable correct operation and improved efficiency. Major BMS strategies changes were made to enhance the efficiency of the building and user comfort. These changes have monitored over the past 12 months to ensure that the building is operating as efficiently as possible whilst maintaining user comfort.

| Consumption kWh & m <sup>3</sup> | Student Centre | 17/18   | 18/19   | Difference |
|----------------------------------|----------------|---------|---------|------------|
|                                  | Grid Electric  | 273,559 | 254,680 | -6.9%      |
|                                  | PV             | 27,626  | 28,344  | 2.6%       |
|                                  | Electric total | 301,185 | 283,024 | -6.0%      |
|                                  | Natural Gas    | 233,599 | 115,030 | -50.8%     |
|                                  | GSHP           | 22,400  | 33,244  | 48.4%      |
|                                  | Water          | 1,034   | 956     | -7.5%      |
| tCo2e                            | Student Centre | 17/18   | 18/19   | Difference |
|                                  | Grid Electric  | 105     | 78      | -25.6%     |
|                                  | Natural Gas    | 43      | 21      | -50.8%     |
|                                  | Water          | 1       | 1       | -7.5%      |

The reductions have also been reflected in the annual Display Energy Certificate which has improved the rating score of the Student Centre from a C rating to a B rating.

In 2018/19 contractor Hoare Lea started to review and optimise the energy and water performance of the Fusion Building. Four key areas were identified requiring investigations:

- i) Domestic Hot Water Services (DHWS). The plate heat exchanger required to be removed and cleaned.

- ii) Main Air Handling Units 4 & 5. Both heating coils were blocked and required cleaning. This caused a decrease in the GSHP generation.
- iii) Building time zones.
- iv) CHP efficiency - A major failure of the Combined Heat & Power (CHP) plant has reduced the onsite electrical generation for the building. Further investigation on the efficiency will need to be completed once the system is back in operation.

| Consumption kWh & m <sup>3</sup> | Fusion Building | 17/18   | 18/19   | Difference |
|----------------------------------|-----------------|---------|---------|------------|
|                                  | Grid Electric   | 469,875 | 510,156 | 8.6%       |
|                                  | PV              | 96,091  | 98,118  | 2.1%       |
|                                  | CHP             | 48,265  | 21,635  | -55.2%     |
|                                  | Electric total  | 614,231 | 629,909 | 2.6%       |
|                                  | Natural Gas     | 597,216 | 544,073 | -8.9%      |
|                                  | GSHP            | 222,000 | 177,000 | -20.3%     |
|                                  | Water           | 2,412   | 2,805   | 16.3%      |

| tCo2e | Fusion Building | 17/18   | 18/19   | Difference |
|-------|-----------------|---------|---------|------------|
|       | Grid Electric   | 180,634 | 156,720 | -13.2%     |
|       | Natural Gas     | 109,986 | 100,088 | -9.0%      |
|       | Water           | 2,537   | 2,951   | 16.3%      |

The project has been successful in identifying design and operational issues with the building which have now been addressed. Despite these improvements, overall there has been an increase in power use (2.1%) between the last two years. This increase is mainly due to the main ventilation units not operating correctly and running constantly at full power. The failure of the CHP unit has also added to the increase due to the drop in onsite electrical generation. The decrease in natural gas use also reflects the loss of the CHP and the warmer weather. The decline in the GSHP output is due again to the main ventilation not operating correctly with the heating coils being blocked thus not providing heat to the building efficiently.

The increase in water consumption for the building is due to a pump failure on the RWH system which is awaiting repair. Further modifications to the pipework are being carried out to enable the system to be more resilient against pump failures.

## 6. Estate Development

The University continues to ensure the principles of sustainable development are incorporated into the design of the new Poole and Bournemouth Gateway buildings. Both buildings include a range of low and zero carbon technologies and rainwater harvesting and are designed to achieve EPC A's and BREEAM Excellent scores. The Sustainable Construction Policy includes commitments to help achieve the UN Sustainable Development Goals and sets out BU's requirements for all construction projects.

Due to the uncertainty of tenure and planned property disposal it is worth noting that this could place constraints on the possible investment in carbon reduction strategies. This could account for nearly a quarter of the estate GIA covering Student Village, Talbot House, UCY, EBC, MH, the Drewitt unit and the three TPAs. If this extended further to buildings with planned changes such as: SMCL, WH and SH this would account for 43% of BU's GIA.

## 7. Staff and student engagement

In 2018/19 the main activities to raise awareness and engage with staff and students were:

- Student Switch Off - Working in partnership with SUBU, BU ResLife and NUS to engage students in saving energy in halls. In 2018/19, 355 (32% of) students pledged support for the project and took part in events. Recording a 6% energy reduction in those halls taking part. Note only Student Village is included in the CMP scope.
- Green Impact – In the third year of running this programme, eleven staff teams signed up for Green Impact and completed 440 'sustainability themed' actions. Four teams achieved a gold award, one achieved a silver award and six achieved a Bronze award. SUBU achieved Excellent and is committed to continuing to achieve this standard.
- Green Rewards – This scheme rewards staff for taking positive sustainable behaviours. 1,018 of BU employees have signed up with an average team sign up of 67%. This year's achievements include; over 171,653 miles travelled sustainably to and from the University by either actively cycling, walking or using public transport, 1 tonne of wasted disposable cups avoided from landfill with almost 78 tonnes tCo2 emissions avoided across all behaviour themes. £1000 was donated to local charities at our celebration event. There were over 60,000 positive actions, such as recycling, active travel, taking the stairs instead of the lift and 277

volunteer days being completed. BU was also a finalist in Edie Sustainability Leaders Award in the Employee Engagement & Behaviour Change category.

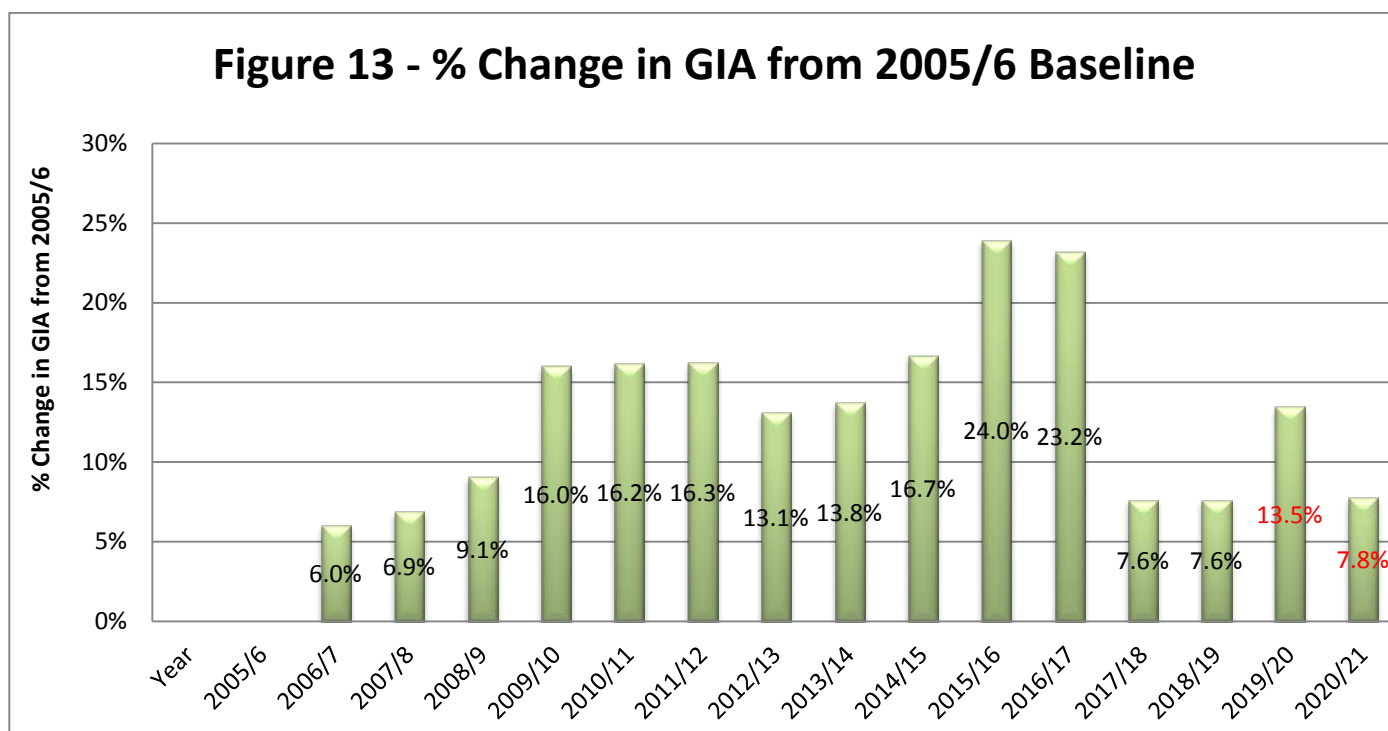
## 8. Forward Plans

Sustainability and carbon reductions are embedded in the EDF2 to 2025. Delivering at least BREEAM ‘Excellent’ buildings with an Energy Performance Certificate ‘A’ is vital for carbon reduction and achieving the 50% reduction target by 2025/26. Estates is now considering adopting the extremely energy efficient Passivhaus design standard for the SMCL project. Estates has also delivered major refurbishment projects to either Ska ‘Gold’ or BREEAM ‘Very Good’ sustainability standards which ensures energy and water efficiency are key outcomes.

Overall the estate is expected to grow in size by 7.8% by 2020/21 (See **Figure 13**). Key to the carbon efficiency of the estate and the 40% reduction target is the disinvestment in inefficient buildings (Bournemouth and Royal London Houses).

The addition of PGB in 2018/19 and BGB in 2019/20 will add carbon emissions and so ensuring these are optimised to operate as efficiently as possible will be key to achieving the 40% reduction target for 2020/21. A contract to optimise their performance over the next three years will be in place for 2020/21.

Arne House design has been completed and if proceeds as per current plans is on track to achieve BREEAM ‘Outstanding’, a first for BU and Dorset and EPC A.



Low and zero carbon projects will continue to be implemented through the carbon reduction programme, focusing on ECM, IT and building optimisation projects. Additional smaller scale projects will be undertaken through the RGF programme, including continued LED lighting replacement to internal and external spaces.

Modifications to the Hot Water Services in Poole House to enable this to be generated from the biomass boiler and potentially adding Solar Thermal collectors which are eligible for the Renewable Heat Incentive (RHI), would provide increases to the LZC generation onsite and provide additional income for BU.

In 2018/19 the installation of utility metering logging devices will enable BU to record and monitor energy consumption at a building level across the estate. Currently the Energy Team is validating the data sent to the AMR and Systems Link. This will provide detailed information as to where potential energy reduction can be achieved and using System Link software help identify areas of increased consumption faster enabling a rapid response to identify and correct the causes. This will help BU achieve its Carbon Management Reduction target, save on energy costs and improve energy efficiency. Proactive use of energy data is also a central component of BU’s Energy Management System which ensures effective management of energy use. The aim is to achieve certification of this system to the internationally recognised standard ISO50001:2018 by summer 2020 at the latest.

Three of the High Voltage Transformers on Talbot Campus will be replaced in 2020/21 and should deliver improved electrical and carbon savings, whilst increasing resilience to the electrical infrastructure.

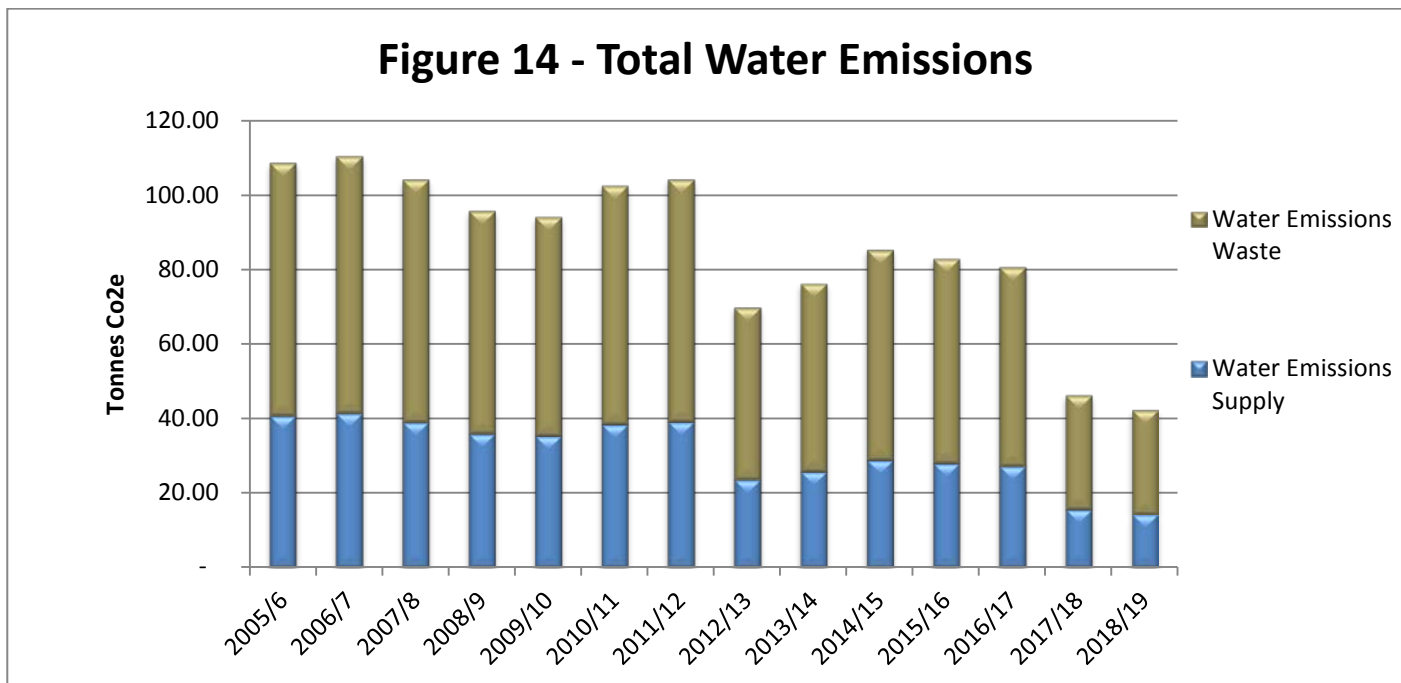
During 2018/19 a new Energy Team was set up, comprising the Energy Manager, Energy Officer and Sustainability and Energy Analyst. This team have started to identify further energy/ carbon efficiency projects across BU. Following a gap analysis in October 2019, the team is also aiming to achieve ISO50001:2018 (Energy Management System) certification in spring 2020.

Other changes to the estate, such as the operation of the MRI scanner, Bournemouth Gateway Building, Chapel Gate and the retention of UCY are expected to have a marked impact on energy consumption and will increase the risk of not meeting the 40% reduction target in 2020/21.

### 9. Scope 3 carbon emissions

These indirect emissions are for water, waste, procurement and transport and the available data is shown in Appendix 1. It should be noted that 2017/18 & 2018/19 scope 3 emissions are much higher than the baseline figure reflecting the addition of more robust data sources.

Water (consumption & waste water) since 2005/6 is detailed in **Figure 14**. Further work is needed before publishing the other Scope 3 emissions, as there are concerns about the accuracy of the data. Information is provided in **Appendix 2**.



Note: Wastewater volume to sewer calculated as 95% of water consumption figures.

**Figure 14** shows that total water carbon emissions have decreased in 2018/19 compared to 2017/18 by 8.5%. This reduction in water consumption was mainly achieved by identifying leaks faster using the university’s metering system along with continued investment in low flow taps and sanitary ware. The Spot the Drop water saving campaign targeted at staff and students to report any water wastage through dripping taps and toilet cisterns also had an impact on reductions. Water and wastewater emissions have fallen by 60.1% between 2005/6 and 2018/19. It should be noted the significant drop in water consumption in 2012/13 was due to the separation of the AUB water supply and the second significant drop in 2017/18 due to the sale of Cranborne House.

The main points to note for the remaining Scope 3 carbon emissions are:

- Waste – very low emissions as no waste sent to landfill;
- Procurement – data not reported as the method to calculate emissions is not robust and provides inaccurate and meaningless data;
- Transport – progress in reporting the different strands of data. The Travel Plan includes measures to improve the provision of carbon data, in particular staff Grey Fleet business travel data;
- Construction – no data available but the embedded carbon emissions for Arne House have been calculated.

Overall, as more robust data becomes available, scope 3 emissions will increase and provide a truer picture of BU’s carbon footprint.

## 10. Conclusion

The carbon management implementation plan continues to be a live document and quantification of further significant and longer term projects as well as small scale projects continues to be a priority. Key to the next 12 months will be delivery of the key themes relating to IT efficiencies and onsite power/heat generation such as the operation of the new PV arrays on the Gateway Buildings and operation of the GSHP in the Bournemouth Gateway Building. Work is in progress to develop the business cases for larger scale infrastructure projects, specifically the replacement of three of the existing Talbot Campus high voltage transformers and the IT Data Centre and IT comms rooms cooling systems. Optimising the performance of existing buildings will continue to ensure the estate is operating efficiently whilst also providing a comfortable working environment.

Overall it is a significant achievement to meet the 40% carbon reduction target two years' early. However, changes to the Estate over the next two years will result in an increase in energy and carbon emissions.

Work has now started to develop the third CMP. The Sustainability Committee has recommended an aspirational net zero carbon target by 2030 for all BU activities for Board approval. This is an extremely challenging target and will require all staff and students to play their part in helping BU continue to drive down carbon emissions.

Dave Archer  
Energy Manager  
January 2020

Appendix 1: Break down of BU Carbon emissions

| Scope | Source                  | Carbon emissions 2005/06 (tonnes CO2e) | Carbon emissions 2017/18 (tonnes CO2e) | Carbon emissions 2018/19 (tonnes CO2e) | Accurate/ Estimate | Comment  |
|-------|-------------------------|--|--|--|--------------------|--|
| 1     | Buildings (Gas)         | 1,633.9                                | 1,275.6                                | 1,239.9                                | A                  | Natural gas used in buildings  |
| 1     | Fugitive emissions      | 0                                      | 0                                      | 0.14                                   | A                  | Losses from air conditioning units   |
| 1     | Fleet vehicles          | 11.3                                   | 16.2                                   | 20.4                                   | A                  | Diesel vans  |
| 2     | Buildings (Electricity) | 6,048.6                                | 3,546.3                                | 2,802.8                                | A                  | Grid electricity used in buildings   |
| 1 & 2 | Sub-total               | 7,693.8                                | 4,838.1                                | 4,063.2                                |                    |  |
| 3     | Water & wastewater      | 40.8                                   | 46.5                                   | 42.5                                   | A                  | 2005/06 data is for water supplied only. 2017/18 & 2018/19 data includes waste water emissions.  |
| 3     | Procurement             | -                                      | -                                      | -                                      | E                  | Calculation is based on spend per procurement categories. Decision to not report emissions due to inaccurate data  |
| 3     | Waste                   | 111.3                                  | 9.54                                   | 9.29                                   | A                  | 2005/06 baseline is for waste sent to landfill only. 2017/18 & 2018/19 figures are for total waste. Based on operational waste production & does not include C&D waste |
| 3     | Staff commuting         | -                                      | 1,144                                  | -                                      | E                  | Based on 2018 staff travel survey  |
| 3     | Student commuting       | -                                      | -                                      | 3,494                                  | E                  | Based on 2019 student travel survey  |

| Scope | Source                             | Carbon emissions 2005/06 (tonnes CO2e) | Carbon emissions 2017/18 (tonnes CO2e) | Carbon emissions 2018/19 (tonnes CO2e) | Accurate/ Estimate | Comment   |
|-------|------------------------------------|--|--|--|--------------------|---|
| 3     | Staff Business travel (grey fleet) | -                                      | 86.7                                   | 89.7                                   | E                  | Based on staff expense claims. Further work required to improve the accuracy of this data   |
| 3     | Staff Business travel (grey fleet) | -                                      | -                                      | -                                      | A                  | Awaiting data for hire cars (Enterprise)  |
| 3     | Unibus                             | 430                                    | 382                                    | 390.3                                  | A                  | Based on Unibus fleet mileage   |
| 3     | Staff Business travel              | -                                      | 1,626                                  | 1,337                                  | A                  | Based on Key Travel flight (includes Radiative forcing - a measure of the additional environmental impact of aviation. These include emissions of nitrous oxides and water vapour when emitted at high altitude) and rail travel. |

| Scope   | Source                                       | Carbon emissions 2005/06 (tonnes CO2e) | Carbon emissions 2017/18 (tonnes CO2e) | Carbon emissions 2018/19 (tonnes CO2e) | Accurate/ Estimate | Comment                                  |
|---------|--|--|--|--|--------------------|--|
| 3       | Student Business travel                      | -                                      | -                                      | -                                      | A                  | Awaiting data for Mini bus hire (Abacus) |
| 3       | Student Business travel (as part of courses) | -                                      | -                                      | -                                      |                    | Data not available                       |
| 3       | Private halls                                | -                                      | -                                      | -                                      | -                  | Data not available                       |
| 3       | Sub-total                                    | 582.1                                  | 3,295                                  | 5,362.8                                |                    |  |
| 1,2 & 3 | Total  | 8,276                                  | 8,133.1                                | 9,426                                  |                    |  |



**Appendix 2: DEFRA Carbon Emissions Conversion Factors for UK Purchased Electricity (including transmission and distribution) and natural gas from 2005/6 to 2018/19**

