Sustainability Annual Report

Academic Year 2014/ 2015

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Introduction

This is the seventh annual Sustainability Report for Myerscough College. The concept of Sustainable Development was first raised in 1987 in the Brundtland Report (Our Common Future). It is generally defined as **'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.**

Since 1987, the majority of Governments have set targets to meet the principles of sustainability. Myerscough College is committed to contributing towards the protocols and targets established by the UK Government. This commitment was clearly demonstrated in February 2012 by the development of the College's 5 year Carbon Management Plan in association with the Carbon Trust – this comprehensive plan will address most of the issues relating to sustainability at the college. The Plan has been accepted by the College's Corporation; its implementation will be overseen by the Carbon Management Team.

Sustainability decision making involves an analysis of the economic, environmental and social consequences of actions taken before implementation. Myerscough College has become a more sustainable College by many individuals doing lots of small actions as well as by major capital investments. Sustainability is now one of our core strategic aims for how we operate.

As a large, land based College, we have direct impacts from the running of our buildings and activities – the main impacts include the consumption of resources (particularly energy and water) and the production of wastes. Indirect impacts include fuel consumption from staff and students travelling to and from the campuses and the energy consumed in the manufacture and transport of the products purchased (stationery, food for the catering outlets et al).

Highlights/ Achievements

- Annual electricity consumption at the Preston campus continues to fall; during the year ending April 2008 annual usage was 3,295,046 kWh. During the year ending July 2015, annual consumption has reduced to 2,881,939 kWh. It should be noted that the campus is larger now than it was back in 2008!

- Annual water consumption at the Preston campus has been monitored closely over the past 5 years. Consumption during the year ending July 2008 was 48,731 m^3 (an average of 134 m^3 per day) whilst consumption during the year ending July 2015 was 34,087 m^3 (an average of 93 m^3 per day).

- During October 2013, an Automatic Meter Reader was fitted on to the gas meter which allows management to monitor WHEN the gas is used. This has helped to identify opportunities for savings and has measured the impact of, for example, shutdown periods during non-term times.

- The Foundation Learning Centre was commissioned in September 2014; it was fitted with a 24 kW array of solar PV panels to generate electricity and with a biomass heating system to reduce gas consumption. The PV panels have produced 21,842 kWh of electricity (slightly over prediction) and the biomass system has saved approximately 89,000 m^3 of gas. Both of these technologies attract subsidies for the next 20 years.

- The Veterinary Nursing Centre was commissioned in September 2013; it is fitted with a mini-CHP (Combined Heat and Power) unit instead of a traditional gas boiler. The CHP unit not only provides hot water for heating but also generates electricity. During the 2014/15, it contributed 22,069 kWh of electricity.

Specific area to target next year

- Whilst it is a challenge to accurately benchmark gas consumption on a complex site, it should be assumed that current usage is too high. Although our understanding of gas consumption has improved, strategies to reduce wastage must continue to be considered as a high priority.

- The routine reading of water meters (particularly those which supply water to outlying areas of the college) must be given a higher priority. Two such supplies incurred estimated wastages of a combined total of 4,711 m^3 at a cost of £7,726 during this year.

- Little progress has been made to achieve the targets laid out in the Carbon Management Plan as funds for previously identified and costed projects are currently unavailable.
  With this in mind, the Plan requires updating; in addition, the role and the membership of the Carbon Management Team needs consideration.

Energy Use

Managing energy resources efficiently and effectively can significantly minimise the carbon footprint of the College and make a positive contribution to sustainable development.

a) Annual Electricity Consumption

Table 1 and Figure 1 below demonstrate the annual trend since the baseline year ending July 2008. This data relates to the electricity consumed through the College's 'HALF HOUR' meter which represents approximately 90% of total consumption of the College Estate.

Year	kWh used	CO_{2e} emissions (t)
2007/08	3,295,046	1,762
2008/09	3,116,205	1,661
2009/10	3,174,557	1,655
2010/11	3,134,333	1,528
2011/12	3,075,039	1,526
2012/13	3,110,492	1,494
2013/14	2,956,945	1,589
2014/15	2,881,939	1,442

Table 1:- Annual Electricity Consumption

IMPORTANT NOTE:-

Although less electricity was used in 2013/14 than in 2012/13, the emissions increased. In 2014, the UK used a lot more COAL (and less gas) to generate electricity; the conversion factor rose significantly to reflect this.

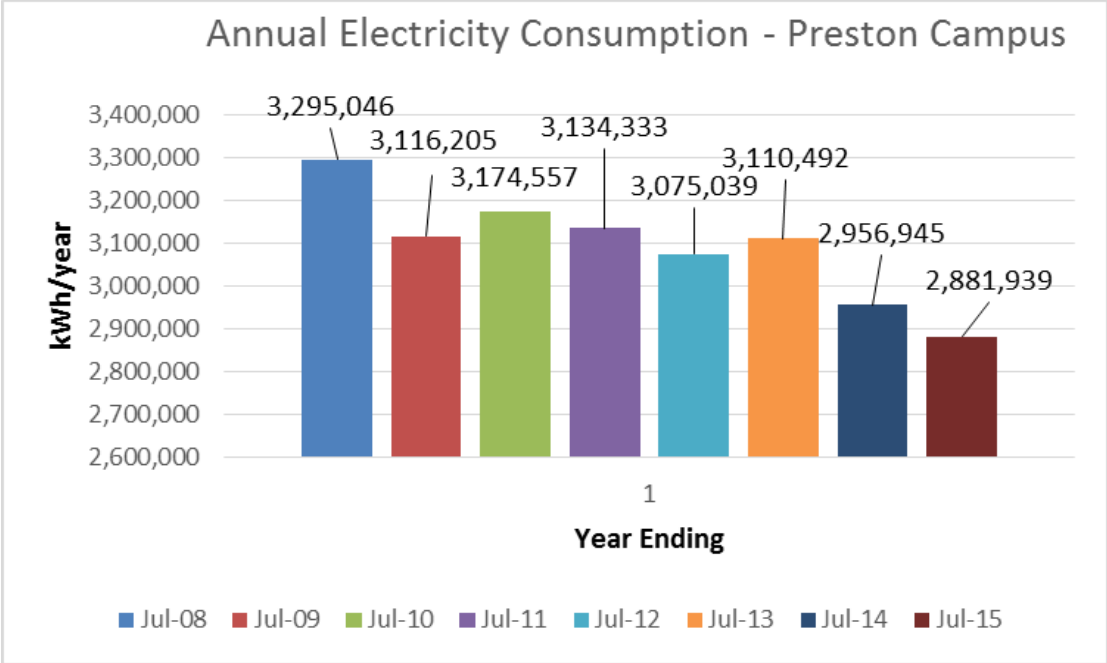

Figure 1:- Annual Electricity Consumption

These figures represent a 12.5% reduction in consumption since 2007/08 and a reduction of 18.2% in carbon emissions. This reduction has been achieved not only by the investment in energy saving technologies but also by behaviour change amongst staff and students. It should be noted that the campus is larger now than it was back in 2008!

The major reasons attributed to this reduction include:

i) awareness raising campaigns
ii) lighting upgrades/control
iii) voltage optimisation/reduction
iv) IT modifications
v) solar PV panels and a mini-CHP unit

Recent new builds have increased the College's demand for electricity. Consumption by floor area is shown in Table 2 below.

Year	kWh used per m^2 floor area
2010/11	61.9
2011/12	59.4
2012/13	60.2
2013/14	55.5
2014/15	54.1

Table 2:- Electricity Consumption by floor area

The monitoring of electricity consumption has become more effective over recent years. Management is now more aware of how much is used and when it is used. The challenge for the future is to monitor WHERE it is used. Following the purchase of a robust, mobile ENERGY DATA LOGGER, management is now aware of where 70% of the electricity is used; approximately 35% is consumed in four areas – the Fitzherbert-Brockholes building, the Equestrian area, the Sports Centre and the New Accommodation in the Student Village. A further 15% is consumed in the Engineering Centre, the Veterinary Nursing Centre and the Rural Skills Centre (all of which are relatively new builds).

It should be noted that electricity consumption at Myerscough is very much 'people related' and that the number of students, staff and visitors will affect its use. Outside temperature variations have little effect on consumption.

Electricity consumption through the non-half hour meters has been included as part of the calculation of the College's carbon emissions in the Carbon Management Plan; **during 2014/15, the consumption was 240,938 kWh.**

Consumption through the non-half hour meters has gradually increased since 2011/12 when consumption was 214,193 kWh. This indicates the lack of attention allocated to this supply compared to the campus supply. This is understandable as the campus uses over 90% of the electricity consumed! Part of this increase may be attributable to more effective data collection in recent years.

Thus, the total consumption for the Preston campus in 2014/15 was 3,122,877 kWh. The total CO_{2e} emissions was 1,562 tonnes compared to 1,825 tonnes during the base year of 2008/09.

b) Annual Gas Consumption

The baseline audit was taken for the year from August 2009 to July 2010; the data relates to the campus at Preston. Consumption over the following four years can be compared to the baseline.

Year	kWh used	CO_{2e} emissions (t)
2009/10	8,578,305	1,587
2010/11	8,677,023	1,605
2011/12	8,078,583	1,495
2012/13	9,937,439	1,838
2013/14	8,366,830	1,548
2014/15	8,511,665	1,575

Table 3:- Annual Gas Consumption

Gas is used to provide heat in three ways around the campus. The provision of hot water in all buildings and heat for cooking in the kitchens is described as the 'BASELOAD' demand – this demand is not dependent upon outside temperatures – it will be consumed whether it is hot or cold outside! It will vary according to the number of people on site.

The third use is to provide central heating for all buildings – this demand is DEPENDENT UPON OUTSIDE TEMPERATURES!

In order to better understand gas consumption it is necessary to differentiate between the 'BASELOAD' demand and the demand for central heating. The installation of the Automatic Meter Reader in October 2013 has facilitated the estimation of the 'BASELOAD' demand.

Table 4 takes account of both the 'BASELOAD' demand and the variations in temperature between the years by reference to freely available 'degree day' recorded information.

Year	Normalised kWh used	CO_{2e}emissions (t)
2009/10	7,620,298	1,410
2010/11	7,800,784	1,443
2011/12	7,485,444	1,385
2012/13	7,963,867	1,473
2013/14	8,229,877	1,523
2014/15	8,000,821	1,480

Table 4:- Annual Normalised Gas Consumption

As with electricity, recent new builds have increased the College's demand for gas. Table 5 takes account of the increase in building floor area in addition to outside temperatures.

Year	Normalised kWh used per m^2 floor area
2010/11	154.2
2011/12	144.5
2012/13	154.0
2013/14	154.4
2014/15	150.2

Table 5:- Annual Gas Consumption by floor area

Following a successful bid to the LSC, a Building Energy Management System (BEMS) was installed; this facility covers the majority of the buildings (newer) on the campus and is designed to control, manage and monitor the gas use in the buildings. It has been estimated that a BEMS can reduce gas usage by up to 20%. This potential reduction has not been achieved; reduction in consumption since the installation of the BEMS is estimated to be approximately 6%.

This indicates the importance of routine maintenance of the BEMS by an external agency if savings are to be fully realised. Routine maintenance is now carried out to rectify any issues. The installation of an automatic meter reader (AMR) in October 2013 has given management a better understanding of when gas is consumed and provide opportunity to reduce usage.

A 'shutdown protocol' has been developed for implementation across the campus during 'non-occupancy' periods in an attempt to reduce consumption.

The annual CO_{2e} emissions associated with gas consumption during 2014/15 were 1,480 tonnes compared to 1,584 tonnes during the base year (2008/09).

The reduction of gas consumption is a significant challenge; actions to control consumption must receive a high priority.

- An awareness raising poster was produced and placed in each Hall of Residence to coincide with the start of the academic year 2014/15.

- During June 2014, a student from Lancaster University conducted a survey in which residential students were asked a series of questions concerning comfort levels in their rooms. This work has been analysed and various actions were taken in response to its findings. The report has formed the basis of case study by Lancaster University to promote other companies to engage with the university.

c) Fuel Oil

This consists of HEATING OIL (KEROSENE) which is used to provide heating to three outlying houses which have no access to gas and DIESEL (GAS OIL) which is used by the farm and the Mechanisation section as tractor fuel.

HEATING OIL consumption has gradually declined from the equivalent of 58 tonnes CO_{2e} emissions in the base year to 47 tonnes CO_{2e} this year.

DIESEL consumption was the equivalent of 143 tonnes CO_{2e} in the base year and 136 tonnes CO_{2e} this year. It has varied significantly over the years from between 136 tonnes CO_{2e} to 187 tonnes CO_{2e}.

The CO_{2e} emissions associated with the consumption of fuel oil during 2014/15 was 182 tonnes compared to 202 tonnes during the base year.

Water use

Water is a precious resource and clean, drinking water is both energy and chemical intensive in its production and supply.

The measurement of water use now receives a higher priority. In June 2008, the College signed a 3- year contract with Advanced Demand Site Management (ADSM) who are responsible for the delivery of the government-sponsored 'Aquafund' initiative. This scheme was created to help organisations reduce water consumption and costs; 50% of any savings made over the 3-year period were paid to ADSM. This initial contract ended in June 2011; the decision was made to sign a new 5-year contract in July 2011.

The installation of an automatic meter reader (AMR) on the main campus meter combined with the installation of isolation valves means that the College has more control over and is better able to understand the majority of its water usage. Works were carried out in July 2012 to zone the campus to facilitate more robust investigation into areas of over consumption. This involved the installation of 4 sub meters along with AMRs to help identify areas of underground leakage which remain at a level worthy of intervention.

Table 1 below indicates the impact on water consumption of these changes on the main campus meter (all the campus except the Horticultural Unit, the Equestrian Centre and the Rural Skills Centre):-

Year Ending	Annual Consumption (m^3)
July 2009	48,731
July 2010	39,601
July 2011	38,553
July 2012	34,825
July 2013	33,577
July 2014	36,508
July 2015	34,087

Table 1:- Annual Water Consumption from the main campus meter.

Water consumption through this meter is very much 'PEOPLE-RELATED' and will vary according to the number people on campus from year-to-year.

All the other meters are now read manually more frequently in order to more effectively monitor consumption. However, these meters have been read less frequently this year due to time challenges. Table 2 below indicates water consumption from all the meters over the past eight years:-

Year Ending	Annual Consumption from mains supply (m^3)	Annual Consumption including Borehole (m^3)*
July 2008	72,084	72,084
July 2009	69,372	69,372
July 2010	67,315	74,059
July 2011	60,484	67,126
July 2012	53,662	61,024
July 2013	51,006	58,306
July 2014	54,241	59,291
July 2015	55,553	62,437

Table 2:- Annual Water Consumption (Preston Campus and Farms)

* A borehole was drilled to provide water to the dairy unit on the farm which became operational in August 2009. The farm can extract 20m^3/day free of charge via this borehole before the supply switches over to the mains supply; this has the potential to reduce the supply the farm has to pay for by approximately 40%.

This shows a 23% reduction in water consumption over the past seven years from the mains supply and a 13% reduction when consumption from the borehole is included.

Two 'water-saving' awareness raising posters were placed around the campus to coincide with the start of term. These were:-

1. A poster has been placed in all toilets/washrooms – it was originally circulated 3 years ago since when new builds have taken place and many had gone missing from older buildings.

2. The majority of showers in the Halls of Residence have now been fitted with 'Showerbobs' – similar to egg timers to encourage shorter shower periods! A poster explains their role.

The annual CO_{2e} emissions associated with water consumption during 2014/15 was 21 tonnes compared to 30 tonnes during the base year.

Wastes Management

The College recognises the importance of the UK Government's waste hierarchy, namely 'reduce, reuse, and recycle'. The College is committed to disposing of materials in an environmentally sensitive manner and encouraging the reuse and recycling of waste materials where possible. However, the minimisation of wastes produced is the priority and is an increasing challenge to the college.

A new wastes management contract started in April 2013; one of the essential requirements included in the specification was that the weight of wastes must be measured and recorded as it leaves the college. Following a year's data (see Table 1 below), a baseline was established in 2014 and will be used in future to assess the impact of any managerial changes in the future.

	Tonnes removed (2014)	Tonnes removed (2015)
General Waste (EfW)	197.2	179.9
General Waste (Landfill)	19.6	35.9
Recycled Waste	26.5	29.5
Food Waste	21.2	17.8
TOTAL	264.5	263.1

Table 1:- Wastes removed by disposal route during the year ending July 2014 and July 2015.

It should be noted that only 10.5% of the waste was sent to landfill over the past two years.

The majority of the General Waste no longer goes to landfill; it is burned in an 'Energy-from-Waste' plant (EfW). Previous to April 2013, this waste was sent to landfill. The burning of waste in controlled conditions is considered to have a lower environmental impact than burying it. Waste which is burned is not subject to Landfill Tax; burning produces an income for the contractor and, thus, the cost of removal is reduced.

The General Waste which is removed to landfill is collected on site in 'skips' on the farm and at Gables, Hutton. Due to the variable nature of this waste stream, the locations of its arising and the type of container used to collect it, this waste is not considered suitable for burning.

The recycled waste stream includes paper, cardboard, plastic bottles and metal cans; it does not include recycled glass bottles, metal and various other streams (e.g. waste oil from workshops, waste cooking oil from the kitchens, waste haylage sheets from equine, waste electrical items and hazardous waste). This waste stream is transferred to a Materials Recovery Facility (MRF) for further separation and disposal.

The food waste stream is removed to an Anaerobic Digestion (AD) plant. The AD plant produces biogas which is used to generate electricity and the waste slurry is used by farmers as a fertiliser.

Transport

The burning of fossil fuels such as petrol and diesel gives rise to emissions of sulphur dioxide, nitrous oxides, particulates and carbon dioxide. By influencing the way the staff and students travel to and from Myerscough College, it is possible to reduce the College's contribution to these problems.

Table 1 below summarises business travel trends over recent years. The distance includes travel using fleet vehicles, company cars, hire cars, staff's own cars and vehicles used by maintenance staff around campus.

Business Travel

Year Ending	Miles Travelled	CO_2 emissions (t)
March 2009	935,714	292
March 2010	1,032,409	335
March 2011	863,331	263
March 2012	833,555	249
July 2013	894,052	239
July 2014	903,585	234
July 2015	897,208	230

Table 1:- Business Travel

The trends identified are as follows:-

- Staff travel in their personal cars has declined significantly.
- Fleet car travel has increased significantly.
- Fleet minibus travel has reduced over the years.
- Vehicle updates have reduced carbon emissions per mile travelled.

The CO_{2e} emissions associated with the travel during 2014/15 was 230 tonnes compared to 292 tonnes during the base year.

CARBON REPORT

The College's Carbon Management Plan was published in March 2012; the plan set an ambitious carbon reduction target, supported by the technical projects and other embedding actions.

Myerscough College will reduce the carbon emissions from its activities at the Preston campus by 35%, from a 2008/09 baseline of 3,883 tonnes CO_2, by July 2017.

The scope of the baseline covers the Preston campus only and includes carbon emissions emanating from:-

- Fuel use in buildings and estates (e.g. gas and oil)
- Fleet transport emissions (e.g. petrol and diesel)
- Electricity consumption in buildings and estates
- Water consumption

Table 1 is taken from the Carbon Management Plan and has been updated to include current performance compared to target.

Year	Predicted Business as Usual Emissions	Target Emissions	Current Performance
2009	3968	3968	3968
2010	3995	3765	3762
2011	4023	3572	3630
2012	4050	3389	3726
2013	4078	3216	3543
2014	4106	3052	3525
2015	4134	2896	3475
2016	4163	2749	
2017	4191	2609	

Table 1:- Annual Carbon Emissions

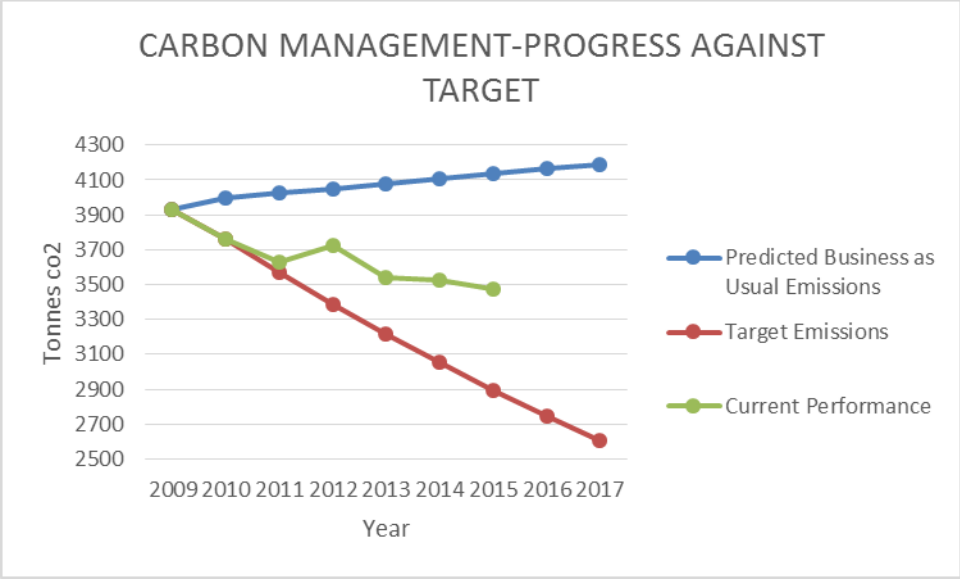

Figure 1:- Current Performance compared to taking no action (Business as Usual) and to Target.

The data illustrates that performance was on target for the first two years and, since 2010/11, carbon emissions have remained below target.

The annual targets set were always considered ambitious and the Carbon Management Plan lists numerous costed projects which were to be carried out in order to achieve target. Financial constraints have not allowed these projects to be implemented during recent years.

It is worth noting that the 'Business as Usual' prediction is 4134 tonnes by this year compared to the actual performance of 3475 tonnes, i.e. a saving of 659 tonnes.

The reduction target by 2014/15 is 27%; the reduction achieved is 12%. Further analysis of the components that constitute the 'carbon footprint' are shown in Table 2 on the next page.

Component	Base Year Emissions (t)	2014/15 Emissions (t)	% Change
Electricity	1825	1562	14.4
Gas	1584	1480	6.6
Water	30	21	30.0
Travel	292	230	21.2
Oil	202	182	9.9

Table 2:- Comparison of CO_{2e} Emissions from Base Year to Present Year.

The reduction in the emissions associated with Water Consumption and Business Travel are approximately on target.

The reduction in the emissions associated with Electricity and Gas Consumption which make up 90% of the 'carbon footprint' are below target; gas consumption is particularly significantly below target.

This analysis indicates that Electricity and, particularly, Gas Consumption have the greatest effect on the 'carbon footprint'. These must remain the priority in terms of any future actions.

*Please note that methodologies for the calculation of carbon emissions have been modified over time as knowledge increases. These changes have been incorporated into this report.