Environmental Association for Universities and Colleges

Scotland

Summary report on Scottish Further and Higher Education Carbon Emissions 2014-15

Carbon Forecast Ltd

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Introduction

The Climate Change (Scotland) Act 2009 introduced ambitious targets and legislation to reduce Scotland's emissions by at least 42% by 2020 and 80% by 2050. Under the Act, there were powers to introduce a statutory reporting requirement for Public Bodies. In November 2015, after a public consultation, the Climate Change (Duties of Public Bodies: Reporting Requirements) (Scotland) Order 2015 was issued and this order requires the major players amongst the Scottish public authorities to prepare annual reports on compliance with their climate change duties. There are 19 Higher and 25 Further Education Organisations in Scotland that are required to report.

This report focuses on data from Section 3 of the PBCCD report which requires organisations to report their Corporate Emissions, Targets and Project Data for the reporting year (which can be academic, financial or calendar). However, the Higher Education organisations in Scotland have also been doing Estates Management Reporting (EMR) since 2008/09 for the Higher Education Statistics Agency (HESA); this report has analysed both of these data sources for the FHE sector in Scotland to determine:

- The overall emissions in 2014/15 and the trajectory of these emissions over time;
- The progress of the sector against carbon reduction targets;
- The probable future emissions of the sector based on different growth scenarios; and
- The type and current level of investment in carbon reduction projects.

Organisations included in the analysis

In order to make it clear how many organisations have been included in the analysis, Table 1 summarises the number of organisations that reported in 2014/15 for the two datasets. For some sections, the HE and FE sector have been analysed separately; this is because there is more historical depth of data for the HE sector and therefore trajectories and progress against targets can be assessed.

Table 1: Number of organisations reporting in each dataset

Parameter	Estates Management Report (2014/15)		Public Bodies Climate Change Duties Report (2014/15)	
	Reported	Not reported	Reported	Not reported
Further Education	N/A	N/A	13	12
Higher Education	17	No individual report for Open University of Scotland. Royal Conservatoire of Scotland does not report.	16	3 (University of Stirling completed a pilot report but did not have footprint data for 2014/15 available)

Important terms

Tonnes of carbon dioxide equivalent (tCO_2e): These are the standard units for measuring carbon footprints. The idea is to express the impact of each different greenhouse gas in terms of the amount of CO_2 that would create the same amount of warming. That way, a carbon footprint consisting of lots of different greenhouse gases can be expressed as a single unit.

Scopes in carbon accounting: Emissions are usually divided into three scopes:

- **Scope 1** are direct emissions from the organisation's own estate e.g. boilers and fleet
- **Scope 2** are energy indirect emissions from the generation of grid electricity or imported heat
- **Scope 3** are other indirect emissions that arise as a consequence of the operations of an organisation, but are not directly owned or controlled by the organisation e.g. business travel, water supply and treatment and waste disposal. Transmission and distribution losses from the grid electricity are counted as Scope 3

Organisational boundaries: these define the operations, facilities, and activities that are to be included in the inventory

Operational boundaries: these define the emission sources resulting either directly or indirectly from the organisation's operations, facilities, and activities.

Boundary creep: this describes the process whereby the organisational or operational boundary becomes larger over time. This can happen as data systems improve and capture more of a dataset e.g. more staff book travel through an online system. It can also happen if sources that were excluded in previous years are added in e.g. waste data. Boundary creep makes it harder to demonstrate progress against targets.

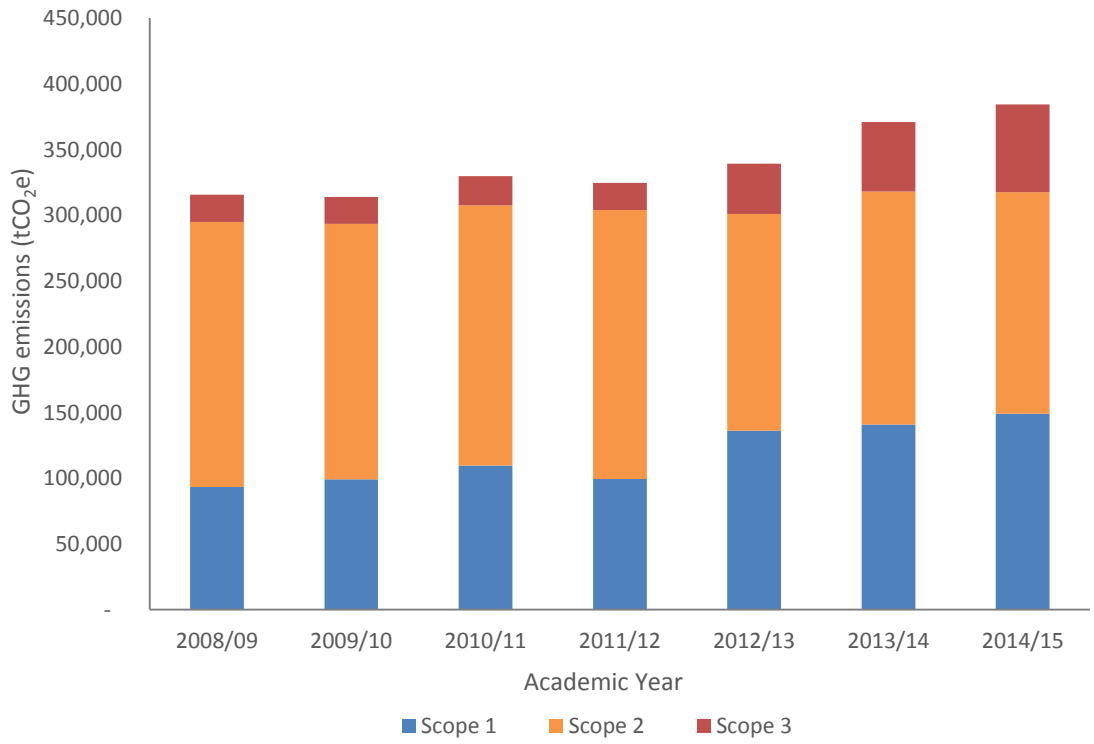
Emissions in the HE Sector

Overall emissions in the HE sector within Scotland have increased over the past 7 years, from 316 MtCO2e in 2007/08 to 384 Mt in 2014/15, but part of this increase is due to 'boundary creep' with increased visibility of emissions from business travel and more generally increased provision of data.

If business travel is removed from the calculation, emissions have still increased by 6% between 2008/09 and 2014/15. This increase has occurred during a background of climate change action within the sector, with effort and investment made to reduce relative and absolute emissions.

One of the key activities to reduce emissions (and costs) can be seen in Figure 1 with the increase in natural gas (Scope 1) and decrease in grid electricity (Scopes 2 & 3) from 2012/13 onwards as organisations have increasingly implemented Combined Heat and Power (CHP) projects, which use natural gas to generate heat and electricity onsite.

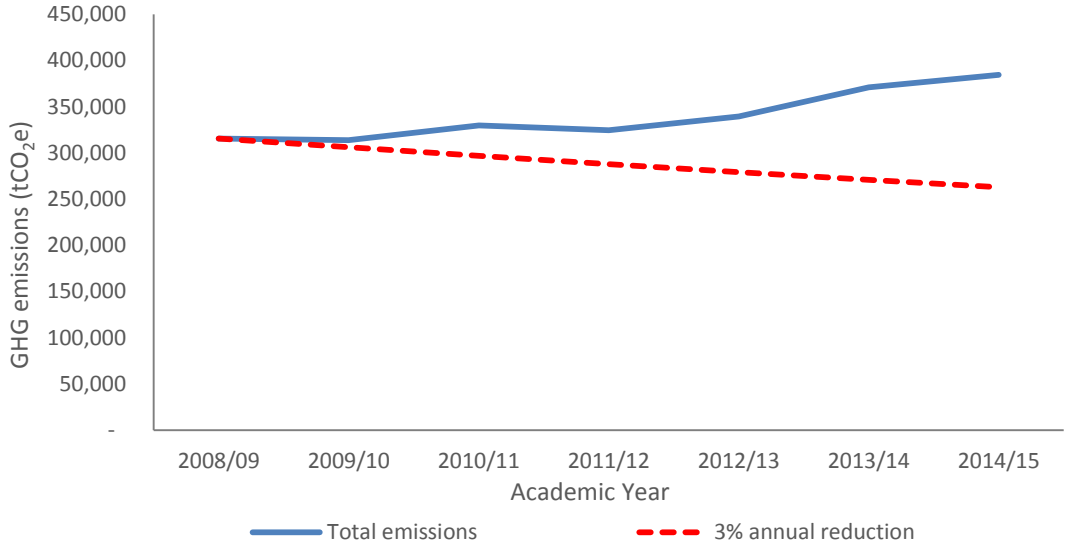
Figure 1: Scope 1, 2 & 3 GHG emissions from HE Sector



Emissions in the Higher Education sector

Although there is no overall set reduction target for the Scottish Sector, an annual 3% reduction is a reasonable estimate of the Scottish CC reduction targets for the country as a whole. However, overall the Scottish HE Sector is failing to meet any reduction target, and between 2008/09 and 2014/15 the sector emissions rose by 22% instead; an average of 3.6% annually. This overall figure hides a wide disparity between climate change performance within the sector, with some organisations meeting and exceeding their targets, with others falling behind.

Figure 2: Actual GHG emissions from HE Sector against an overall 3% annual reduction target

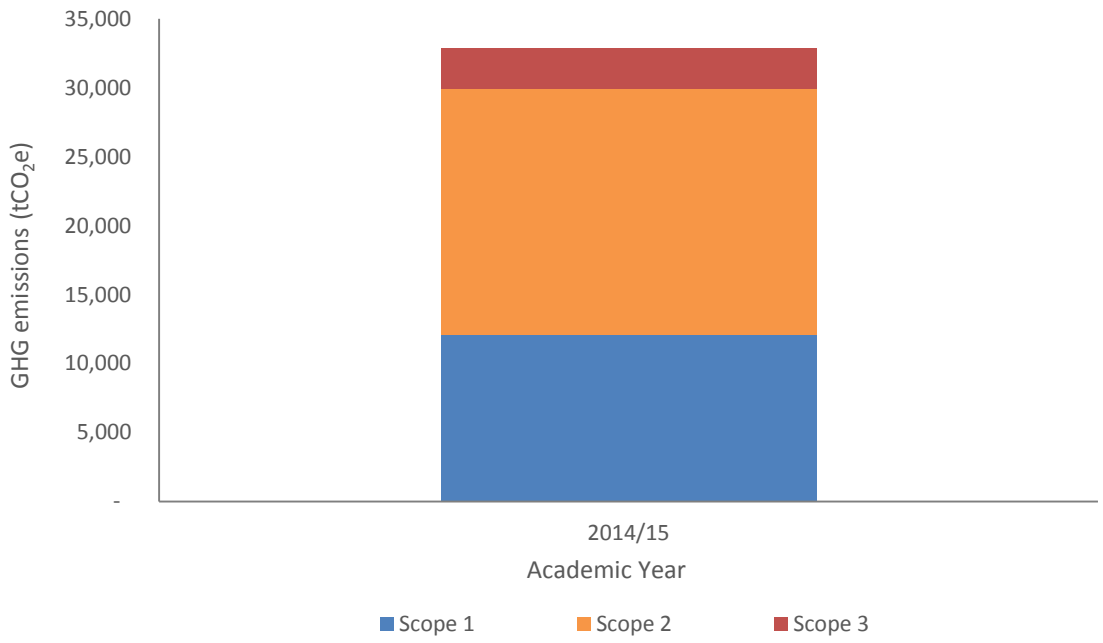


Emissions in the Further Education sector

Although only 12 out of the potential 26 FE organisations reported in the pilot year, there was still sufficient data to draw some conclusions about the emissions:

1) The average emissions per organisation in the FE sector are significantly lower than for the HE sector, due to their smaller size and less energy intensive activities.
2) The organisations that did report took a reasonably consistent approach to organisational and operational boundary setting.
3) The distribution of emissions between Scopes is similar to the HE sector, but the FE sector has a higher proportion of Scope 2 and a lower proportion of Scope 3 emissions. This is likely to be due to lower levels of business air mileage and increased reliance on grid electricity.

Figure 3: Scope 1, 2 & 3 GHG emissions from FE Sector for 2014/15 (based on 12 Colleges)



Estimate of the total emissions of the FHE sector for 2014/15

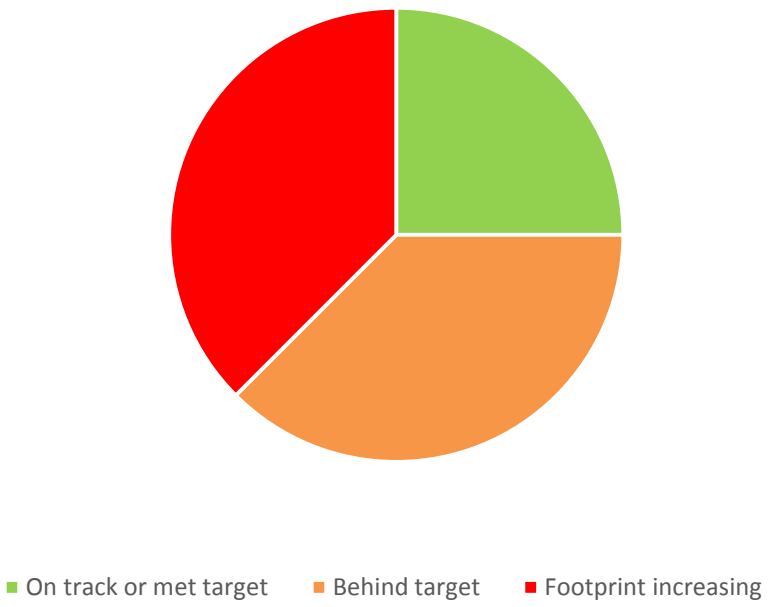
The total emissions for the FHE Sector in 2014/15 is estimated at 480,000 tCO2e, based on the known reported emissions and expected proportional representation of non-reporting organisations. There are also likely to be underreported emissions in terms of the boundary, especially of Scope 3 emissions from business travel. The FHE sector makes up around 14% of the emissions of the Scottish Public Sector as a whole, and like this sector, the FHE emissions are dominated by a small number of organisations that contribute a significant proportion of emissions.

HE Progress against targets

There were a very wide variety of target types, baseline and completion years and boundaries even within the subset of HE organisations in Scotland, implying that there has not been a consistent approach for setting targets.

Of the targets where it was possible to assess progress, only two organisations were on track or had met their target. Of the remaining six organisations, three were significantly behind their target and a further three had actually increased their emissions. This result shows clearly that the Sector as a whole has been very variable in terms of success in achieving carbon reductions and there are likely to be lessons learnt from organisations in all situations.

Figure 4: Progress against targets in the HE Sector (based on eight organisations)

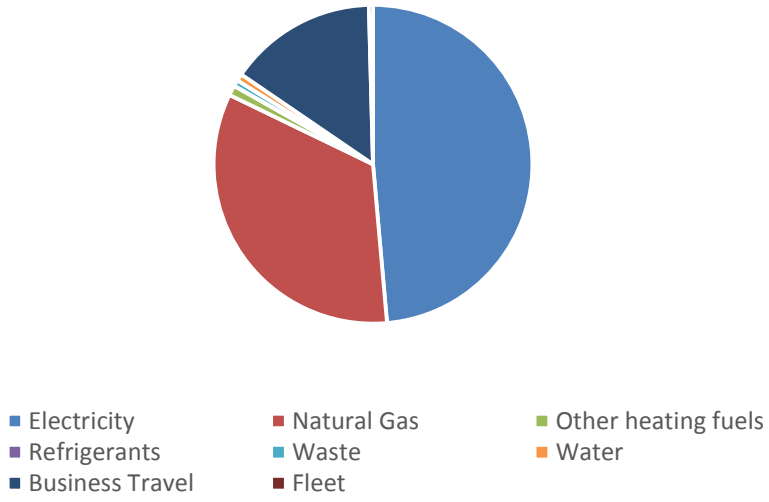


Breakdown by source for FHE sector

The breakdown of emission source for the FHE sector is fairly similar to the overall public sector in Scotland, with two significant exceptions:

1) Grid electricity is lower and natural gas is higher in the FHE sector which is likely to be at least partly due to the implementation of CHP projects in the HE sector but also due to heating requirements of the estate.
2) Business travel emissions are a significantly higher proportion in the FHE sector than the public sector as a whole, largely driven by air travel in the HE sector. It is probable that air travel is still underreported as individuals might book travel out with normal systems.

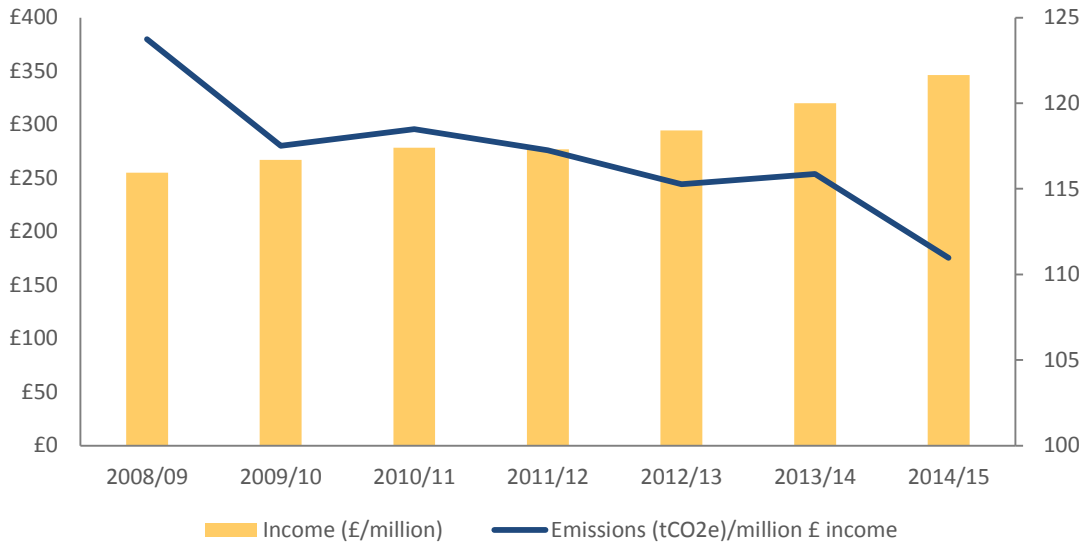
Figure 5: Emissions broken down by source for 2014/15



Emissions by metric for HE sector

The availability of annual consumption data along with metrics in the EMR data allows for useful expression of the emissions data by metric. Income has shown the most rapid growth over the past seven years; total income in the HE sector increased by 36% over the period and emissions did not keep pace with this rate of growth, therefore the emissions per £ million income have decreased significantly over the period by 10%.

Figure 6: Income and emissions per £ million income



While it is encouraging that two key metrics (overall emissions/£ million of income and building emissions/1,000 m^2 of floor area) are decreasing, which implies that the HE sector is becoming more efficient, it is important to note that these still represent absolute increases in emissions. Predicting future emissions from these patterns is not easy and there is likely to be significant inter-organisation variation.

Project emission saving

Under current rates of growth in income, floor area and student numbers, it is going to be hard for the HE sector in Scotland to reduce their absolute emissions without a combination of a lowering of the carbon intensity of the grid factor and significant investment in carbon reduction projects, including renewable generation.

There was a general lack of project data reported by the sector in the PBCCD report which suggests that the FHE sector either did not have projects to report or were unable to collate the project data effectively.

For data that was made available, there were some inconsistencies in the data, however, the key finding is the rate of implementation of project carbon savings would need to be significantly increased if organisations are to reach carbon reduction targets.

Estimated project savings compared to the proportion of emission source

Emissions source	Total Emissions (PBCCD)	Estimated project savings	% of emissions
Electricity	198,246	2,064	1.0%
Natural Gas	136,952	2,579	1.9%
Other heating fuels	4,178	34	0.8%
Refrigerants	61	0	0.0%
Waste	2,494	268	10.7%
Water	2,918	89	3.0%
Business Travel	61,424	72	0.1%
Total	**407,959**	**5,128**	**1.3%**

Project funding

The key issue for the sector going forward is an insufficiency of carbon reduction projects to counteract growth in emissions in the sector. This might be due to a number of factors, including lack of single collated project lists making reporting easier, lack of investment for projects requiring initial capital, or lack of resources to identify and implement suitable opportunities.

The data suggests that costing of projects remains an issue for the sector. With higher than expected cost/tonne CO2e for gas and transport projects, organisations need support to investigate development of these projects and cost them effectively. This is of key importance since funding/financing requires much greater accuracy.

Focus on Combined Heat and Power in the HE Sector

Given the commercial and environmental benefits of the tried and tested technology of Combined Heat and Power Projects, along with its proven effectiveness in the FHE sector, it is recommended that organisations are encouraged to investigate the further potential for CHP (through a CHP feasibility study) and progress to installation and commissioning where feasible. CHP should only be considered after other energy efficiency (reduction) activities have been carried out, and alongside renewables appraisals as a high investment proposal. Where the supply of heat to campus buildings is the primary driver an examination of the opportunity to improve the efficiency of campus heat networks is recommended. This could involve increasing thermal storage capacity. A detailed assessment of low carbon heat technology options such as large water source or ground heat pumps should also be undertaken.

Organisations with existing CHP units should be supported to measure and monitor their units' performance in order to maximise their effectiveness and hence savings.

Conclusions

The FHE sector in Scotland is estimated to have produced around 480,000 tCO2e in 2014/15 as a result of its operations. The majority of these emissions come from Scope 1 and 2 sources and are related to energy use in buildings; the two key sources are natural gas and grid electricity. However, there were also significant emissions produced by business travel. This total does not include

additional Scope 3 emissions such as student and staff commuting and procurement of goods and services.

Improving reporting of emissions

It seems probable that, over time, a unified boundary approach will be applied to the whole public sector and therefore it is recommended that the FHE sector are proactive and take a lead in helping to develop boundary conditions and reporting rules.

A second recommendation is that an auditing protocol is drawn up to help organisations understand how to internally check their data. This could involve providing training to help organisations improve their internal processes and also to help them understand how to peer-review data from other organisations.

Setting targets

The wide range of target types, baselines and completion years, applicable boundaries and amounts has made it very hard to assess the actual progress of the whole sector. This diversity is not helping organisations communicate and compare their progress. In the same way that the boundary that organisations use to report can be unified, so can the targets. However, getting agreement for the target format and conditions (e.g. permitted adjustments for degree days, level of materiality of reporting etc.) could take some time and therefore the process should be started before organisations reach the end of their current target period.

Investment in projects

Metrics and scenarios are useful tools and further work could be done to reduce the uncertainty in reporting and predicting future emissions, but the message from the initial analysis is already clear: without a significantly increased level of investment in carbon reduction projects and/or a lowering of the carbon intensity of the grid, the FHE sector is likely to increase its absolute emissions over the next 5-10 years, and most organisations will miss their carbon reduction targets.

Analysis of the project information in the Public Bodies Climate Change Duties Report showed that for the reporting year, sufficient projects were funded and implemented across the sector to reduce emissions by just 1.3%. This reduction is highly likely to be exceeded by the sector growth in income and floor area.

The current evidence from the analysis of the historical data of the HE sector and the analysis of the reported implemented savings for the FHE in 2014/15 and the predicted savings for 2015/16 is that the current strategy is not working, *if the goal is to reduce absolute emissions in the FHE sector*. Simply put, there is just insufficient investment in carbon reduction projects to turn the tide of growth in emissions. This also means that the climate change teams in these organisations are being set up to fail with the majority of carbon reduction targets that are set. Therefore, there needs to be an honest conversation with the sector about what the actual objectives are and how these could be achieved, through internal or external investment, or other innovative strategies. Whatever decision is taken by the FHE sector, whether they are going to reduce absolute emissions, reduce relative emissions or cap emissions, support needs to be given to keep this objective as a top priority for the management team of those organisations. There then needs to be some consequence applied for failing to meet those targets and equally importantly, celebration of, and learning from, organisations that are meeting their targets.