April 2010/04
Good practice
Annual report
This report is for information

This publication reports on the progress and findings of Estate Management Statistics (EMS) during 2008. EMS shares estates information among UK higher education institutions and empowers institutions to improve management of the physical infrastructure. The report highlights four different aspects of estates performance.

Performance in higher education estates

EMS annual report 2009

Higher Education Funding Council for England
Scottish Funding Council
Higher Education Funding Council for Wales
Department for Employment and Learning, Northern Ireland

Contents **Page**

Performance in higher education estates: EMS annual report 2009

To	Heads of HEFCE-funded higher education institutions Heads of SFC-funded higher education institutions Heads of HEFCW-funded higher education institutions Heads of universities in Northern Ireland
Of interest to those responsible for	Strategic planning, Finance, Estates
Reference	2010/**04**
Publication date	April 2010
Enquiries to	Andrew Smith at HEFCE tel 0117 931 7001 e-mail a.smith@hefce.ac.uk Derek Horsburgh at SFC tel 0131 313 6649 e-mail dhorsburgh@sfc.ac.uk Chris Cowburn at HEFCW tel 02920 682247 e-mail chris.cowburn@hefcw.ac.uk Billy Lyttle at DEL tel 02890 257408 e-mail billy.lyttle@delni.gov.uk

Executive summary

Purpose

1. This publication reports on the findings of the Estate Management Statistics Service (EMS) during 2008-09 for the 2007-08 financial year. It focuses on:

- the changing profile of the UK higher education estate over a five-year period between 2003-04 and 2007-08
- trends over this period with particular emphasis on space.

2. We recommend that senior management teams and estates committees consider this report in the context of their estates and use EMS to assist them in developing their strategies and operational planning.

Key points

Cost and income analysis

3. The level of income coming into the sector has increased over the five-year period 2003-04 to 2007-08, up 41.6 per cent to £23.3 billion in 2007-08. Expenditure also increased over the period but at a slower rate, up 38.3 per cent.

4. Total property costs per student full-time equivalent (FTE) in the UK rose by 16.5 per cent over the period 2003-04 to 2007-08 with inflation over a similar period (as measured by the retail price index) up 18.5 per cent. Whereas the distribution of total property cost per m² showed relative consistency year-on-year, the variability across the institutions for total property cost per student FTE has increased significantly. In 2003-04 the inter-quartile range was £659 per student and in the most recent update period this had increased to £821 per student FTE.

5. Progress has been made since 2003-04 in relation to higher education institutions' ability to meet their backlog maintenance liabilities. Relative to institutional income, backlog liabilities are now at their lowest level for five years.

Space management

6. The size of the UK higher education estate increased by approximately 6 per cent between 2003-04 and 2007-08, from 24.4 million m² to 25.9 million m² of gross internal area (GIA) while FTE student numbers increased by 7.3 per cent.

7. The total amount of non-residential space per student FTE has remained relatively constant over the five-year period, with growth in FTE numbers slightly exceeding the expansion of space. The trend has seen a reduction from 7.9 m² per student in 2003-04 to 7.7 m² in 2007-08.

8. The median amount of core teaching space per student has reduced by 9.7 per cent over the five-year period but despite this the remaining teaching space is being used less intensively, perhaps indicating a shift to new approaches to teaching and a move to more flexible spaces.

9. Academic office provision per academic staff FTE has increased by 2 per cent over the five-year period to a median figure of 13.6 m² per academic staff FTE, while office space provision for

support staff has fallen by 6 per cent to 13 m^2. The rise in the provision of academic office provision is at odds with the general trend towards more intensive use of space. Comparisons with other sectors, contained in the report, suggest that there is potential for greater efficiency in the use of space.

Environmental sustainability

10. The median energy consumption per student FTE fell by 3.9 per cent between 2003-04 and 2007-08. Up until 2006-07 there had been a steady decrease in the energy consumption per FTE, reaching a low of 3,423 kWh per student FTE. For 2007-08, however, the trend changed, with levels of consumption increasing by 4 per cent. Energy consumption figures from one year to the next are affected by the weather and in particular temperature variations; we will be exploring how EMS data can be adjusted for this in the future.

11. Notional energy emissions per FTE follow the overall energy consumption trend, with a reduction overall, down 4.1 per cent relative to 2003-04; however, in 2007-08 carbon dioxide (CO_2) emissions rose more than the increase in energy use. This variation was caused by changes in the Department for Environment, Food and Rural Affairs rates for conversion of energy use to CO_2 emissions.

12. The median percentage of waste recycled in the higher education sector was 26.6 per cent for 2007-08 which represents significant improvement relative to 2003-04 when this was at 12.7 per cent.

13. Median water consumption per student FTE has fallen from 12.57 m^3 per student FTE to 11.93 m^3, which represents a 5.1 per cent decrease. The distribution of results also indicates that with the upper and lower quartiles at their lowest for the last five years the sector as a whole is making great strides in reducing water consumption levels per student FTE.

Condition and repair

14. During the last five years there has been a marked improvement in the percentage of non-residential GIA in condition A and B[1] (D20a). The median value has risen from 69 per cent in 2003-04 to 73.1 per cent in 2007-08. There has also been marked improvement when taking the condition by weighted GIA, with the amount of space in good condition increasing by 3.7 per cent between 2003-04 and 2007-08.

15. The functional suitability of the non-residential estate over the period 2003-04 to 2007-08 has seen a steady improvement, increasing eight percentage points.

16. A glossary of key terms and abbreviations used in this report is at Annex A.

[1] That is to say, the two higher grades of the four used by EMS to classify condition.

Introduction

17. The latest Estate Management Statistics (EMS) data set was collated during 2008-09 and covers the 2007-08 financial year. It incorporates data from 157 out of a potential 158 higher education institutions (HEIs) in the UK. EMS remains a voluntary initiative and its continued success reflects the high value placed on it by institutions and others.

18. EMS continues to deliver a consistent and robust set of estates data for the vast majority of UK HEIs. The increased use of EMS data is demonstrated by the fact that EMS metrics are now embedded in HEFCE's Capital Investment Framework[2] and in People and Planet's 'Green League'[3].

19. This report was produced by IPD Occupiers and has been endorsed by the EMS Steering Group. It looks at the main estates trends and challenges in higher education. For more information on EMS, see www.opdems.ac.uk. HEIs may also download EMS results from this web-site.

20. This report continues the commentary on sector trends for key metrics consistent with previous annual reports, with a particular focus on space use across the estate.

21. With changing styles of teaching, new ways of learning and increasingly flexible ways of learning brought about by new technologies, anecdotal evidence increasingly points towards a growing trend among institutions to provide a different type of space to support these requirements (for example atria, corridors and increasing amounts of non-bookable space). In the space section therefore we focus on whether EMS data supports the hypothesis of a move to more flexible spaces for learning and working.

22. The focus is on the total and non-residential elements of the sector, with no analysis of the residential component.

23. This year we have introduced a new feature to the analysis, incorporating quartile ranges. Through this we are able to identify changes in the distribution of the sample over time and address whether metrics are showing signs of converging to a 'norm' or whether in fact there are signs of increasing divergence across a sample.

The size of the sector

24. Over the five-year period 2003-04 to 2007-08 the UK higher education sector has seen a steady increase in both the size of the estate and in full-time equivalent (FTE) students. Gross space has increased from 24.4 million m² to 25.9 million m², a rise of 6.2 per cent. This has been matched by a 7.4 per cent rise in FTE numbers from 1.48 million to 1.59 million over the same five-year period.

---

[2] For further details see www.hefce.ac.uk under Finance & assurance/Finance and funding/Capital funding/Capital Investment Framework.

[3] For further details see www.peopleandplanet.org

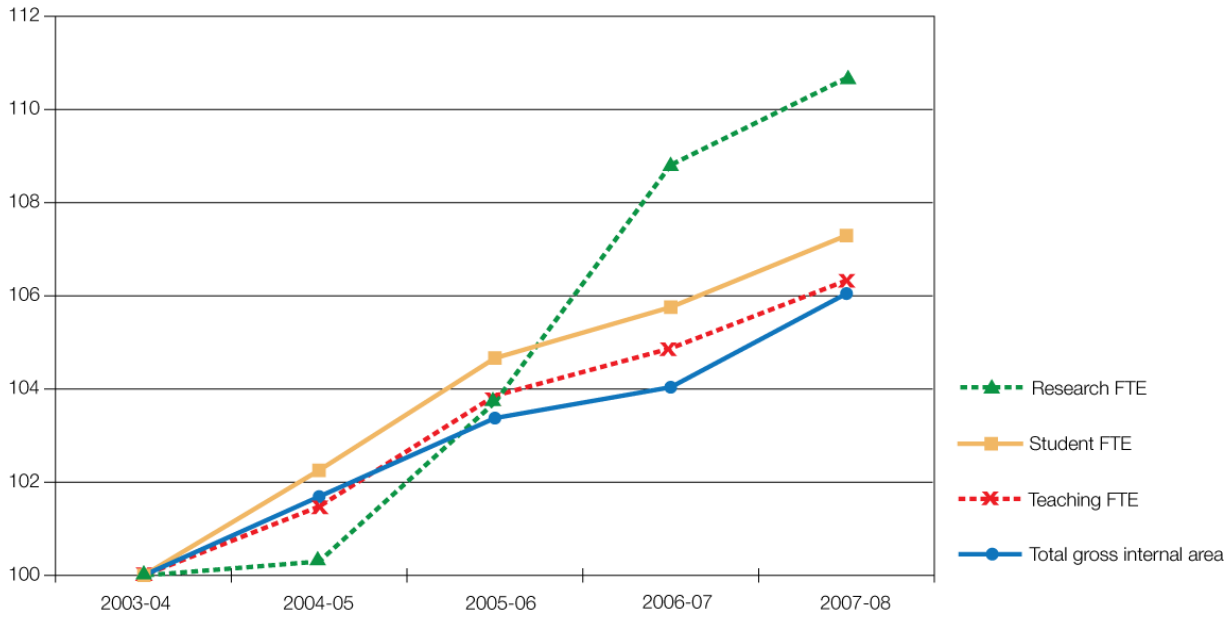
25. The relationship between the number of students and amount of space is a critical factor in interpreting some of the data presented in this report. Figure 1 shows how this relationship has changed over the past five years and demonstrates that each year the number of students is rising at a faster pace than the space being provided, with one exception: 2007-08 was the only year of the five-year period where the year-on-year change in space rose at a greater rate than the number of FTEs.

26. Figure 1 also identifies the change in research and teaching FTEs. Research student FTE figures have risen more sharply than the teaching FTE figures, up 10.7 per cent since 2003-04 compared with a 6.3 per cent increase for teaching FTEs.

27. The 2007-08 median m² per research student FTE was 21.73 m² and the median m² per academic student FTE was 4.26 m² – a ratio of research to teaching of 5.1:1.

28. Given the rate of increase in research students and the amount of space on average allocated per research student FTE, institutions that experience a significant increase in research activities will need to consider the potential impact from a space planning perspective.

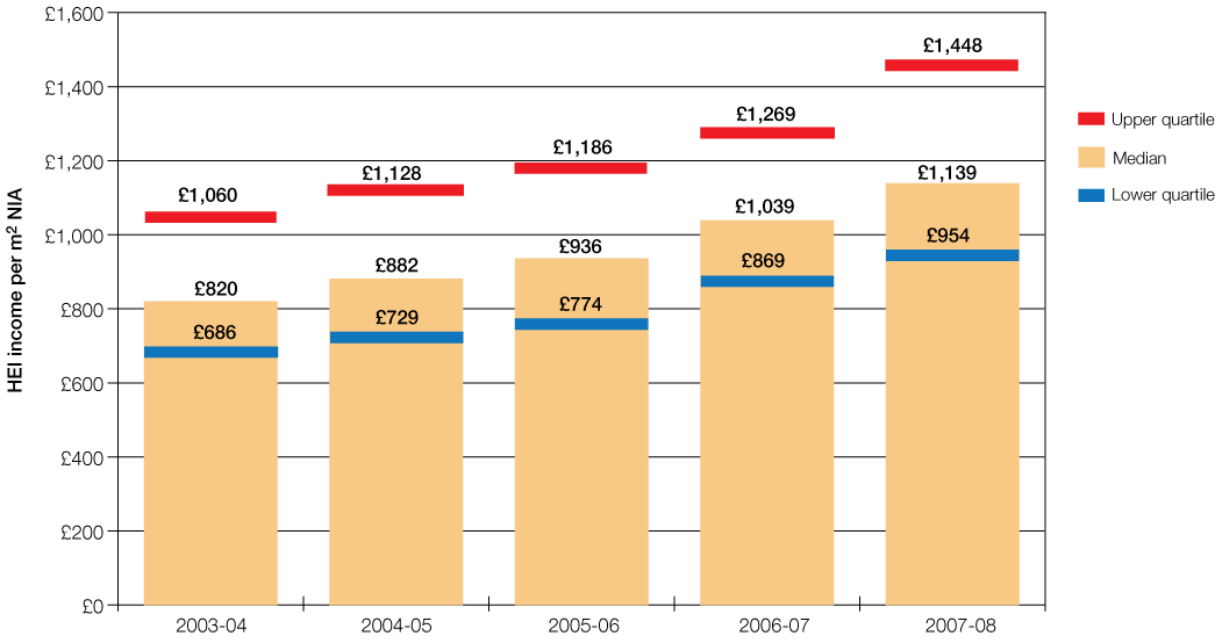
Figure 1 Indexed growth in UK FTE student population and gross internal area



Cost and income analysis

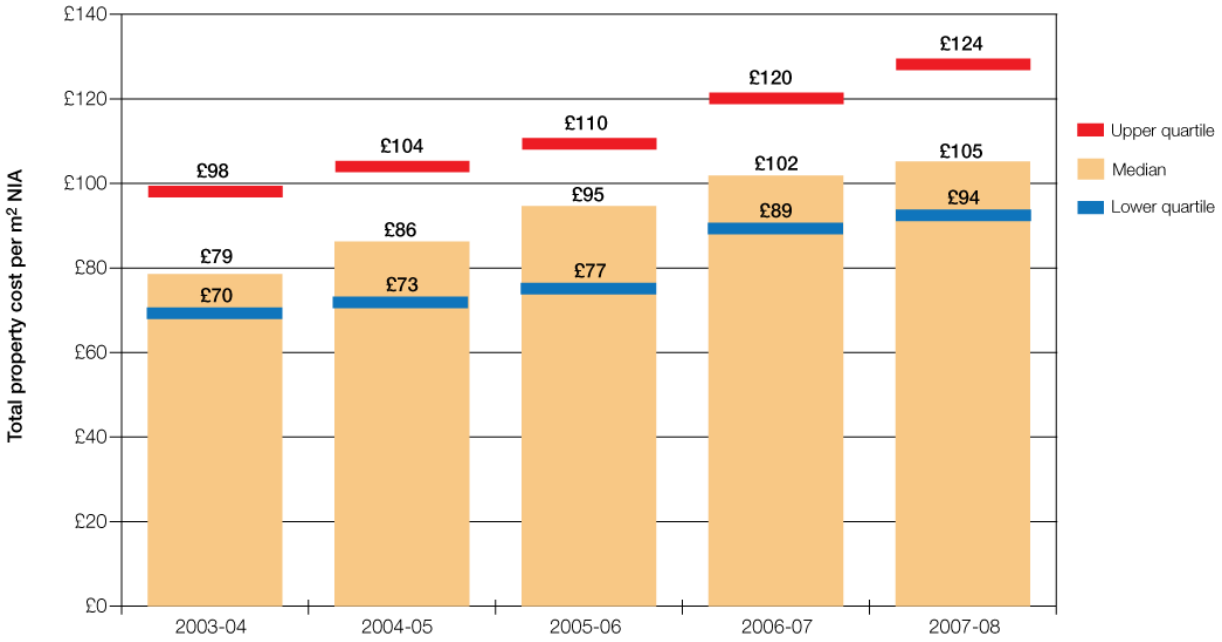
29. The level of income has increased over the five-year period to £23.3 billion for 2007-08, an increase of 41.6 per cent relative to 2003-04, with a corresponding increase in total property cost expenditure. Figure 2 illustrates how the income per m² of net space has risen year on year, together with the upper and lower quartile figures. These quartile results further emphasise the rising levels of income over time with both lower quartile and upper quartile values registering significant increases over the period.

Figure 2 UK HEI income per m² net internal area (140 institutions)



30. As income levels increased, revenue expenditure, as measured by total property costs, also steadily rose over the five-year period. When considered on a m² basis, as shown in Figure 3, these have increased 32.9 per cent across the UK from £79 per m² in 2003-04 to £105 per m² in 2007-08. In comparison with the more general measures of inflation over the period 2003-2008 the all-items retail price index (RPI) registered an increase of 18.5 per cent with the consumer price index (CPI) increasing 12.2 per cent. Total property costs as measured on a m^2 basis have therefore increased at a much greater rate than the more general measures of inflation, in part because of increased maintenance expenditure.

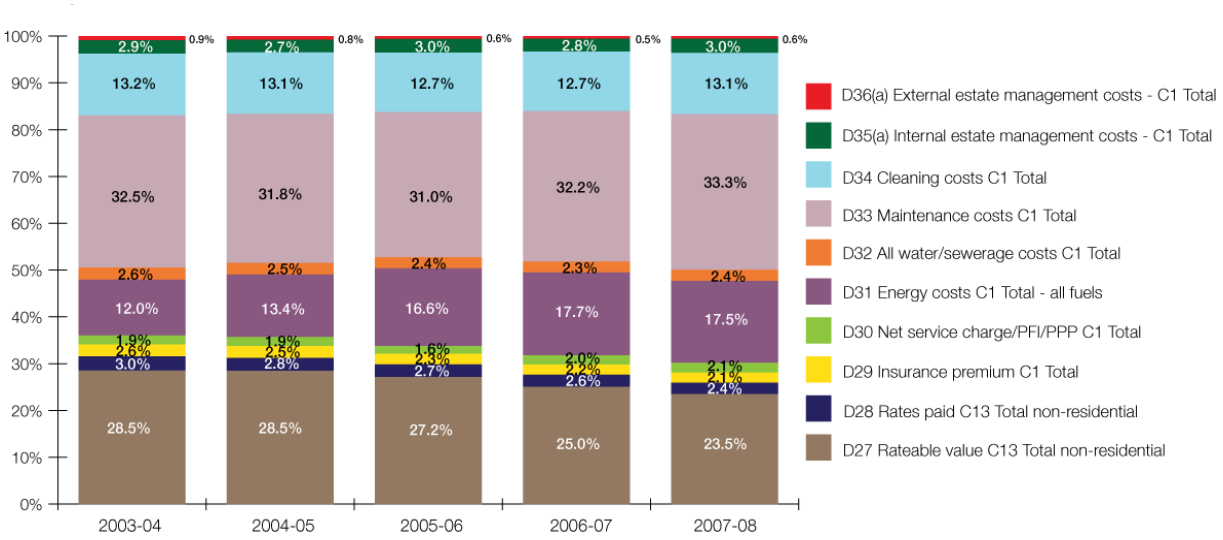
Figure 3 UK HEIs' total property costs per m² net internal area (125 institutions)



31. There has been minimal change in the inter-quartile range over this period which hints at costs within the sample being similarly variable across institutions: while costs have increased the variability has remained relatively consistent. Therefore while there is still variability across the different cost bases, these have remained consistent over the five years, which may be an indication of the geographical influence over costs as opposed to 'poor' and 'good' performing institutions. Scotland and England, at £104 and £105 per m² respectively, are spending more than institutions in Wales which operate at £96 per m².

32. The breakdown of total property cost over the five years is illustrated in Figure 4. The largest changes are reflected in the rateable value which, as a relative proportion of the overall costs, has fallen from 28.5 per cent in 2003-04 to 23.5 per cent in 2007-08. This is likely to reflect the impact of the five-year cyclical nature of valuations and one would expect this to increase when valuations are updated. Other noticeable shifts include the rise in the relative proportion of energy, which in 2007-08 accounted for 17.5 per cent of the total property cost – an increase of 5.5 percentage points relative to 2003-04.

Figure 4 UK total property cost breakdown (127 institutions)

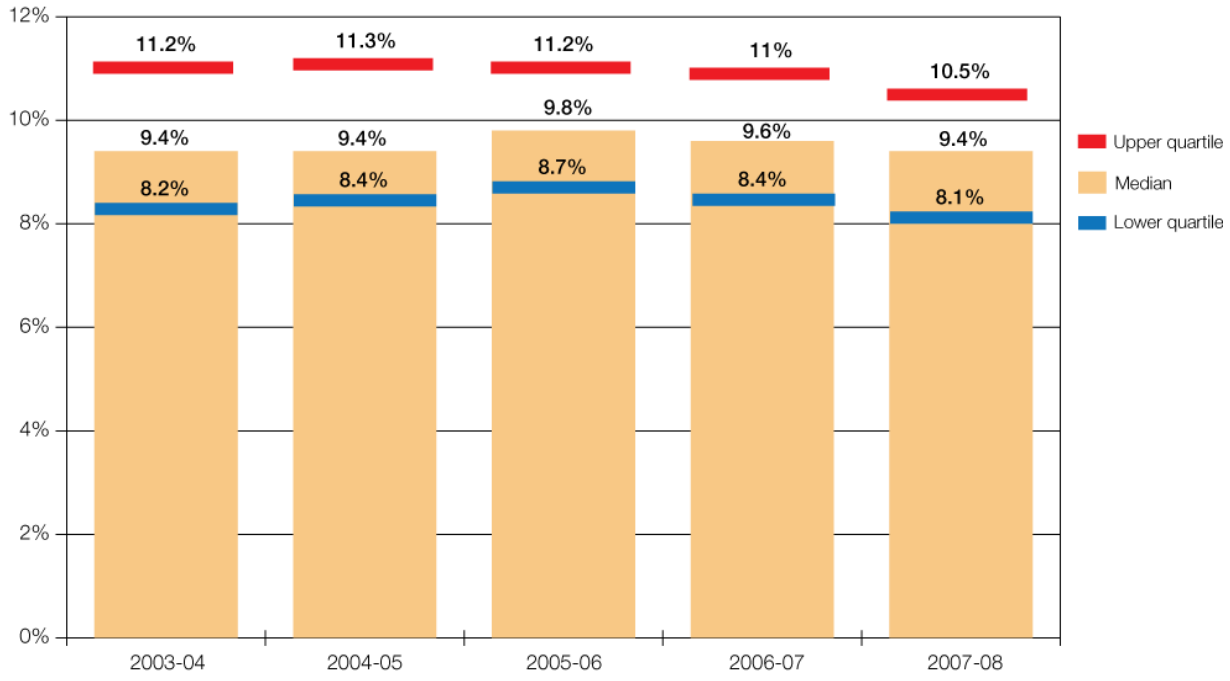


Note: Code references relate to the EMS definitions, available on the EMS web-site at www.opdems.ac.uk

33. The ratio of total property costs to income (shown in Figure 5) is an indicator of the potential for investment in the estate – the greater the percentage the higher the proportion the revenue expenditure forms as part of the overall income, with less income available for further improvements in the estate.

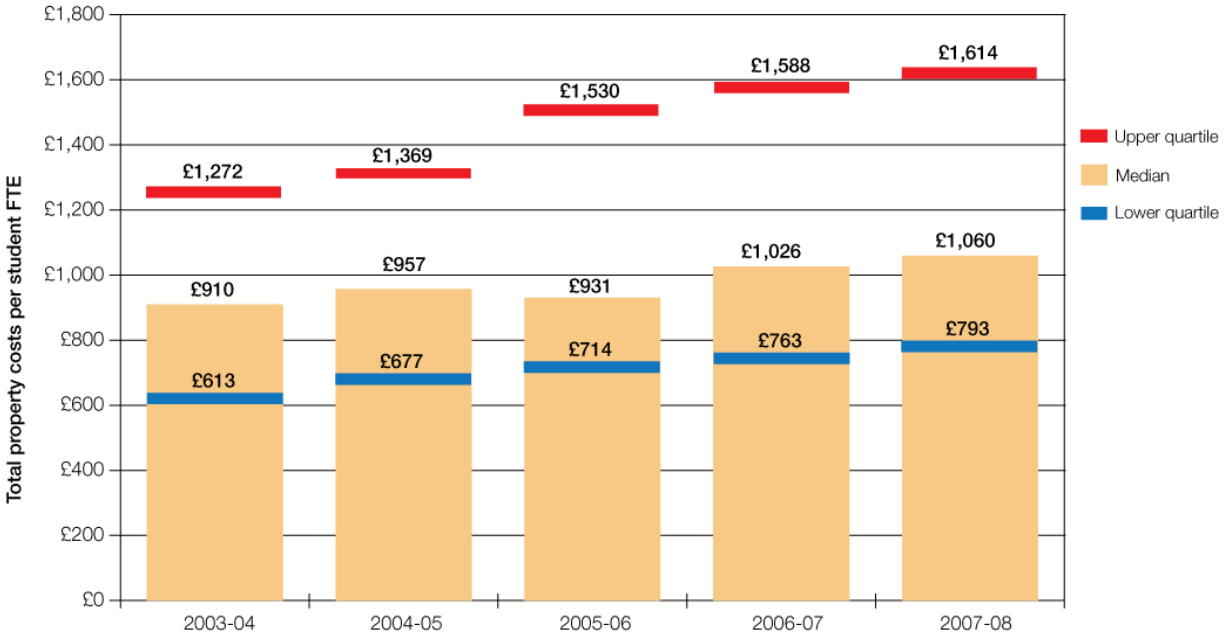
34. Between 2003-04 and 2007-08 the median has remained relatively consistent, the exception being 2005-06 which peaked at 9.8 per cent. This has since levelled off, returning to the 2003-04 levels of 9.4 per cent, the difference now being the narrowing of the quartile range. This indicates a convergence within the sample, implying an increasing consistency among the institutions in terms of the balance made between income and expenditure.

Figure 5 Ratio of total property costs to UK HEI income (128 institutions)



35. Total property costs per student (FTE) in the UK rose 16.5 per cent over the period 2003-04 to 2007-08 (Figure 6). This is below the RPI figure of 18.5 per cent which, on a per student FTE basis, would indicate that costs have been well managed across the sector.

Figure 6 UK total property costs per student FTE (126 institutions)



36. Backlog affordability (an expression of the number of times an institution's repair backlog is covered by its total income) demonstrates the institutions' ability to meet repair backlog requirements. A high score is preferable because this indicates that an institution is better able to meet its backlog requirements. A low score implies an exposure to risk. Figure 7 demonstrates that progress has been made since 2003-04 with the median score for all UK institutions increasing from 4.54 to 5.30. Total backlog affordability is now at the highest it has been in the last five years.

Figure 7 UK total backlog affordability score (78 institutions)

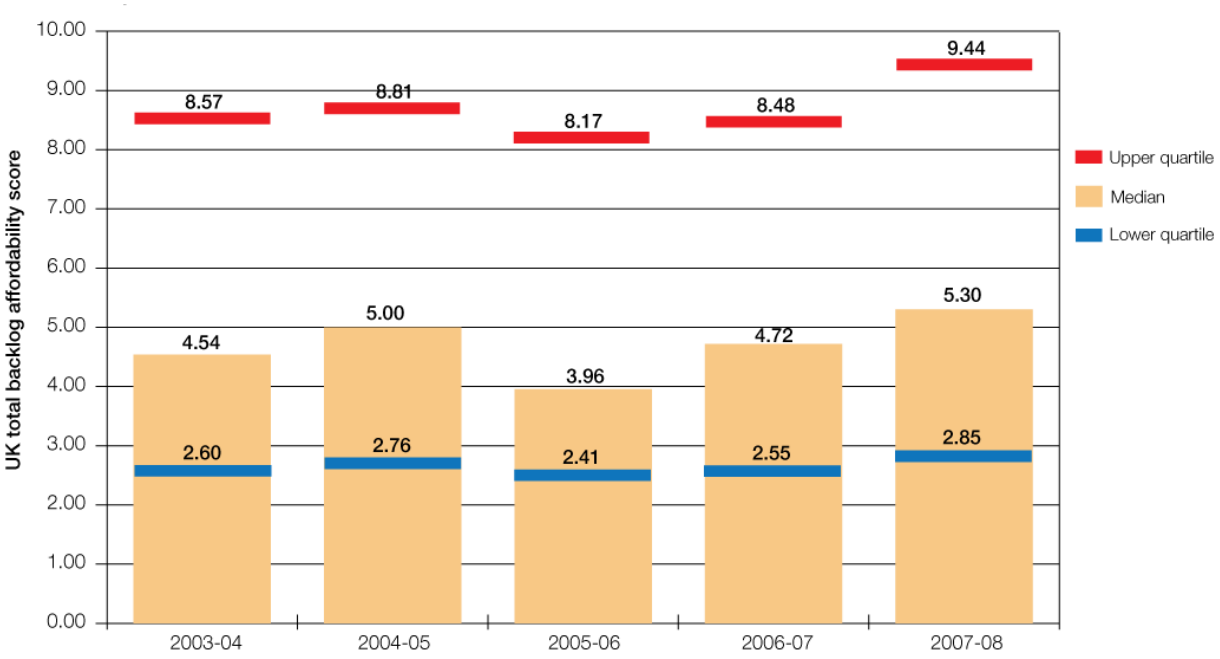


Table 1 Cost to income summary by country

HEI income (D1[†]) per m² NIA* (D12, C1) (£)	2003-04	2004-05	2005-06	2006-07	2007-08	Change 2003-04 to 2007-08
UK	820	882	936	1,039	1,139	38.9%
England	860	907	960	1,059	1,170	36.1%
Scotland	761	777	831	926	1,026	34.8%
Wales	643	697	749	966	1,092	69.8%
Total property costs (D26) per m² NIA* (D12, C1) (£)	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Change 2003-04 to 2007-08**
UK	79	86	95	102	105	32.9%
England	78	87	98	102	105	34.6%
Scotland	81	82	93	101	104	28.4%
Wales	70	71	80	90	96	37.1%
Ratio of total property costs (D26) to HEI income (D1, C1)	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Change 2003-04 to 2007-08**
UK	9.4%	9.4%	9.8%	9.6%	9.4%	-
England	9.4%	9.3%	9.8%	9.6%	9.3%	-1.1%
Scotland	10.4%	10.9%	10.0%	10.7%	10.1%	-2.9%
Wales	10.4%	9.6%	10.5%	9.4%	9.8%	-5.8%
Total property costs (D26) per student FTE (D4, C1) (£)	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Change 2003-04 to 2007-08**
UK	910	957	931	1,026	1,060	16.5%
England	811	887	882	983	992	22.3%
Scotland	1,179	1,176	1,345	1,447	1,447	22.7%
Wales	971	930	929	980	1,260	29.8%
Total backlog affordability score	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Change 2003-04 to 2007-08**
UK	4.54	5.0	3.96	4.72	5.30	16.7%
England	4.54	5.28	4.06	4.77	5.05	11.2%

Scotland	2.97	2.94	2.38	3.51	4.02	35.4%
Wales	7.60	7.23	4.84	5.06	5.47	-28.0%[4]

* Net internal area

† These codes relate to the EMS definitions which are available on the EMS web-site at www.opdems.ac.uk

Space management

37. Effective space management is a key driver in achieving cost efficiencies and helping to drive energy reductions. As identified in 'Sustainable Development in Higher Education: 2008 update to strategic statement and action plan' (Feb, 2009:19)[5]:

> 'Good space management not only benefits the environment, it also frees up resources that can be used for teaching and research.'

38. The report also comments on the findings of the UK Higher Education Space Management Group where it notes the importance of creating spaces that can be used for multiple activities as well as making the most of common spaces. Within this section of the EMS report we look to identify whether there is evidence that points to a shift/changing pattern in how space is used.

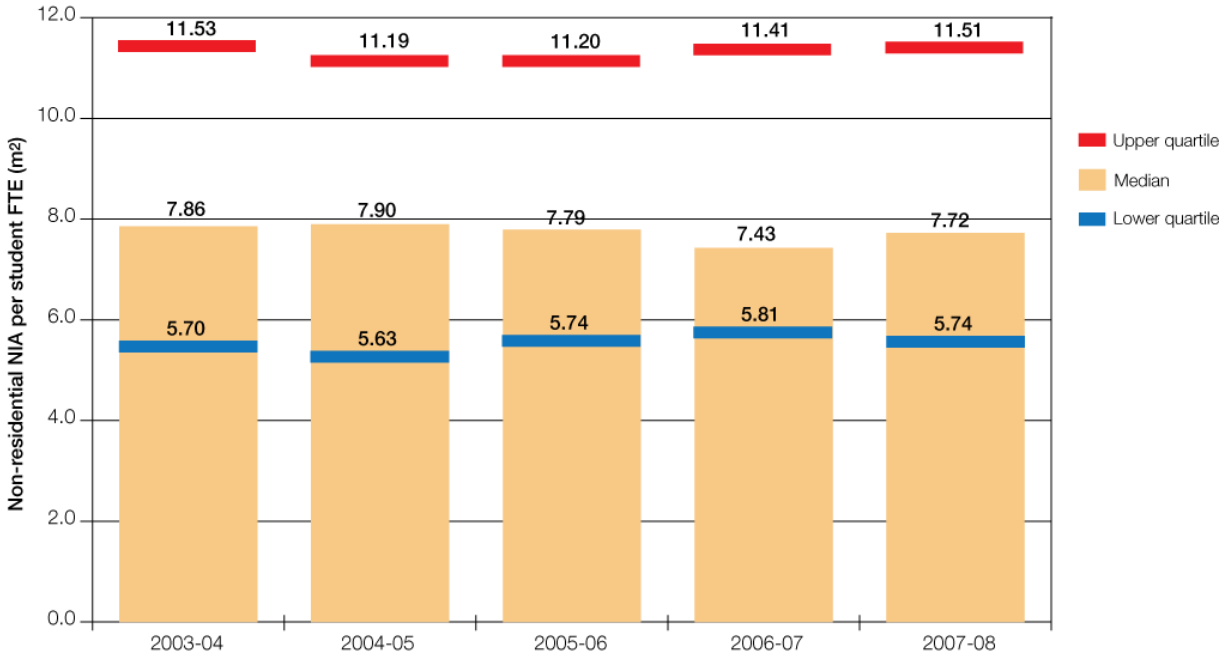
39. The size of the UK higher education (HE) estate increased approximately 6 per cent between 2003-04 and 2007-08, from 24.4 million m² to 25.9 million m² of gross internal area (GIA).

[4] The results for Wales are volatile due to variable response rates within a small sample.

[5] This document can be read at www.hefce.ac.uk under Publications.

40. For the UK, the median total amount of non-residential space per student FTE has remained relatively constant over the five-year period, despite the growth in FTE numbers outstripping the growth in space available. There has been a reduction from 7.9 m² per student in 2003-04 to 7.7 m² in 2007-08 (see Figure 8).

Figure 8 Total UK non-residential net internal area per student FTE (140 institutions)



41. Moreover the quartile boundaries indicate that the distribution of results has also remained steady. Potentially therefore there may be scope for improvement in space efficiency across the sector given the relatively minimal changes witnessed over the last five years, although whether targeting space efficiency at spaces occupied by students is the most effective or relevant is questionable.

42. The median academic space per student FTE (the combined teaching and research space allocation per student) already indicates that teaching space is reducing, recording its second lowest value over the five-year period at 4.3 m², down 3.8 per cent from the 2003-04 figure of 4.4m² (see Figure 9).

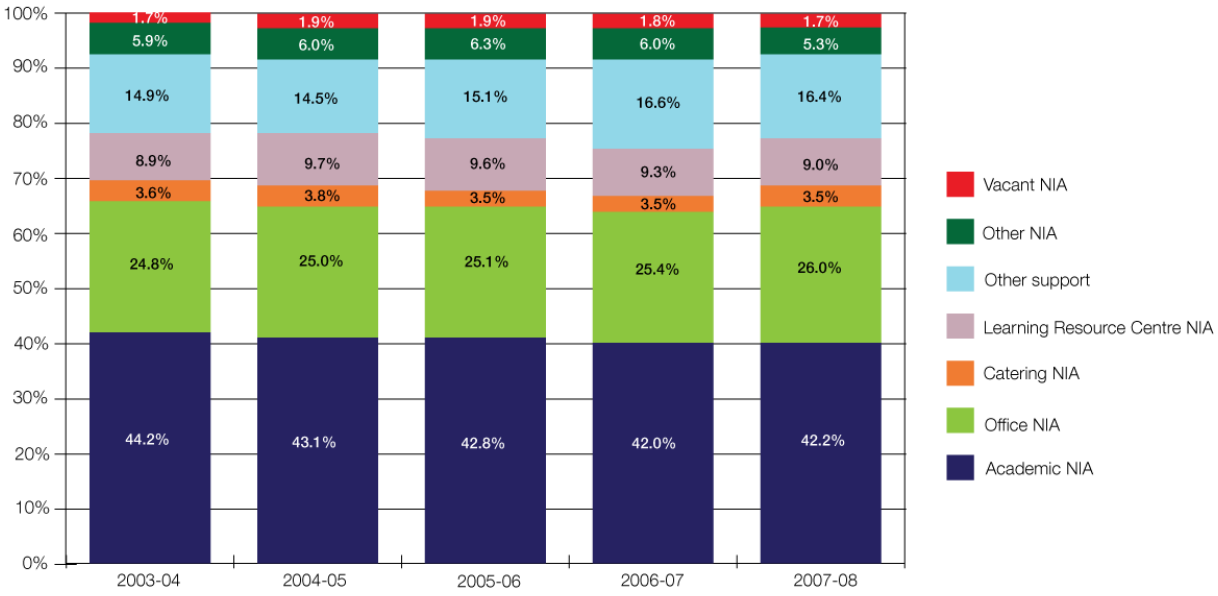
Figure 9 Median UK academic teaching space per student FTE (129 institutions)

43. The median amount of core teaching space per student FTE (teaching rooms, lecture theatres, seminar rooms, laboratories, stores, computing facilities and workshops used for teaching) has reduced by an even greater amount, down 9.7 per cent to 2.5 m². With core teaching space traditionally considered the principal space used for learning perhaps this overall reduction is an indication of a shift away from the more traditional approaches to teaching and a move towards more flexible spaces.

44. With reducing academic and core teaching spaces it is necessary to investigate the breakdown of the space in more detail to establish whether there is evidence of new flexible space emerging. This breakdown is shown in Figure 10.

45. The academic space (teaching and research) has seen a 2 per cent reduction from 44.2 per cent in 2003-04 to 42.2 per cent in 2007-08. At the same time, other support space has risen from 14.9 per cent to 16.4 per cent (increasing 1.5 per cent over five years). The classification of space under 'other' is relatively broad but these results may well be hinting that more flexible styles of learning are being adopted in the current space allocation.

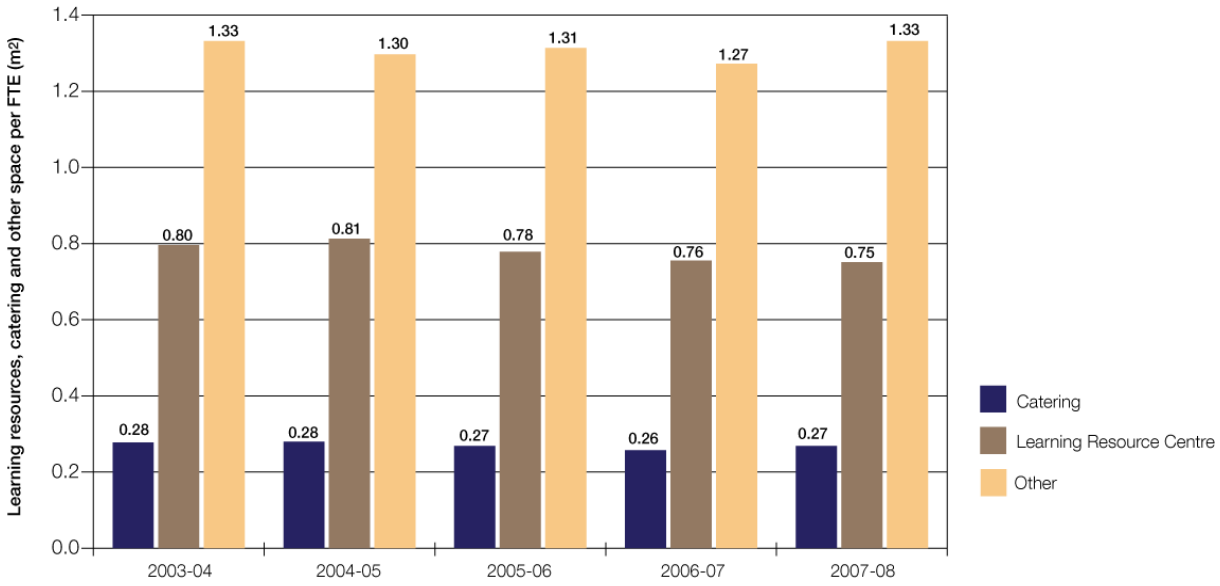
Figure 10 Breakdown of different space types (70 institutions)



46. By addressing spaces not currently counted as traditional core space and looking at areas where more flexible activities may be occurring – catering, learning resource and other support space – it is possible to identify whether any trends are emerging.

47. Increasing student numbers have put pressure on the learning resource space such that there has been a reduction from 0.8 m² to 0.75 m² per FTE (Figure 11). However, over the same five-year period the amount of catering space has remained relatively consistent at 0.27 m² per FTE and this may be an indication that the space has been closely guarded here in order to support new ways of learning – for example, cafeterias can double up as useful meeting areas for informal gatherings and knowledge sharing. Furthermore, the other support net internal area (NIA) – that is, that which is neither learning resource space nor catering space – has also remained steady at 1.33 m² per FTE over five years and it could be that here also space is being adopted for less formal learning.

Figure 11 Breakdown of learning resource, catering and other space per FTE (123 institutions)

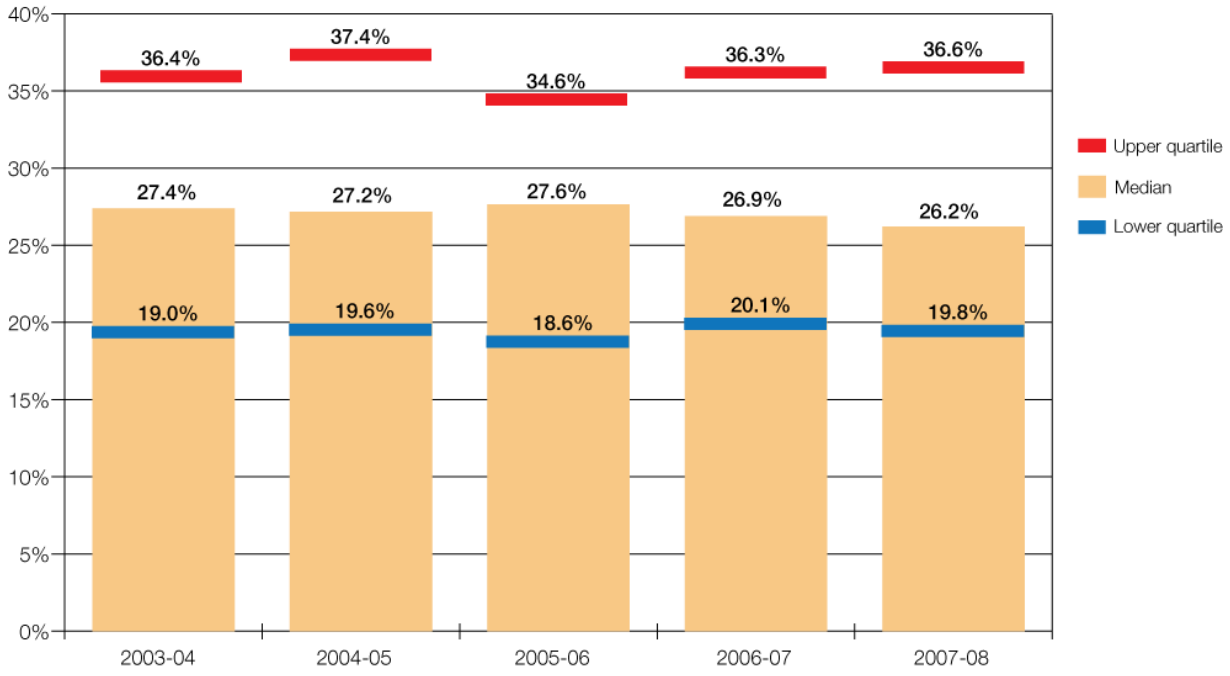


48. Investigating further the possibility of identifying that space considered flexible and how this may be captured, it is important to look at spaces that lend themselves to alternative uses and different ways of working. Areas such as cafeterias and learning resource centres are examples and it may be worth developing a set of data fields giving a detailed breakdown of these spaces in order to derive a greater level of transparency and enable understanding of the types of space in use.

49. The median utilisation rate of teaching space fell by 1.2 percentage points from 27.4 per cent in 2003-04 to 26.2 per cent in 2007-08 (Figure 12). While it is widely recognised that capturing utilisation rates is a difficult process the trend does indicate a reduction in the successful utilisation of teaching space.

50. Perhaps this is further evidence of the increasing use of flexible space – a rise in students and staff occupying more impromptu areas such as cafes and spaces other than the more traditional classrooms could explain the falling figures for utilisation.

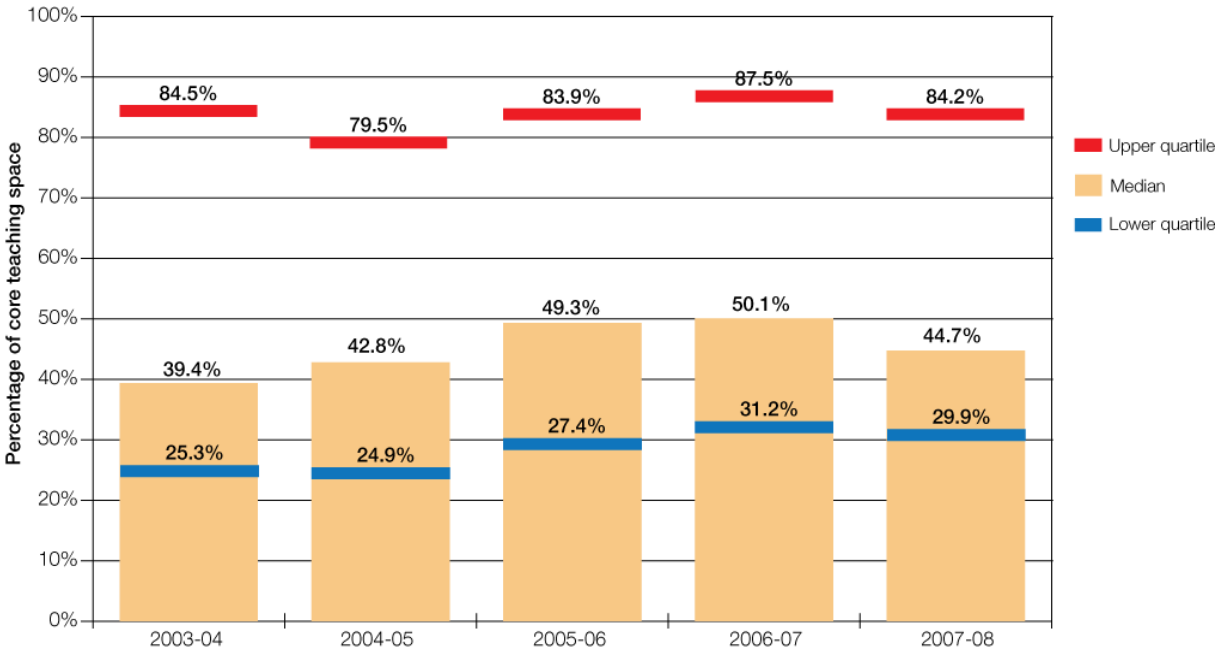
Figure 12 Median utilisation rate – UK teaching space (79 institutions)



51. As Figure 13 shows, in 2007-08 only 44.7 per cent of the core teaching space was identified as being monitored from an occupancy and frequency perspective, which begs the questions: what is happening to the remaining 55 per cent and why is it not being measured? This may be further evidence of an increasing proportion of space being used more flexibly; that is to say, space that cannot be monitored precisely because it does not fit within the usual timetabled rooms traditionally associated with teaching.

52. The trend indicates a move away from the previous pattern of increasing measurement of utilisation.

Figure 13 Occupancy/frequency rate coverage as a percentage of core teaching space (85 institutions)



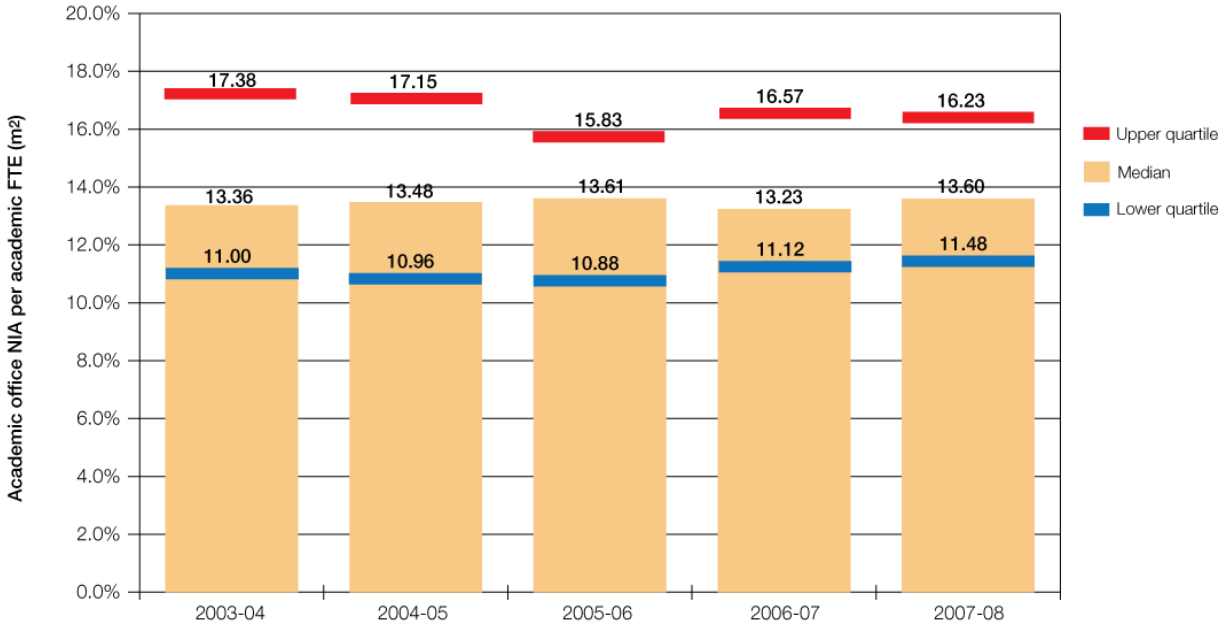
53. With a falling utilisation rate, reduction in occupancy/frequency rate coverage and an increase in the levels of other support space, individually these changes may not be considered too significant. But perhaps as a collective set of metrics, these are hinting at initial evidence of a move to more flexible ways of learning[6].

[6] Information on learning space design and development has been assembled by JISC at www.jiscinfonet.ac.uk/infokits/learning-space-design

54. Figure 14 illustrates the five-year trend of academic office space per staff member FTE and indicates an increase of 1.8 per cent overall. The generous space allocations afforded have been touched on in previous EMS annual reports and it would seem that there is still potential for greater space efficiencies.

55. Despite this increase, however, the positive signs are the reduction in variability across the distribution of the sector. The last five years has seen a reduction in the upper quartile figure by 1.2 m² per office staff member, while the gap between the lower and upper quartiles has reduced from 6.38 m² to 4.75 m². So although the space allocation still appears generous, the sector is converging to a more consistent level.

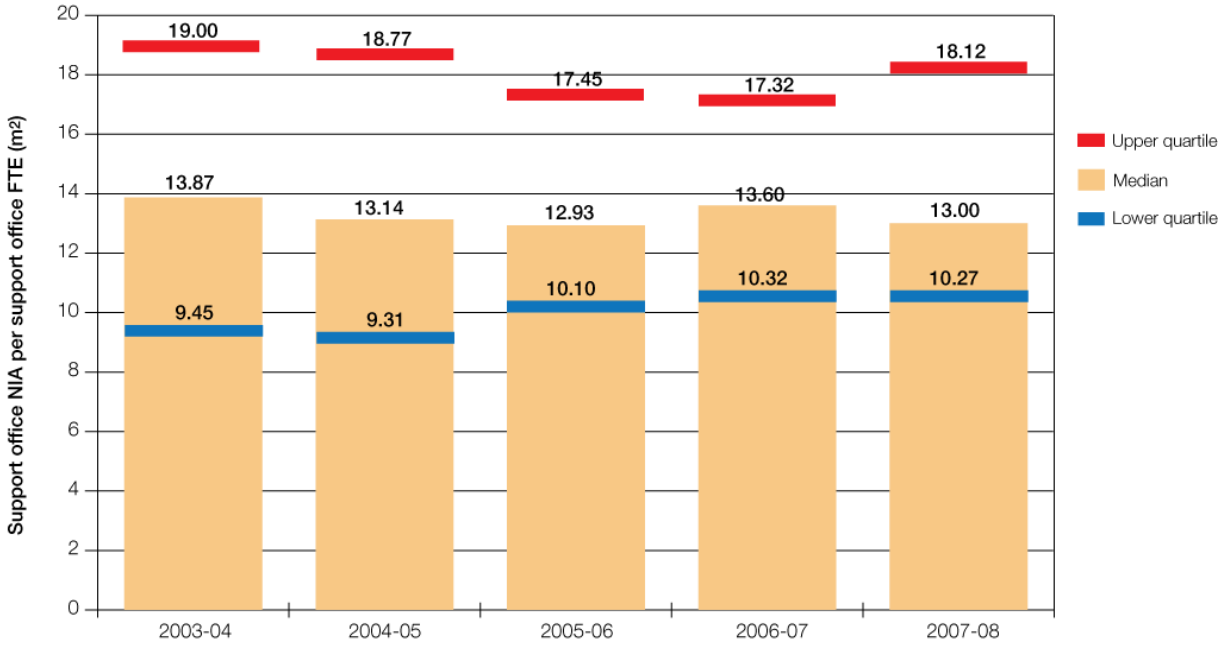
Figure 14 Academic office space per academic staff FTE (108 institutions)



56. In contrast support office NIA per support office staff FTE, shown in Figure 15 demonstrates an overall reduction over the same period. For 2007-08 the allocated space per support office staff was 13 m², down from the 2003-04 figure of 13.87 m², a reduction of 6.3 per cent. This is one of the areas therefore where space efficiencies have been derived.

57. While it may be that these spaces are not used solely for single person occupation and these may support student activities for contrast, the Office of Government Commerce, based on an IPD report, recommends an office space standard of 12 m² per FTE across the central government office estate. Figure 16 includes some additional office space density comparisons and indicates it is likely that there is further room for improvements to be achieved.

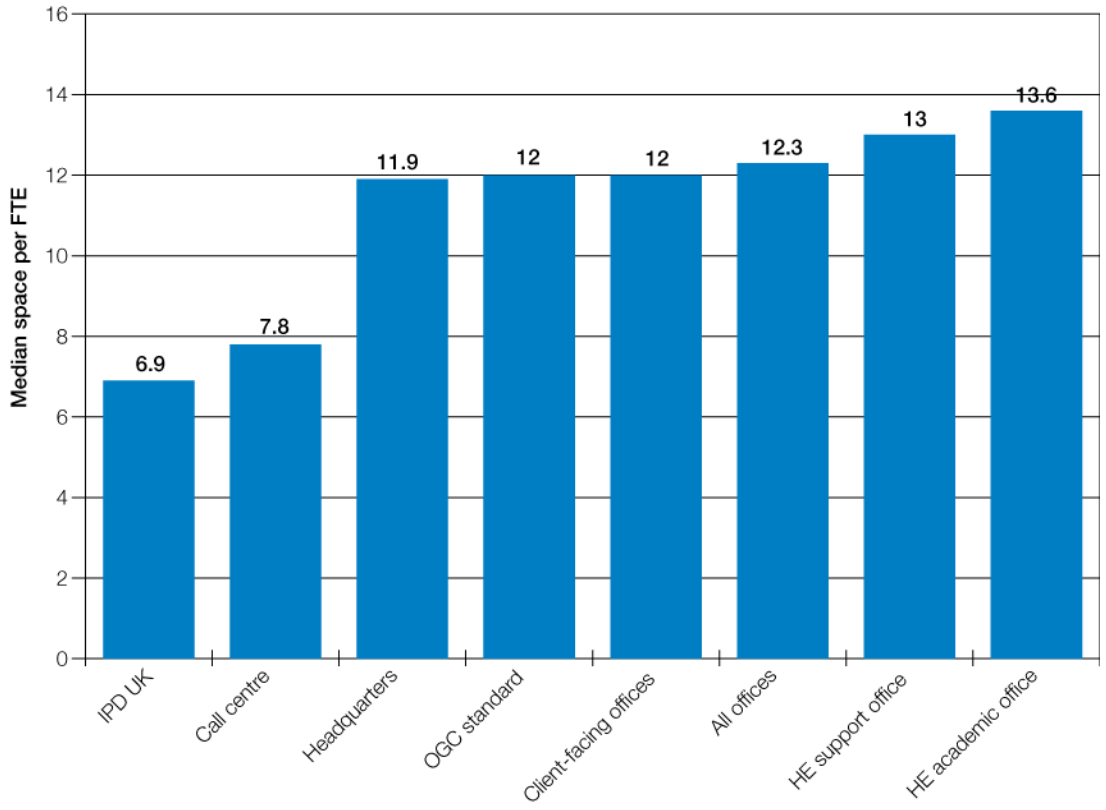
Figure 15 Support office space per support office staff FTE (109 institutions)



58. Figure 16 demonstrates that although improvements in efficiency are being achieved, there is still room for improvement. Moreover, the benchmarks in figure 16, for purely office buildings, will also contain spaces such as library, social and catering spaces not commonly included in HE office submissions, because these are collected separately. On account of this, HE office space per FTE may well be approaching an equivalent figure closer to 20m^2 per FTE.

59. However, the cost associated with re-modelling the space to achieve improved efficiencies can be considerable and potentially affect the ability to achieve improvements.

Figure 16 Different sector benchmarks for office space allocation



(Sources: IPD Occupiers Corporate Real Estate Trends 2008 and EMS Statistics 2007-2008)

Table 2 – Space management by country

Total non-residential NIA m² (D12) per student FTE	2003-04	2004-05	2005-06	2006-07	2007-08	Change 2003-04 to 2007-08
UK	7.9	7.9	7.8	7.4	7.7	-2.5%
England	7.3	7.4	6.9	6.8	6.9	-5.5%
Scotland	12.1	11.7	12.5	12.2	12.0	-0.8%
Wales	8.9	8.7	8.6	7.8	7.9	-11.2%

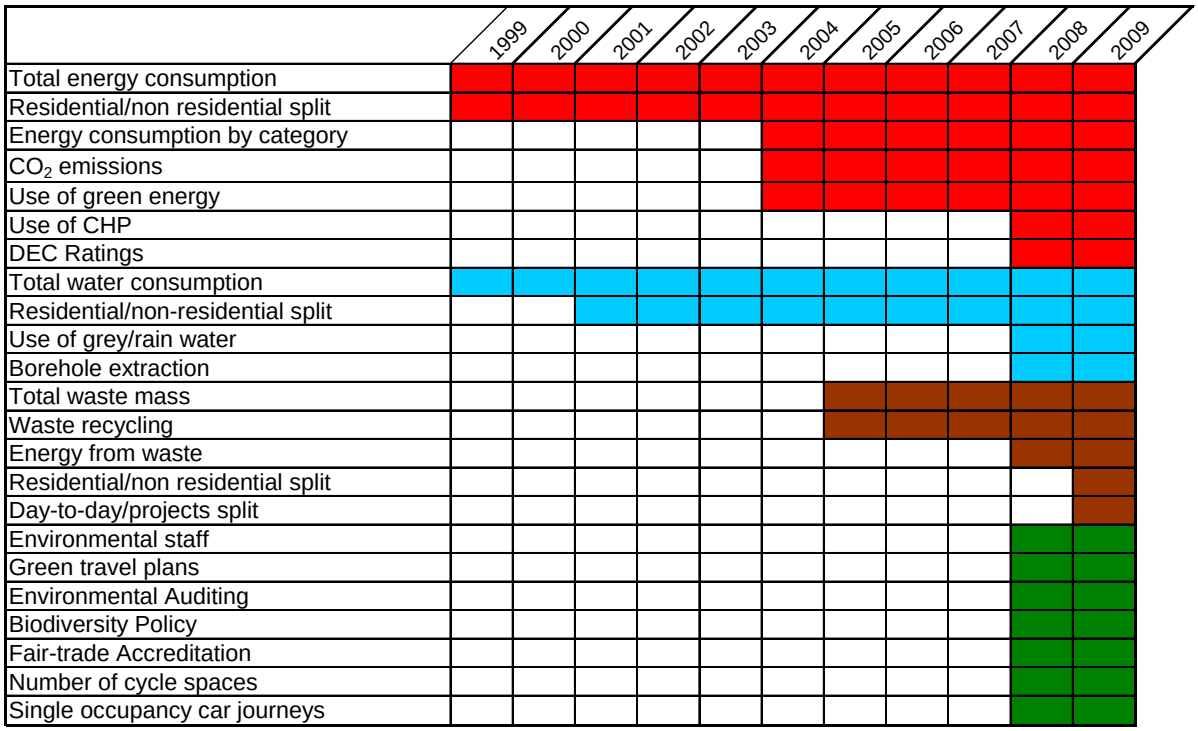
Academic space m² (D12, C4 + C7) per student FTE (D4)	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Change 2003-04 to 2007-08**
UK	4.4	4.5	4.3	4.1	4.3	-2.3%
England	4.2	4.1	3.9	3.9	4.1	-2.4%
Scotland	7.2	7.4	8.3	7.1	7.2	-
Wales	5.3	4.8	5.1	4.6	4.4	-17%
Core teaching space m² (D12, C3) per taught student FTE	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Change 2003-04 to 2007-08**
UK	2.8	2.7	2.5	2.6	2.5	-10.7%
England	2.6	2.5	2.5	2.5	2.4	-7.7%
Scotland	3.2	3.2	3.3	2.9	3.0	-6.3%
Wales	3.7	3.5	3.3	3.1	2.9	-21.6%
Utilisation rate – teaching space	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Change 2003-04 to 2007-08**
UK	27.4%	27.2%	27.6%	26.9%	26.2%	-4.4%
England	30.0%	28.7%	29.6%	29.3%	28.4%	-5.3%
Scotland	24.2%	22.9%	21.3%	24.5%	25.0%	3.3%
Wales	20.9%	24.0%	24.9%	22.2%	24.9%	19.1%
Academic office NIA m² per academic staff FTE	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Change 2003-04 to 2007-08**
UK	13.4	13.5	13.6	13.2	13.6	1.5%
England	13.6	13.5	13.5	13.1	13.4	-1.5%
Scotland	13.8	14.7	14.8	13.6	13.8	-
Wales	12.7	12.4	14.1	15.1	15.6	22.8%

Support office NIA m² per support office staff FTE	2003-04	2004-05	2005-06	2006-07	2007-08	Change 2003-04 to 2007-08
UK	13.9	13.1	12.9	13.6	13.0	-6.5%
England	14.5	13.5	12.7	13.5	13.1	-9.7%
Scotland	11.9	12.1	12.8	14.0	11.8	-0.8%
Wales	11.6	8.4	11.5	12.8	12.4	6.9%

Environmental sustainability

60. Figure 17 illustrates the increase over the last 10 years in the level of environmental information captured.

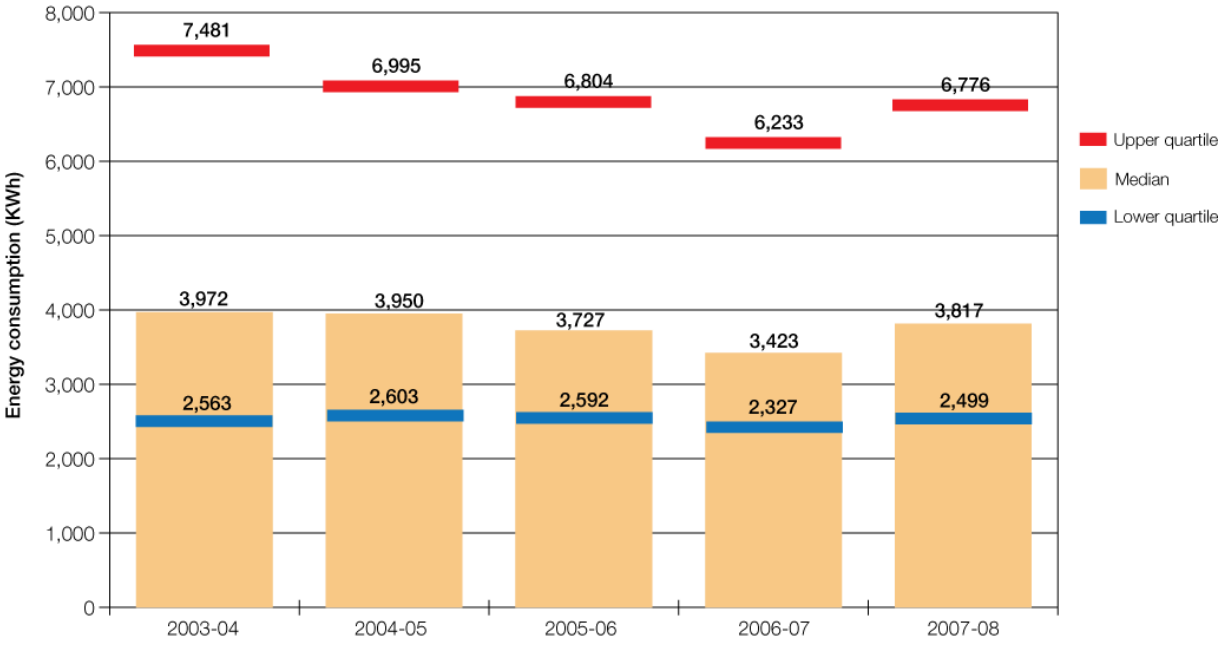
Figure 17 Environmental metrics captured



61. Energy consumption per student FTE fell 3.9 per cent between 2003-04 and 2007-08 (see Figure 18). Up until 2006-07 there had been a steady decrease in the energy consumption per FTE reaching a low of 3,423 kWh per student FTE. For 2007-08 however this increased once more, although encouragingly the upper and lower quartiles registered the second lowest values for the five-year period. It is a concern, however, that energy consumption levels have risen and this warrants further investigation. For example, energy consumption figures from one year to the

next are affected by the weather and in particular temperature variations; it is likely that EMS data could be adjusted for this.

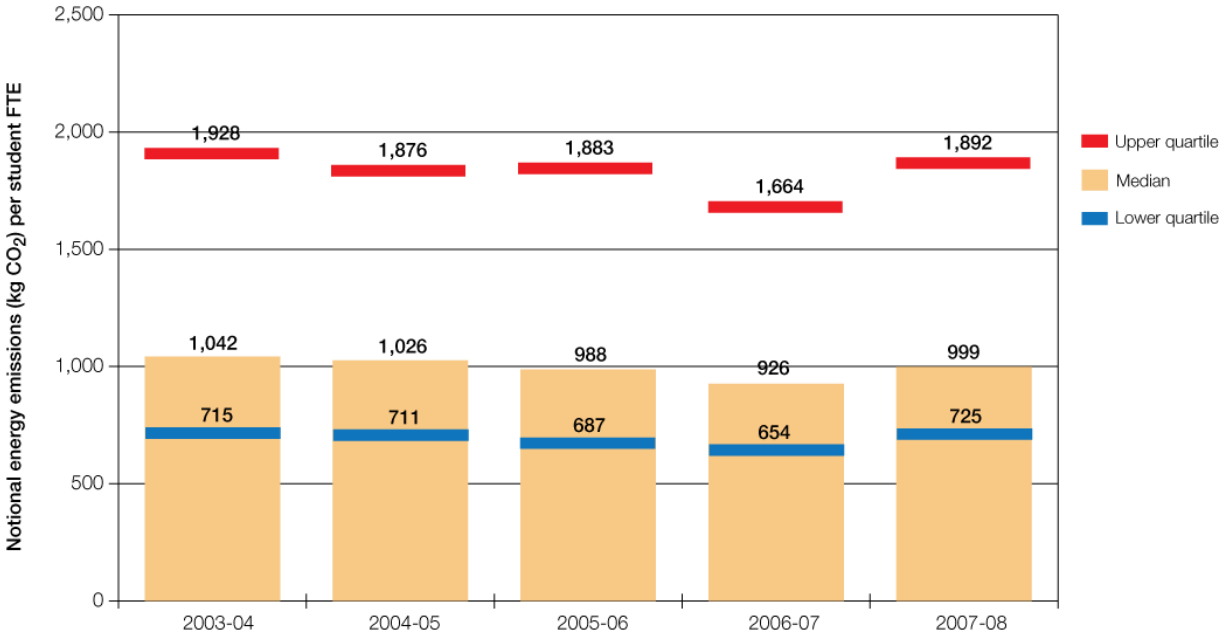
Figure 18 Median UK energy consumption per student FTE (126 institutions)



62. Notional energy emissions per FTE follow the overall energy consumption trend, with a reduction in overall emissions per FTE witnessed over the five-year period, down 4.1 per cent relative to 2003-04 (see Figure 19). Once again, however, the overall reduction is minimised by the year-on-year increase relative to 2006-07 when figures increased 7.8 per cent.

63. Reducing the level of carbon emissions will involve significant investment.

Figure 19 UK Notional energy emissions per FTE (115 institutions)

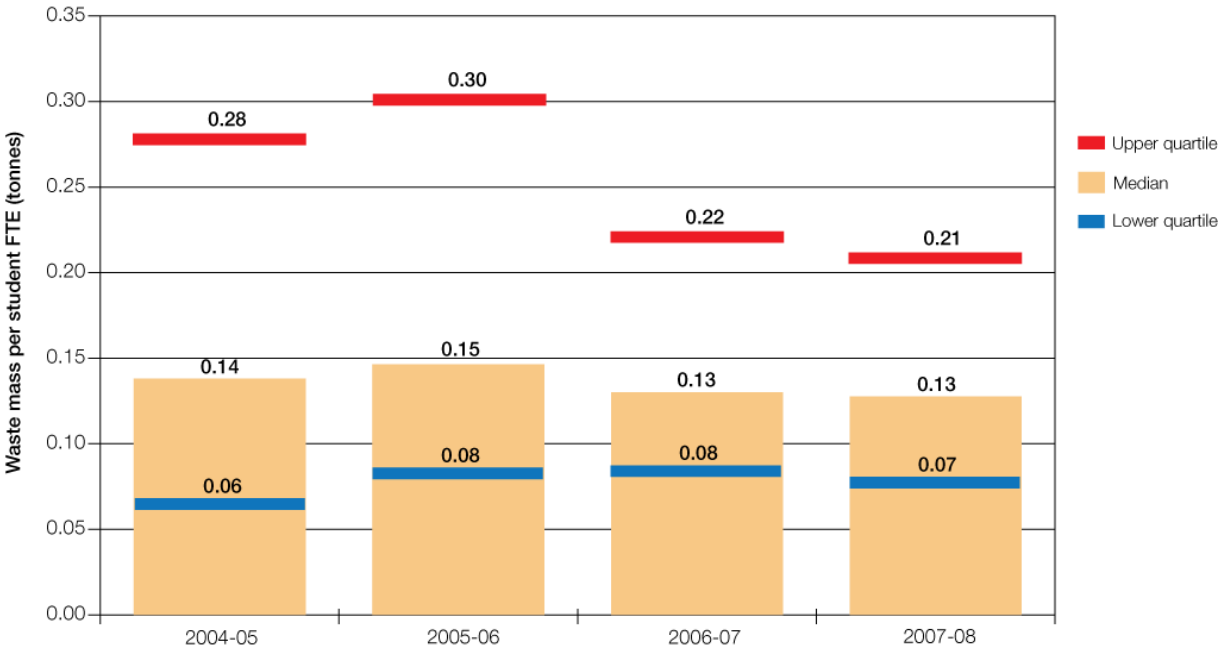


64. Median water consumption per student FTE, shown in Figure 20, has fallen by 5.1 per cent from 12.57 m³ to 11.93 m³. The distribution of results also provides upper and lower quartiles at their lowest for the last five years, demonstrating that the sector is making progress in reducing consumption levels per student FTE. The number of institutions recording the use of grey/rain water increased from 11 in 2006-07 to 18 in 2007-08.

Figure 20 UK water consumption per student FTE (119 institutions)

65. The variability of waste mass (tonnes) per student FTE has reduced dramatically over the five-year period, as shown in Figure 21. While the median has fallen 7.1 per cent from 0.14 tonnes to 0.13 tonnes, the upper quartile values have also fallen from 0.28 tonnes to 0.21 tonnes. Behaviour change has had a significant impact in contributing to a reduction in these waste metrics. Successful campaigns at individual institutions are combining with rising awareness about the importance of minimising waste.

Figure 21 UK waste mass per student FTE (80 institutions)



66. As total waste levels per student FTE have reduced, the median percentage of waste recycled in the HE sector has increased from 12.7 per cent in 2003-04 to 26.6 per cent for 2007-08 (Figure 22). The percentage of waste handled by UK local authorities that is recycled (including composted waste) increased from 31 per cent in 2006-07 to 34.5 per cent in 2007-08. This indicates that there is room for further improvement in the HE sector although the progress already made should not be underestimated.

Figure 22 Proportion of waste recycled (77 institutions)

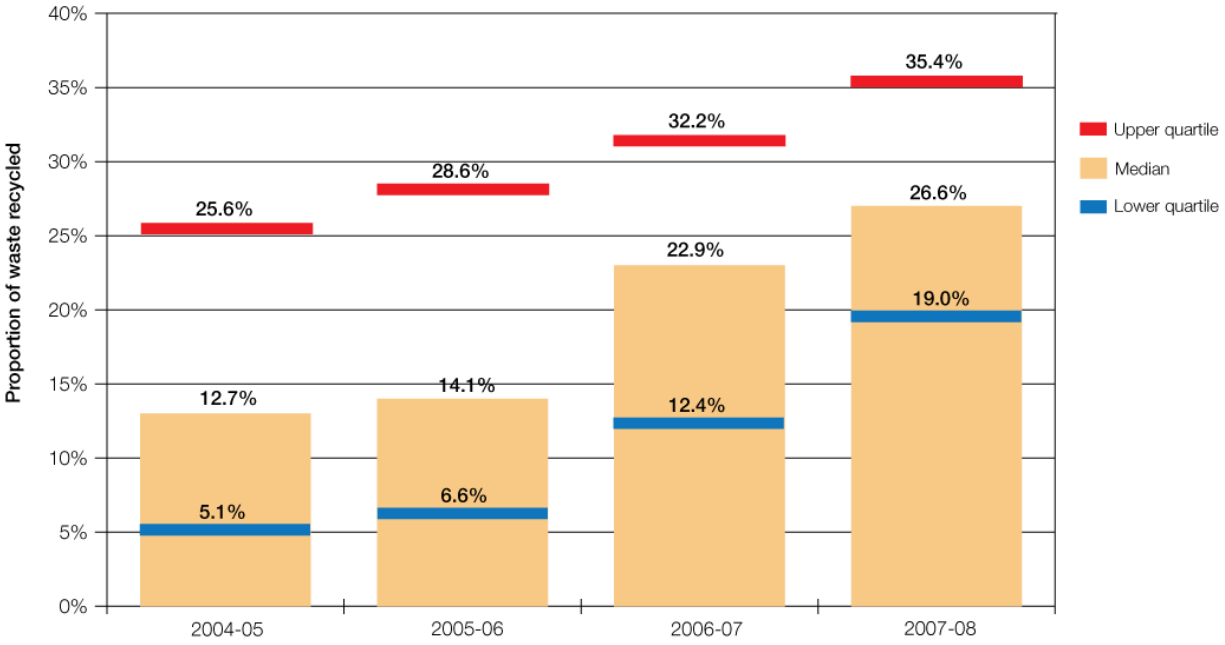


Table 3 Environmental summary by country

Energy consumption kWh (D38A) per student FTE (D4, C1)	2003-04	2004-05	2005-06	2006-07	2007-08	Change 2003-04 to 2007-08
UK	3,972	3,950	3,727	3,423	3,817	-3.9%
England	3,397	3,454	3,497	3,209	3,223	-5.1%
Scotland	6,593	6,300	6,467	5,617	6,264	-5.0%
Wales	5,599	4,429	4,365	4,435	4,585	-18.1%

Notional energy emissions kg CO_2 (D38C) per student FTE (D4) C1	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Change 2003-04 to 2007-08**
UK	1,042	1,026	988	926	999	-4.1%
England	915	979	917	846	871	-4.8%
Scotland	1,804	1,658	1,658	1,426	1,554	-13.9%
Wales	1,339	1,123	1,294	1,003	943	-29.6%
Water consumption m³ (D38B) per m² GIA (D11, C1)	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Change 2003-04 to 2007-08**
UK	0.87	0.87	0.92	0.92	0.87	-
England	0.88	0.89	0.96	0.92	0.88	-
Scotland	0.86	0.85	0.93	0.92	0.87	1.2%
Wales	0.91	0.84	0.77	0.78	0.72	-20.9%
Water consumption m³ (D38B) per student FTE (D4, C1)	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Change 2003-04 to 2007-08**
UK	12.6	12.3	12.0	11.8	11.9	-5.6%
England	10.3	11.3	11.3	11.6	11.5	11.7%
Scotland	19.1	17.8	19.0	15.7	15.4	-19.4%
Wales	14.7	12.4	11.2	10.6	11.6	-21.1%
Recycled waste proportion	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Change 2004-05 to 2007-08**
UK		12.7%	14.1%	22.9%	26.6%	109.5%
England		12.7%	14.0%	25.9%	28.8%	126.8%
Scotland		15.0%	14.6%	13.7%	24.3%	62%
Wales		14.4%	17.3%	22.9%	31.6%	119.4%

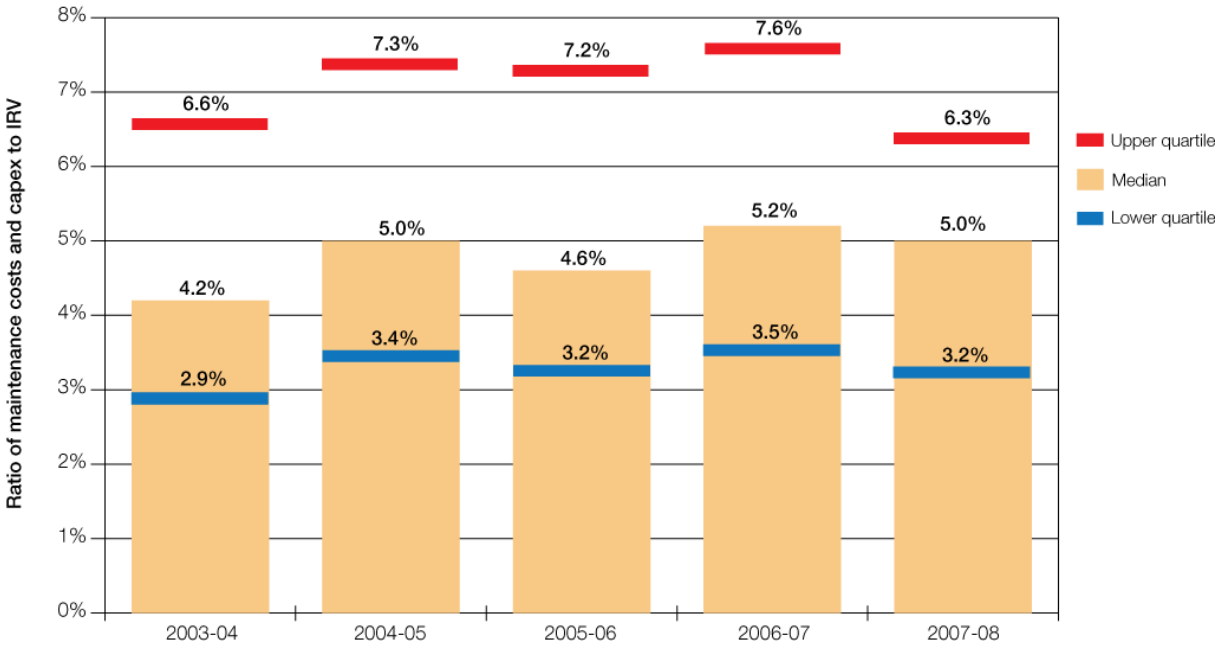
Condition and repair

67. Maintaining or improving the quality of the HE estate, in the context of increasing student numbers and increasing customer expectations, continued to present a challenge to institutions in 2007-08.

68. Capital expenditure across the sector on estates increased from £2.18 billion in 2006-07 to £2.33 billion in 2007-08. The estimated total cost of backlog maintenance was £5.1 billion in 2007-08.

69. The 2007 EMS annual report (HEFCE 2008/41) referred to the recommended ratio[7] of 4.5 per cent for combined capital and revenue expenditure to Insurance Replacement Value (IRV). The median of 5 per cent, shown in Figure 23, indicates that once again investment in the estate is above the level recommended and as a result condition and functional suitability are increasing.

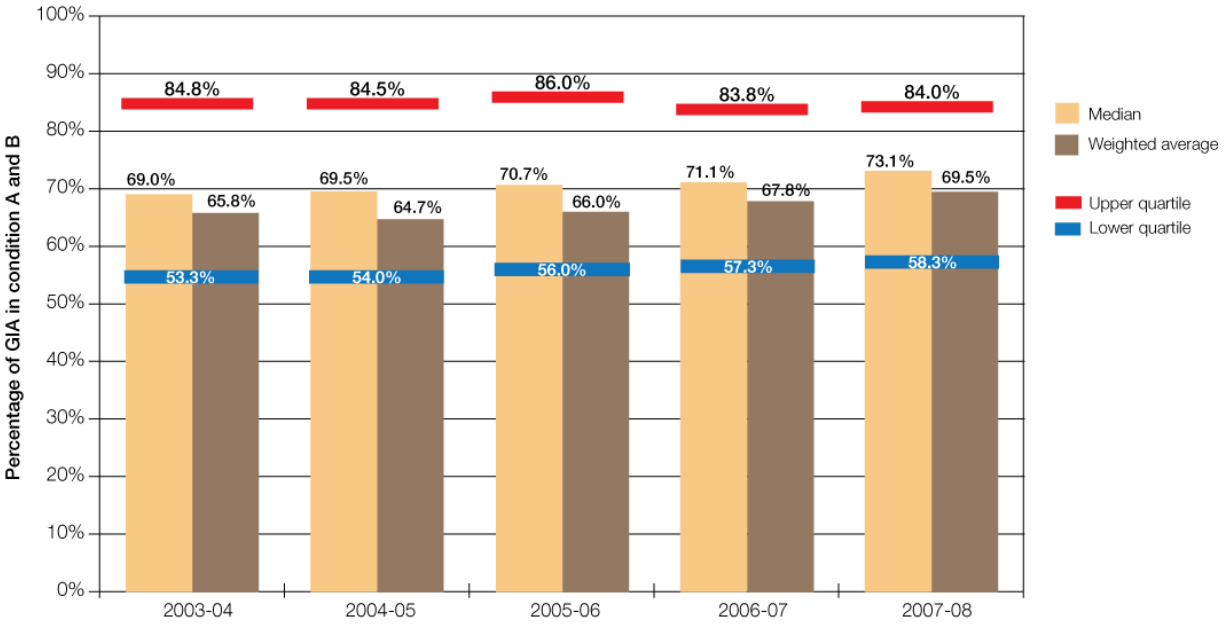
Figure 23 Ratio of maintenance costs and capital expenditure to IRV (104 institutions)



[7] This figure was recommended in 'Future needs for capital funding in higher education: A review of the future of SRIF and learning and teaching capital', a report to HEFCE by JM Consulting (September 2006) which can be read at www.hefce.ac.uk under Publications/Research & evaluation.

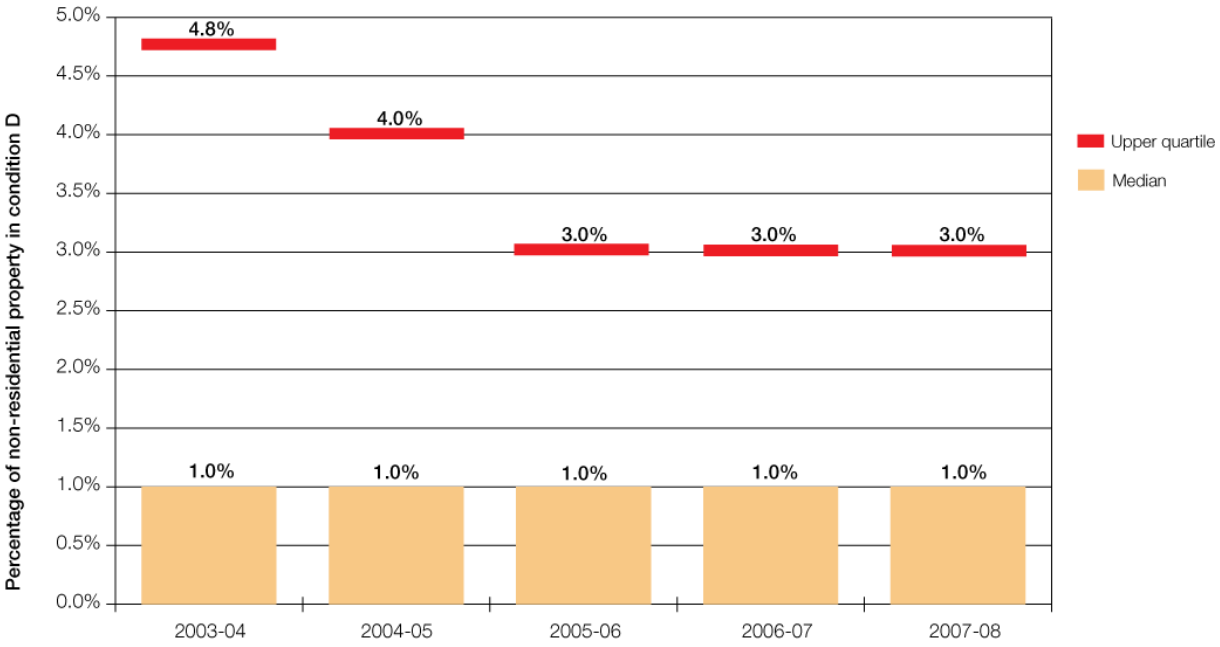
70. One hundred and thirty-four institutions provided condition data covering the last five years and there has been a marked improvement in the percentage of non-residential GIA in condition A and B (D20a). The median value has risen from 69 per cent in 2003-04 to 73 per cent in 2007-08 (see Figure 24). This is also true when considering the condition as weighted by GIA, with the amount of space in good condition increasing by 3.7 per cent from 65.8 per cent to 69.5 per cent between 2003-04 and 2007-08. Condition is becoming more consistent across the estate.

Figure 24 UK median building condition – percentage of GIA in condition A and B non-residential (134 institutions)



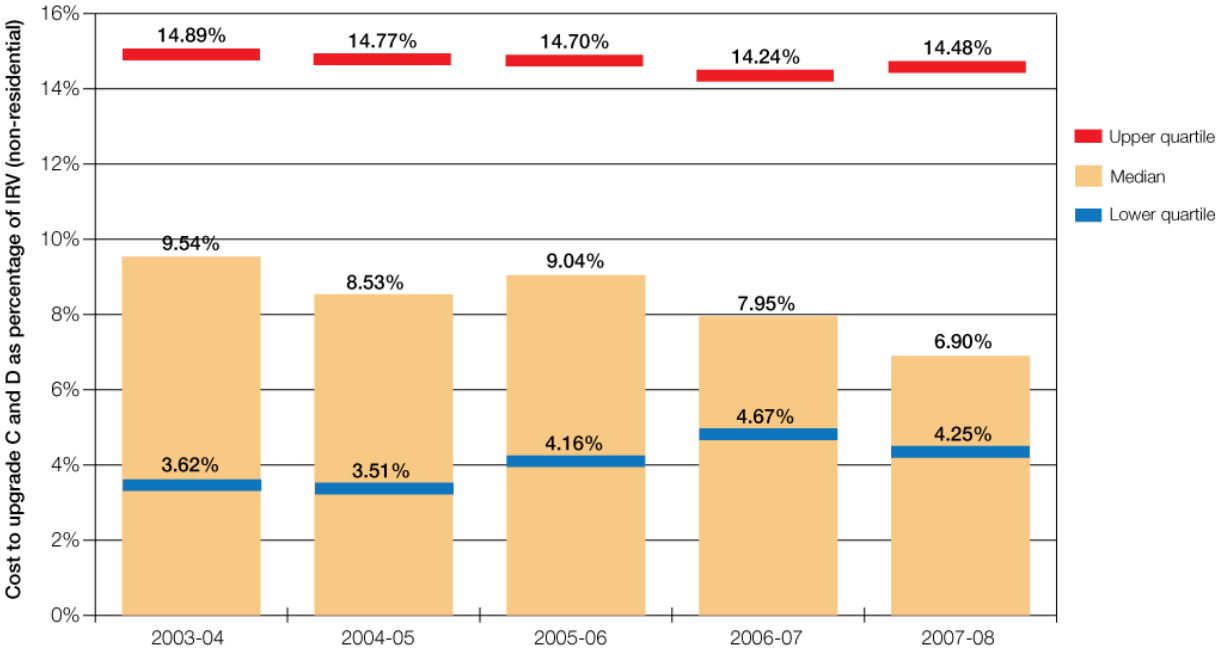
71. The percentage of non-residential space in condition category D (that is, in the lowest of the four categories used by EMS to describe the condition of space) has remained constant over the five-year period at 1 per cent (Figure 25), maintaining the low level of risk from buildings that are either 'inoperable or at serious risk of major failure or breakdown'. Furthermore, the upper quartile value has dropped from 4.8 per cent to 3.0 per cent which shows that, across the sample, institutions are recording a lower percentage of space in condition category D, further illustrating the improving condition of the estate.

Figure 25 UK median building condition – percentage of GIA in condition D non-residential (134 institutions)



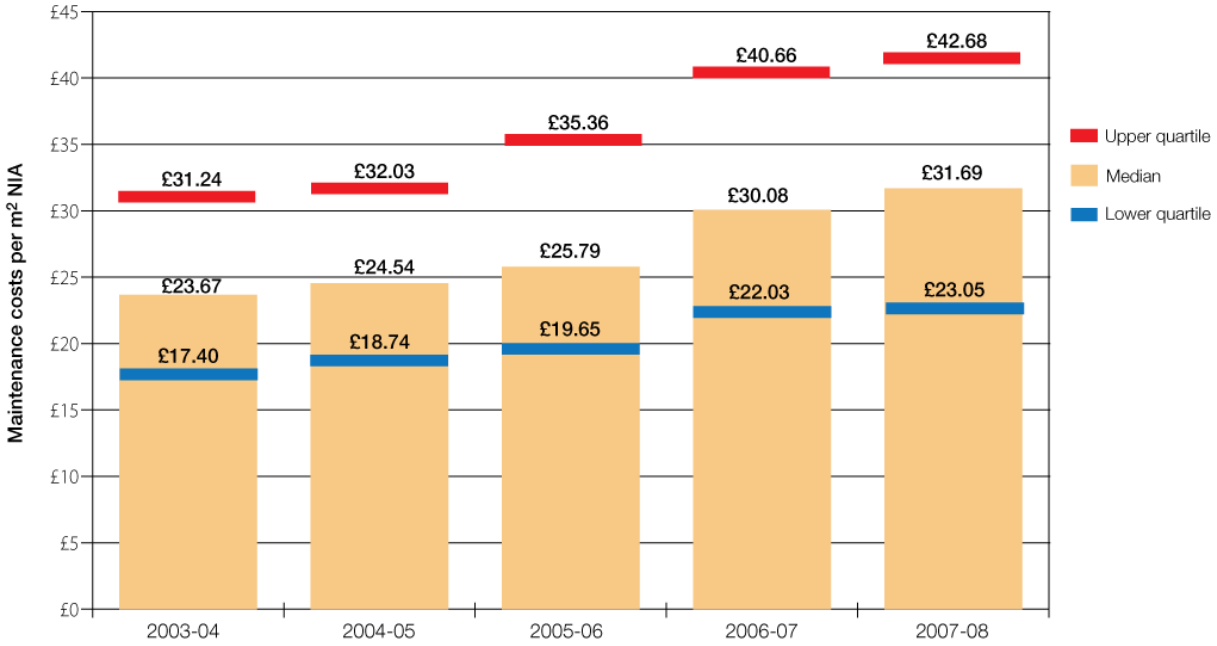
72. The cost to upgrade poor-condition, non-residential space as a percentage of IRV has fallen over the five-year period, reducing from 9.5 per cent in 2003-04 to 6.9 per cent in 2007-08, as shown in Figure 26. A reduction in relative cost indicates that the cost to upgrade is becoming a less significant issue for the sector. The distribution has, however, remained relatively wide and some institutions still have a much higher proportion of space in poor condition and a higher associated cost to remedy this.

Figure 26 Cost to upgrade condition C and D to B as a percentage of IRV non-residential (92 institutions)



73. The reduction of space in poorer condition may well be explained by the increasing levels of maintenance expenditure per m² over the five years (see Figure 27). Since 2003-04 maintenance costs have risen from £23.67 per m² NIA to £31.69, a rise of 33.9 per cent. The increase in expenditure has had a positive impact on the condition of the estate.

Figure 27 Maintenance costs per m² NIA non-residential (138 institutions)



74. Functional suitability between 2003-04 and 2007-08 has shown steady improvement, registering an 8 per cent increase as shown in Figure 28. Values for quartiles have also continued to rise (lower quartiles increasing 10 per cent; upper quartile rising 7 per cent) with the distribution of results also converging (the inter-quartile range has fallen from 29 per cent in 2003-04 to 25 per cent in 2007-08). Together these results indicate that across the sector institutions are recording an overall improvement in the functional suitability of space.

Figure 28 Percentage of UK GIA in functional suitability grades 1 and 2 non-residential (117 institutions)

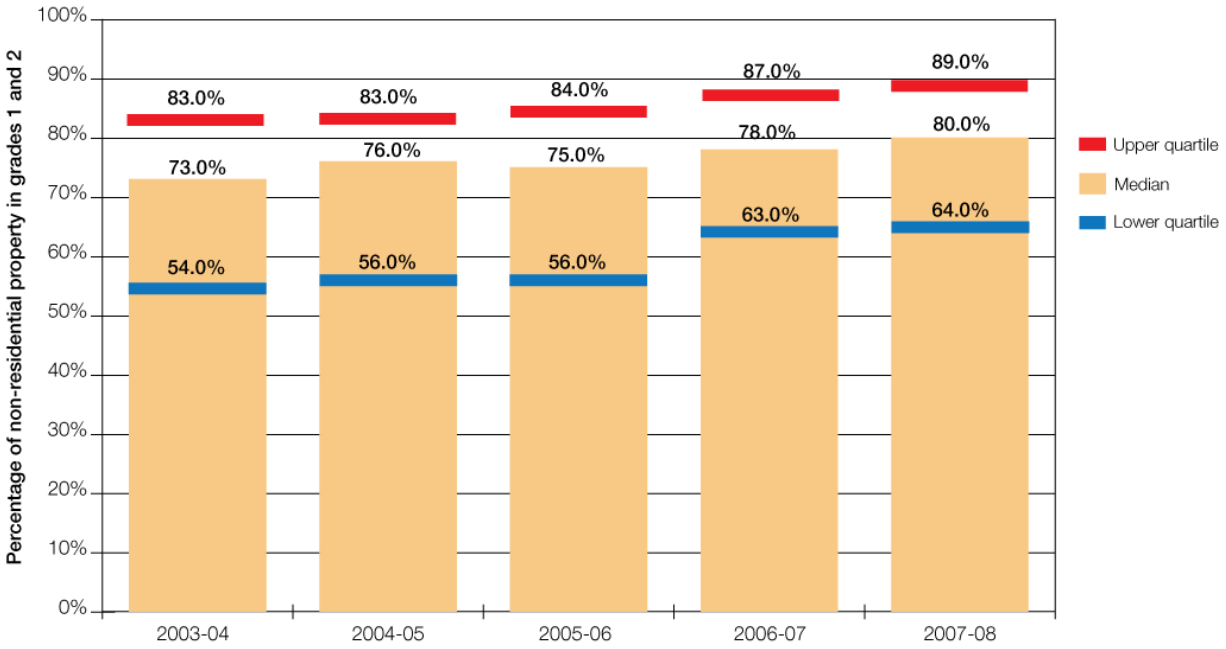


Table 4 Condition summary by country

Maintenance costs (D33) and capital expenditure (D25) as a percentage of IRV (D24, C1)	2003-04	2004-05	2005-06	2006-07	2007-08	Change 2003-04 to 2007-08
UK	4.2%	5.0%	4.6%	5.2%	5.0%	19.1%
England	4.4%	4.9%	4.8%	5.6%	5.2%	18.2%
Scotland	4.0%	5.7%	3.5%	4.1%	4.7%	17.5%
Wales	2.8%	4.2%	4.0%	4.5%	3.2%	14.3%

Percentage of GIA in condition A and B (C13 – non-residential) median	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Change 2003-04 to 2007-08**
UK	69.0%	69.5%	70.7%	71.1%	73.1%	5.9%
England	70.0%	70.0%	75.0%	75.5%	75.0%	7.1%
Scotland	54.5%	51.9%	47.5%	60.0%	61.0%	11.9%
Wales	70.5%	74.0%	68.0%	68.5%	69.5%	-1.4%
Percentage of GIA in condition A and B (C13 – non-residential) weighted by GIA	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Change 2003-04 to 2007-08**
UK	65.8%	64.7%	66.0%	67.8%	69.5%	5.6%
England	67.0%	67.2%	68.6%	70.0%	71.2%	6.3%
Scotland	55.3%	49.8%	52.9%	57.7%	60.3%	9.0%
Wales	64.7%	62.6%	59.5%	59.6%	61.0%	-5.7%
Cost to upgrade condition C and D to B as percentage of IRV (C13 – non-residential)	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Change 2003-04 to 2007-08**
UK	9.5%	8.5%	9.0%	8.0%	6.9%	-27.4%
England	9.7%	8.0%	8.9%	7.9%	7.6%	-21.7%
Scotland	11.9%	15.8%	15.6%	12.4%	11.4%	-4.2%
Wales	6.6%	6.4%	6.3%	5.9%	5.2%	-21.2%
Functional suitability percentage of GIA in grade 1 and 2 (C13 – non-residential)	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Change 2003-04 to 2007-08**
UK	73.0%	76.0%	75.0%	78.0%	80.0%	9.6%
England	73.0%	76.0%	75.0%	78.0%	81.0%	11.0%
Scotland	59.3%	79.0%	59.5%	68.5%	80.0%	34.9%
Wales	69.5%	69.5%	73.5%	77.5%	78.0%	12.2%

Table 5 Summary statistics

Estimated totals in UK HE estates, 2001-02 to 2006-07

Year	2003-04	2004-05	2005-06	2006-07	2007-08
Number of HEIs	**163**	**161**	**161**	**161**	**158**
Estate size					
1. Total gross internal area of the UK HE estate (million m²)	24.9	25.2	25.4	25.6	25.9
2. Total net internal area of the UK HE estate (million m²)	18.4	18.6	18.8	19.2	19.0[8]
3. Total net internal area: teaching space (million m²)	5.6	5.5	5.3	5.4	5.5
4. Total net internal area: research space (million m²)	2.7	2.8	3.0	2.9	3.0
5. Total net internal area: support space (million m²)	3.6	3.9	3.8	3.9	4.1
6. Total net internal area: residential space (million m²)	4.9	4.9	4.9	4.7	4.8
7. IRV of total estate (£ billion)	38.9	43.3	48.1	52.2	57.4
Total costs					
8. Total (revenue) property costs (£ billion)	1.55	1.67	1.87	2.0	2.1
9. Maintenance expenditure (£ million)	507	533	588	636	692
10. Capital expenditure (£ billion)	1.7	1.9	1.9	2.2	2.3

[8] The decline in net internal area appears to have been caused by comprehensive re-measurement undertaken by a number of HEIs. The divergence from the upward trend in GIA is surprising and discussions have been held regarding interpretation of the NIA definition.

Age and condition					
11. Proportion of non-residential space constructed pre-1940	25%	24%	24%	24%	23%
12. Amount of non-residential and residential space in categories C and D (million m^2)	8.4	8.7	8.6	8.6	7.8
13. Total backlog cost of maintenance (including residences) (£ billion)	3.9	4.3	3.8	3.9	5.1
Energy and water consumption					
14. Energy consumption total (million kWh)	7,742	7,771	7,752	7,256	7,600
15. Water consumption (million m^3)	25.6	31.1	26.0	25.4	26.0
16. Estimated CO_2 emissions (million tonnes)	1.9	2.0	2.0	1.8	2.1
Business indicators					
17. Total income (£ billion)	16.1	17.3	19.4	21.1	23.3
18. Student FTEs (millions)	1.47	1.49	1.56	1.57	1.59

Table 6 Assumptions used to produce data in Table 5

Row number in Table 5	Comment
All	All figures contain an element of estimate due to variable response rates and the changing shape of the sector. Efforts have been made to reduce the effects of this.
1	For HEIs unable to provide a GIA for the entire estate, a total has been estimated by grossing up the net area. Where data are missing, an estimate has been based on previous data returns. Where no figure is available for the residential estate, no total GIA is available.
2	For institutions unable to provide a total NIA for the entire estate, the area has been estimated by scaling down the gross area. Where data were missing, an estimate has been based on the 2008 data return. Where no figure is available for the residential estate, no total NIA is available. A number of institutions are unable to provide an NIA for residences, thus precluding presentation of total NIA.
3 to 5	The actual area of categories of space at institutions unable to make returns has been estimated by assuming those HEIs have an average proportion of space types. Support space includes learning resource centres, libraries and open-access computer space available for general use.
6	For institutions unable to provide a total net internal residential area for the entire estate, the area has been estimated by scaling down the gross residential area. Where the number of bed spaces has been provided by HEIs, the net residential space has been estimated by application of the average space per bed space.
7	In previous years the IRV per m² gross space has been used to estimate an IRV for institutions where no data were available.
8	Total property cost includes rateable value (as a proxy for rental value), rates, service charge, insurance premiums, energy, water and sewerage, maintenance (revenue only), cleaning, and internal and external estate management costs. No capital expenditure is included in this figure. Where HEIs were unable to return a total property cost in accordance with EMS, an estimate was made by adopting the mean cost per m² in respective countries.
9	Where HEIs were unable to return a total maintenance cost in accordance with EMS, an estimate was made by adopting the mean cost per m² in respective countries. Total maintenance cost relates to revenue costs only and is a subset of total property cost.
10	Capital expenditure totals have been calculated from annual returns to the Higher Education Statistics Agency (HESA). Historical figures will differ from previous reports due to the use of HESA data in place of the HEI return.
11	The mean proportions of pre-1940 space returned by HEIs.

12	For HEIs unable to classify the proportion of space in poor condition (categories C and D), a mean average proportion of total net area was assumed to be in those categories.
13	For HEIs unable to estimate the cost of upgrading 'poor' space, respective average costs per m^2 to upgrade have been applied to total gross space data at institutional level. Historical figures will differ from previous reports due to a different method of calculation.
14	For HEIs unable to provide total estate energy consumption data, an estimate has been made using the student FTE population and the median reported consumption per student FTE in each year.
15	For HEIs unable to provide water consumption volumes, an estimate has been based on student FTE population and the median reported consumption per student FTE in each year.
16	In many instances, CO_2 emissions provided by HEIs have used specific local CO_2 conversion factors depending on the specific energy sources and processes. Where no specific conversion data were accessible, an estimate of CO_2 emissions has been made using standard conversions of consumption data.
17	Income figures, as supplied by HESA, for all HEIs that made an EMS return in each year. There may therefore be some small discontinuities in the time series.
18	Total student FTEs, as supplied by HESA, for all HEIs that have made an EMS return in each year. There may therefore be some small discontinuities in the time series.

Annex A Glossary and abbreviations

Academic space/staff	Space used for teaching and research and for its support (faculty offices, for example). Also all staff who tend to work in such areas.
Backlog affordability	The ratio of HEI income to the size of the repair backlog. The higher the number, the more affordable is the repair backlog.
EMS	Estate Management Statistics
DEL	Department of Education and Learning (Northern Ireland)
FTE	Full-time equivalent
Functional suitability	EMS measures the ability of space to support its existing function taking into account factors such as environment, layout, location and flexibility. The top grade (1) is described as excellent and the lowest (4) as poor.
GIA	Gross internal area
Good/poor condition	EMS classifies all space in four categories (A to D). For EMS purposes, the top two categories (A and B) are described as being in good condition and the bottom two (C and D) in poor condition.
HE	Higher education
HEFCE	Higher Education Funding Council for England
HEFCW	Higher Education Funding Council for Wales
HEI	Higher education institution
HESA	Higher Education Statistics Agency
Income per m²	The total income of the HEI divided by the total floor space (based on NIA).
IRV	Insurance Replacement Value
m²	Square metres
m³	Cubic metres
Net internal area (NIA)	A measure of the total amount of space within the external walls, excluding major circulation space and other major elements.
Occupancy rate (teaching)	The overall percentage rate at which teaching space is occupied, reflecting the average proportion of space utilised and the average proportion of teaching workspace capacity used.
Property cost to income ratio	The ratio between total property costs (see below) and HEI income.

Repair backlog	The cost of remedying all sub-standard property and ensuring the estate complies with legislation, as measured by the HEI.
SFC	Scottish Funding Council
Student FTE	Student full-time equivalent
Support space/staff	Support space comprises most of the non-teaching and research space in the HEI apart from the residential space and any space devoted to commercial activities. Also all staff who tend to work in such areas.
Teaching/research income per m²	The total teaching and research income of the HEI divided by the total floor space (based on NIA) allocated to teaching and research respectively. Because support space that does not generate income is excluded from these numbers, the teaching and research income per m² is almost always higher than the overall income described above.
Total property costs	Total property cost includes rateable value (as a proxy for rental value), rates, service charge, insurance premiums, energy, water and sewerage, maintenance, cleaning, and internal and external estate management costs. No capital expenditure is included in this figure.