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Overcoming Barriers to Campus Greening: A Survey among Higher Educational Institutions in London, UK

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Abstract

This paper explores the greening of higher educational institutions. It is based on a survey carried out on a sample of higher educational institutions within London, UK. A qualitative research approach, using semi-structured interviews, is applied to assess a) how far the relevant institutions have reached with respect to greening within the areas of energy and solid waste management, b) what the interviewees consider to be the most important barriers to further green their campuses, and (c) how such barriers can be reduced, or possibly overcome. The study maintains that although the institutions are not at ground zero with respect to greening, their overall environmental quality is relatively poor, particularly concerning recycling. It is argued that the barrier suggested to be of greatest significance by the interviewees, namely budgetary constrains, is at least partly due to a lack of knowledge concerning how greening initiatives can save costs as well as an institutional reluctance to change. It is concluded therefore that one of the most important measures that needs to be undertaken to overcome barriers to greening is to raise the environmental awareness within campus communities.

Keywords Waste management, Energy management, Sustainability, Environmental awareness, Financial constraints, Cultural barriers

Introduction

The greening of higher educational institutions can be defined as the process of reducing the multitude of on- and off-site environmental impacts resulting from campus decisions and activities, as well as raising environmental awareness within the human communities of a college or university (Creighton, 1999).

In a time faced with increasing environmental challenges, the tertiary sector is being recognised as well suited to take on the leadership for environmental protection (Leal Filho et al. 1996, p. *v*). By greening their own campuses, higher educational (HE) institutions can teach and demonstrate the principles of awareness and stewardship of the natural world, as well as increasing the chances of clean and pleasant local and global environments for the future (Creighton 1999, p. 6).

However, although several colleges and universities have started to understand and act upon their 'sustainable development responsibilities' (Khan 1996a, p.39) by implementing environmental concerns into their policies and day-to-day practices, a general trend both within the USA and in Europe, is that few HE institutions are vigorously pursuing greening initiatives throughout their campus operations. There is still a long way to go before environmental education becomes an integrated part of higher educational institutions, and before the environmental impacts resulting from their practices have been reduced to acceptable levels (Smith, 1993).

Empirical studies have suggested various reasons for why HE institutions may be reluctant to actively implement 'green' actions at their campuses (see, for example, Creighton (1999), Riera (1996), Leal Filho (1999, 2000), Van Ginkel (1996)). Causes mentioned are, among others, misconceptions to the meaning of 'sustainable development', the lack of environmental interest among students and staff, university conservatism, and the extensive costs associated with implementing green initiatives.

However, as the 'greening of higher educational institutions' is a complex and relatively new field of research, further studies are probably needed to be able to establish the various factors causing the reluctance to greening, and thereby help HE institutions realise that 'going green' has numerous advantages. Leal Filho (2000, p. 193) suggests 'going into the specifics', i.e. dealing with specific issues and themes such as energy use and waste management, as one possible way of addressing the task of transforming colleges and universities into green institutions. As Leal Filho (2000, p. 193) indicates, 'such contexts have clear approaches and clear outcomes'.

Going 'into the specifics' is exactly what this study aims to do. It is motivated by a desire to explore in more detail specific problems of the greening of HE process. The hope is that a

more detailed knowledge about these problems will allow more informed recommendations on ways to overcome barriers to greening. This study therefore examines solid waste[1] and energy[2] management in HE institutions. The research is based on an overall evaluation of how far a sample of higher educational institutions within London, UK, have reached with respect to greening within these areas. In the light of this survey, the study further aims to determine what the relevant institutions consider to be the most important barriers to greening within these areas, and how such barriers can be reduced, or possibly overcome. The specific components of campus greening, i.e. solid waste and energy management, were chosen because they are believed to be suitable and encouraging starting points for a greening process; they involve initiatives that are relatively easy to implement, with opportunities for financial payback. A successful implementation of such actions can therefore give a HE institution a positive impression of greening, and thereby catalyse the implementations of further greening initiatives. Furthermore, as the most significant university environmental impacts are those resulting from campus waste and energy use, sustainable practices within these areas can effectively prevent environmental degradation. Prudent energy and waste management can also serve as a good example for students, teaching and demonstrating principles of environmental awareness and stewardship (Creighton 1999, p. 6). Of importance is also the fact that HE institutions, due to national and international targets set to reduce the amounts of solid wastes and CO2 emissions, are likely to face increased regulatory and political pressures within these areas.

It is hoped that the findings from this study can be of use to other HE institutions; both concerning obstacles that might rise as well as measures for how difficulties can be reduced or overcome, in a greening process.

[1] Solid waste management includes the various initiatives that can be undertaken to reduce the volumes of solid waste on campus, such as reusing and recycling materials, composting, and source reduction (Keniry 1995).

[2] Energy management includes the various initiatives that can be undertaken to promote energy conservation and improve energy efficiency. Energy conservation implies various energy-saving measures that reduce energy use without overhauling technology, focusing rather on people and habits. Energy efficiency includes implementing technologies to provide comparable lighting, cooling, heating and so on, using less energy and spending less money (Keniry 1995).

With these expectations and queries in mind, this paper tries to provide an answer to the following questions:

1. Within the areas of energy and solid waste management, how far have the sampled institutions reached with respect to greening?

2. What is considered to be the most important barriers to further greening, and how can such barriers be reduced or overcome?

Theoretical Foundation

Sustainable Development and Higher Educational Institutions

The now well established concept of sustainable development has been awarded much attention since it was first introduced in 1987. The question of how we can achieve a 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987), has been subject to lively debate at numerous occasions.

A growing consensus of opinion is that the framework offered by sustainable development cannot only be a matter of concern at governmental level, but that all institutions, including those of higher education, need to take an active part in the struggle to achieve this goal (Leal Filho,1996). As institutions for research, teaching and policy development, with their influence and resources, universities and colleges are well suited to take on the leadership for promoting sustainable development (Leal Filho et al. 1996, p. *v*). The potential of educational institutions for contributions within this area, is now being recognised by various quarters, such as the United Nations, the European Union, Government policies, agreements, and numerous research reports. The Agenda 21, Chapter 36 (UNCED, 1992) recommends that:

> Governments should strive to update or prepare strategies aimed at integrating environment and development as a crosscutting issue into education at all levels within the next three years.

The Greening of Higher Educational Institutions – What can it Achieve?

HE institutions can be described as 'microcosms' of environmental problems facing the larger society in numerous ways (Smith 1993, p.44). Hazardous chemicals used in laboratories,

fertilisers, insecticides, and pesticides are abundant on campuses, and can contribute to water pollution and indoor air pollution problems that can put the campus community and natural systems in danger (Smith 1993, p. *xii*). Chemicals depleting the ozone layer, causing increased human, animal, and plant exposure to ultraviolet radiation, are common in cooling and refrigeration systems, automobiles, libraries, and fire extinguishers. Furthermore, transportation to and from campus can lead to congestion, noise, and air quality problems for local communities (Creighton, 1999 p. 5). Universities and colleges also generate vast amounts of radioactive, solid and hazardous wastes. Creighton (1999, p. 4) indicates that in New England, US, alone, thirty-five universities or colleges are listed as contributors to hazardous waste sites for the failure of their contractors to dispose hazardous waste thoroughly. Indirect impacts are also created off campus by the production of goods and the use of services, such as dioxin arising from paper bleaching, and pesticides used on food served on campus. However, the largest environmental impacts caused by HE institutions, are probably the carbon dioxide emissions and the air pollutants resulting from the burning of oil and natural gas to heat water and to cool and heat buildings (Creighton, 1999 p. 4).

By implementing 'greening' actions on their campuses, however, HE institutions can reduce the cumulative effect of these environmental problems, and thereby prevent environmental degradation.

As many of the people whose decisions will affect the future attend colleges and universities today, HE institutions have the potential of teaching environmental literacy to the politicians, teachers, and decision-makers of tomorrow (Eagan and Keniry 1998, p. 9). Both in the classroom and by the example of its physical plant, a university can give students an understanding of the interrelationship between business decisions and the natural environment, and thereby model behaviours and attitudes that encourage environmental responsibility (Creighton 1999, p. 6). A green university can furthermore become a green model for the external community by gathering and sharing effective ideas on environmental issues and practices.

The greening of a college or university can also be cost effective. Eagan and Keniry (1998), show that revenues and savings for 23 campus conservation projects in the USA came to more than $ 16 million in just one year. The possibilities of saving costs on campus greening has

also been exemplified by the “50-50” pilot project, now widely spread in Germany (Leal Filho 1999 p. 23).

In a society with increased environmental awareness, a ‘green attitude’ can also give a HE institution a positive image to the outside world, and thereby be a selling point. Creighton (1999 p. 6) maintains that more than 20 percent of the students who enter the Tufts University, USA, each year, lists its environmental ‘label’ as one of their three top concerns.

HE institutions are “integral parts of the larger society’s economic, social, and physical landscape” (Smith 1993, p. *xii*). Their economic power, through the investments they make, the products they buy, and the companies they do business with, is extensive. By demanding environmentally friendly products and technologies, colleges and universities can therefore create or encourage markets for sustainable commodities.

How ‘Green’ are Today’s Institutions of Higher Education?

As numerous differences exist between HE institutions, both within and between countries, giving an exact and up-to-date overview of where HE institutions stand today with respect to greening, is complex. However, a general summary can be established. Today’s institutions of higher education are slowly beginning to realise, and act upon, their ‘sustainable development responsibilities’ (Khan 1996a, p.39). Several universities and colleges have started to implement environmental concerns into their policies and day-to-day practices. In the UK, for instance, 50 out of 132 institutions had an environmental policy in 1995, compared to only one, in 1990 (Khan 1996a, p.39). Various international conferences, treating the role of universities in promoting sustainable development have also taken place. At such events, declarations, charters and action plans, outlining suggestions for how to ‘green’ a college or university, have been established (Leal Filho 2000, p. 186).

However, although several HE institutions have started to implement prudent environmental practices, few are vigorously pursuing greening initiatives throughout their campus operations. Typically, particular efforts are carried out in one part of a university, while other operational units of the same institution will lag behind. Referring mainly to the USA, Creighton (1999 p. 7) claims that to date, few, if *any* college or university have undertaken a comprehensive, across-the-board, environmental stewardship *both* within educational and operational areas. As for Europe and the UK, the situation seems to be quite similar. At some

institutions, efforts have started but faded away, and at others a greening process has yet to begin (Leal Filho, 2000). There is, as the 1993 Toyne-Report establishes, 'yet much to be done, and it needs to be done urgently' (Khan, 1996b).

Given the clear benefits of 'going green', such as possibilities for saving money, demonstrating new and clean technologies, and increasing student learning, why are so few universities and colleges active within this field? In other words, what are the barriers to the greening of higher educational institutions?

Empirical Studies on Barriers to the Greening of Higher Educational Institutions

Empirical studies suggest various reasons for why HE institutions may be reluctant to actively implement green actions. Creighton (1999), found the main barriers to greening at the Tufts University, to be a fundamental lack of interest and commitment towards green initiatives among administrators, staff and students. Further barriers were established to be a lack of financial resources and environmental education within the campus community. Van Ginkel (1996) found the organisational structures and the predominating culture of the university to prevent the introduction of greening initiatives at the Utrecht University in the Netherlands. Riera (1996), determined the main barriers to implementing environmental policies at the Universitat Autonomia de Barcelona, to be the lack of expertise, the lack of tradition, and as Creighton (1999) budgetary constraints. Meyerson and Massy (1995) established the most important barriers to greening to be long payback periods, and a general lack of incentives and information on environmental issues. Leal Filho (2000) found that misconceptions related to the topic 'sustainability' sometimes was used as an 'excuse' by HE institutions for not implementing sustainable measures at their campuses. Leal Filho (1999 p. 22), further claims that such misconceptions often are translated into a negative view, reflecting HE institutions' lack of willingness of implementing more sustainable actions.

Methodology

The research was carried out during July 2000. Data were collected through in-depth, in-person, semi-structured interviews conducted at the following six institutions of higher education in London, UK:

- Imperial College of Science, Technology and Medicine
- University of North London
- University College London
- University of East London
- London School of Economics and Political Science
- London Guildhall University

The interviews served both to obtain specific information concerning greening initiatives that had been carried out at the sampled institutions, as well as individual judgements regarding difficulties experienced, and ways to overcome these.

Semi-structured interviews were chosen because the interviewees were asked to elaborate on subjects that perhaps could be perceived as delicate (such as problems experienced with certain members of the campus community). Semi-structured interviews are characterised by more or less open questions being brought to the interview situation in the form of an interview guide (Flick 1998, p. 94). According to Kohli (1978), such interviews are more likely to evoke the interviewees' viewpoints than is the case with standardised interviews and questionnaires, which may restrict, rather than illuminate the interviewee's standpoint. It was hoped that with such an openly designed interview format, the interviewees would speak freely. The specific class of semi-structured interview applied can be described as an 'expert-interview'; an interview form where the interviewee as a person is of less interest than is his or her ability of being an expert for a certain field of activity, in this case; energy and solid waste management (Flick 1998, p. 92). As several interviewees preferred to be anonymous, their names are not listed.

The interview guide was divided into two parts: part one served to extract concrete information regarding greening initiatives that had been undertaken, while part two aimed to evoke the interviewees individual views on difficulties to greening and solutions for change, within energy and waste management. See Box 3.1 for interview guide.

Box 3.1 The interview guide

Part One:

Energy Management

1. Which initiatives, if any, have been carried out to conserve energy and to increase energy efficiency at your campus?

2. Have your campus undertaken any actions to raise campus awareness about the need for energy conservation?

- If so, what has been done?

Solid Waste Management

3. Which initiatives, if any, have been carried out to reduce the volumes of solid waste at your campus?

4. Have your campus undertaken any actions to raise campus awareness about the need for waste reduction?

- If so, what has been done?

Part Two:

Barriers to Greening

5. What do you consider to be the most important barriers to the implementation of greening initiatives within energy and waste management?

6. How do you think such difficulties can be overcome?

7. What should be the role of:

a) students

b) staff

c) academics

- In overcoming such barriers and further ‘green’ your institution?

The interview sample constituted sixteen people chosen by criteria of whether they would have the knowledge necessary to be able to answer and elaborate on the questions in the interview guide. The interviewees were therefore people who dealt with environmental and operational activities on a daily basis, such as environmental managers and officers, energy managers, waste managers, estate officers, and health and safety officers. Four students, all members of environmental pressure groups, were also part of the interview sample. The students were included as they were likely to have some experience with trying to improve the environmental quality of their universities, and therefore hold opinions concerning difficulties to greening, and ways to overcome these.

Qualitative data were analysed by coding and categorising the responses into major conceptual areas. An ‘open coding’ approach was applied, meaning that no pre-constructed categories existed before the analyses took place (Birley and Moreland, 1998). Using a ‘scissors and paste’ method, statements were grouped by their contents to create larger categories. E.g. various statements concerning difficulties with the implementation of ‘greening’ devices because of their expenses, were gathered together in a group named ‘financial barrier’, while statements treating the lack of interest among students and staff, were placed in a ‘cultural barrier’ category.

The number of interviewees ‘giving rise’ to the various categories was noted (such as sixteen people mentioned the lack of financial resources to be a problem, while only five mentioned the institutions’ geographical location to be of importance). This was done with the aim of providing simple frequency distributions to illustrate consensus or disagreements on topics, and to be able to establish which issues that were considered to be of greatest importance to the interviewees.

There are various reasons for why the findings from this study should be interpreted with care. The sample is rather small, and the collected data concerning greening initiatives that had been carried out within energy and waste management at the various institutions, is based solely on the information provided by the interviewees. It can be questioned whether the

individuals involved possessed the necessary 'expert' knowledge to include all relevant facts. The data is further based on personal viewpoints, and is therefore subjective. As the majority of the interviewees were asked to criticise their own places of work, it also seems probable that their responses to some extent were biased. Furthermore, as great differences exist between the various institutions (such as their number of students, campus size, subjects taught, etc.), their experiences concerning greening within energy and waste management is likely to differ, which may question the validity of an 'overall' evaluation.

However, because the interviewees[3] occupied key positions within energy and waste management it can be assumed that their responses largely were credible and well considered. It is therefore hoped that the gathered data reflect the current 'greening' situation both in terms of attainments and difficulties experienced. Regarding further research, it could be of interest to incorporate further members of a campus community in the interview sample (such as academics, administration, and more students), to examine whether their views would agree with the findings from this study. Research that evaluates barriers to greening within other areas (such as food, purchasing, transportation, and hazardous and radioactive waste) would also be of great use.

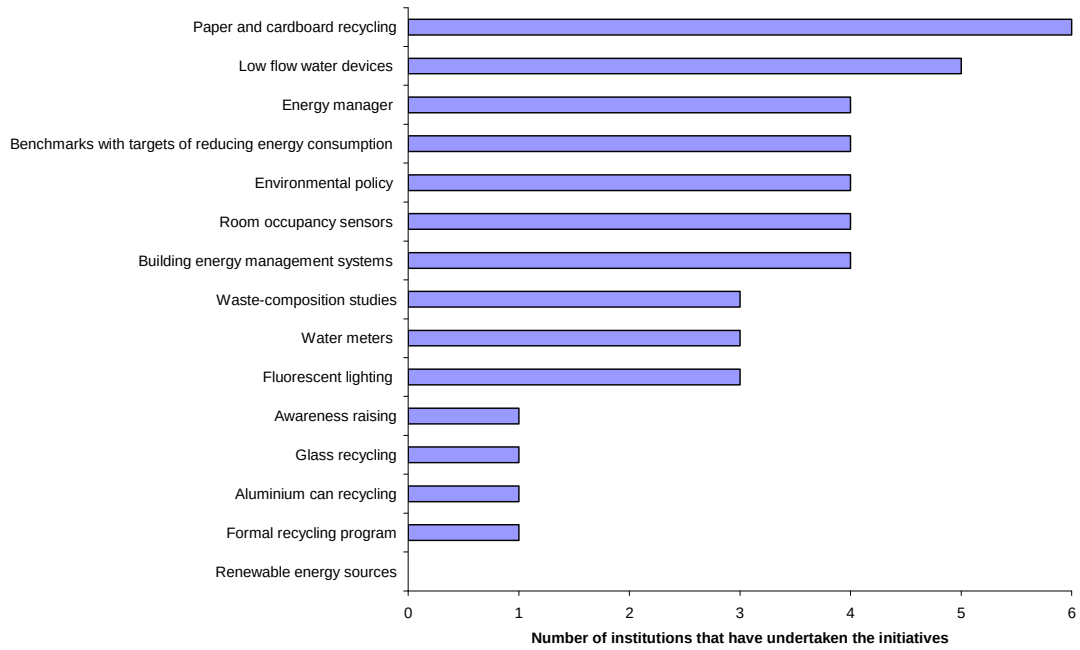
Results and discussion

How green are the sampled institutions in the areas of solid waste and energy management?

The first set of results to be presented, refers to the various greening initiatives that the sampled institutions have carried out within solid waste and energy management. Figure 4.1 provides an overview of the findings.

Figure 4.1 Greening initiatives carried out at the sampled institutions within solid waste and energy management

[3] Apart from the four students involved.



Solid Waste Management

The results suggest that the sampled institutions have not reached particularly far in a greening process within solid waste management. Although they were all recycling paper and cardboard, such initiatives were only carried out to a minor extent, typically they had boxes for paper trash placed in lecture theatres and offices. It was mentioned by many that such initiatives were not very successful, because people threw all kinds of rubbish in these boxes. Two institutions had in fact implemented recycling programmes for glass bottles and aluminium cans, but closed them down shortly after, as they did not work.

However, the fact that no efforts had been undertaken to inform people about how recycling works, demonstrates the low priority that recycling is currently awarded. In other words, change does not happen spontaneously, it takes time to readjust peoples' behaviour (Ackerman, 1997). Shutting down an important greening initiative simply because it has some problems to begin with, does not reflect environmental stewardship in a time where the amounts of solid waste generated by colleges and universities is on the rise (Smith 1993, p. 3). Recycling can further have a symbolic value, as it can be a visual sign of an institutions' commitment to the environment (Eagan and Keniry 1998, p. 59).

None of the institutions had undertaken efforts to reduce solid waste through composting[4] or source reduction[5], and only fifty percent had undertaken waste composition studies to determine the main waste streams leaving their campus. Such studies are very important first steps for waste management, after all; "you cannot manage what you have not measured" (Forum for the Future, 1999a).

Energy Management

The sampled institutions are not at ground zero with respect to greening within energy management. The fact that a majority had employed energy managers to supervise conservation and to improve the efficiency of their energy systems, reflects caution. Several institutions had also invested in building energy management systems (BEMS) to control and monitor temperatures. Such systems can reduce energy use by up to twenty percent, and are therefore successful devices towards a sustainable university (Creighton 1999 p.70). However, none of the institutions had installed energy saving devices throughout their campuses, typically only a minority of the campus buildings contained such equipment. Furthermore, none of the institutions had incorporated equipment for safe and renewable energy sources, like cogeneration[6] and solar power. The extensive initial capital costs attended with implementing energy saving equipment, was emphasised by many as being a decisive barrier for undertaking further greening initiatives within these areas (see the discussion of barriers further below).

[4] Composting is a biological process that breaks down organic matter into material. Return of the compost to university grounds can improve the soil structure, and reduce the need for fertilisers. Composting can help avoid adverse environmental impacts associated with landfilling and incineration. Waste that can be the subject of composting is organic matter such as food waste, paper napkins, leaves, grass clippings, and chipped brush (Creighton 1999, p. 62).

[5] Source reduction implies reducing the amount of material discharged for eventual recycling or composting. Source reduction programmes typically eliminate single-use items, encourage reuse of materials, use materials that are more durable and eliminate unnecessary usage such as junk mail (Keniry 1995, p. 150).

[6] Cogeneration produces high-temperature heat and generates electricity. It involves a process that maximises the efficiency of boiler systems and decreases off-site emissions generated by electric power plants. Such devices can be of particular use for universities with large central boilers in colder climates (Creighton 1999, p. 119)

Only one institution had tried to educate its campus community on how energy conservation can reduce environmental impacts and financial costs. It appears as if individual involvement is not considered an effective measure in decreasing energy use. Although successful energy conservation probably takes more than stickers or notice boards telling people to turn off the lights, awareness-raising initiatives have in fact proved to be effective in reducing campus energy use (Keniry 1995, p. 70).

It seems like greening initiatives within energy and solid waste management is on the sideline of the sampled institutions' main priorities. Although various environmental initiatives had been undertaken, it was carried out rather occasionally, and not throughout the campuses. It appears that only greening initiatives where the financial payback are believed to be quick, are considered. Measures like renewable energy equipment, which significantly can reduce a HE institution's carbon dioxide emissions, have not been implemented by any of the sampled institutions. It further seems like those initiatives that require 'a little extra' effort, such as making recycling work despite initial problems, are not given much attention. Undertaking greening actions simply because it is the 'right thing to do', as it can benefit the natural environment and teach and demonstrate environmental stewardship, did not seem to be a driving force behind the initiatives that had been carried out, i.e. all measures appear to be cost related.

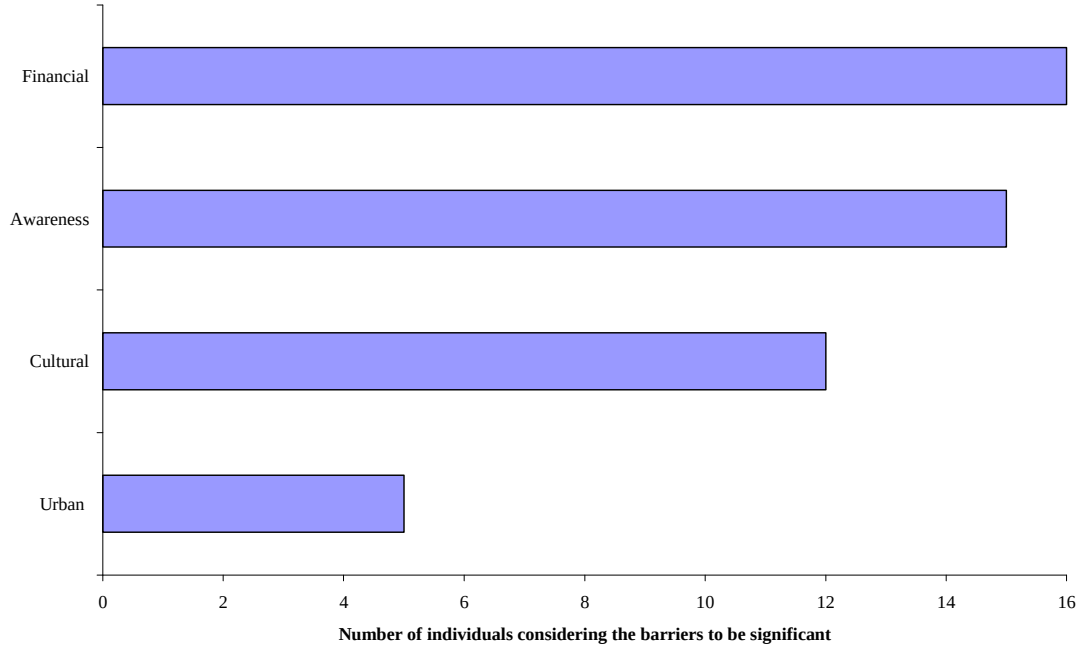
What are the most important barriers to greening and how could they be overcome?

The second set of results to be presented, refers to which factors the interviewees considered to be of greatest importance in preventing a greening process from taking place within solid waste and energy management. Coding and categorising the responses gathered from the interviews into main conceptual areas, gave rise to the following categories:

- Financial – the lack of financial resources
- Awareness – the lack of environmental education
- Cultural – a non-environmental attitude prevailing at campus
- Urban – the lack of space for storing waste and constructing new, more energy efficient buildings

Figure 4.2 provides an overview of the main barriers and the number of individuals emphasising these to be of significance in preventing a greening process from taking place.

Figure 4.2 Main barriers to greening within energy and solid waste management



The Lack of Financial Resources

The results indicate that the main barrier to further greening within energy and waste management is considered to be the great expenses connected with implementing energy saving and waste reducing measures. It was generally asserted that as much as such initiatives were preferred, they mainly had to remain a goal for the future. However, although greening actions can require up-front capital, several waste and energy reducing projects represent opportunities for colleges and universities to save vast amounts of costs.

Particularly within energy efficiency, there are possibilities for significant returns on a university's investments. In regions where electricity is more expensive, installation of new energy efficient technologies can have payback periods as short as months. The State University of New York saves $9,000,000 annually due to a thorough implementation of energy efficient retrofits and the promotion of energy conserving awareness in its campus community. Although the initial capital investments were comprehensive ($17,000,000), these were paid back in less than four years (Eagan and Keniry 1998, p. 20).

Renewable energy can also pay. Technologies within this area have now achieved efficiency levels comparable to those of conventional fuels, and are cost-competitive for many applications (Keniry 1998, p. 59). Georgetown University annually saves $45,000 on photovoltaic panels[7] installed on its roof (Eagan and Keniry 1998, p. 28). Also in colder regions, solar power can be an efficient energy source, particularly for water heating where large volumes are used, such as in students' halls of residents. Creighton (1999, p. 119), asserts that solar power in fact can raise 40-degree water to a preheated temperature of 80 to 90 degrees on a cold winter day. Although alternative energy may not be able to supply all the power needed for a HE institution's operations, it can still be a useful supplement in reducing the amount of electricity that must be bought and thereby save costs (Creighton 1999, p. 120).

However, due to their long payback periods, renewable energy equipment is not widespread among HE institutions today, initiatives with short financial payback periods are mainly preferred. Keniry (1995, p. 65), warns against such practices, as it can make it difficult to ever financially justify measures that takes longer to pay for themselves. When quick payback projects are completed, the savings from such initiatives are typically not made available to finance longer payback measures, but are used for other, more immediate purposes. This can leave the longer payback projects stand alone because they never seem financially attractive enough to be addressed. However, considering the fact that most institutions of higher education plan to be in business for long times, maybe well into the next century, investing in long-term energy saving devices can be justified (Creighton, 1999 p. 6). Besides, the energy produced thereafter is virtually free.

The main argument used by the sampled institutions for not recycling was its lack of cost efficiency. It is correct that the market value of recycled material, particularly paper and cardboard, has declined during the past couple of years, resulting in revenue shortfalls (Keniry 1998). However, with a little creative thinking, costs can still be saved. The University of Wisconsin changed its recycling contractor and thereby saved the university $70,000 annually. Its new contract established a floor price of zero dollars in the monthly transaction for cardboard, newspaper and other lower grades of paper, which protected the university in times of extreme volatility in the market (Eagan and Keniry 1998, p. 64). The University of

[7] Photovoltaic panels are systems that generate electricity from solar power.

Colorado has developed another way to cover the expenses of its recycling programme. The programme is primarily carried out on a voluntarily basis by students and it is funded by a small fee (£ 1.50) assessed per student, in addition to revenues generated from materials sales (Eagan and Keniry 1998, p. 60).

Although costs can be saved on greening initiatives, a common problem is that universities only have a finite amount of capital available for greening measures. This implies that although a project has rapid returns, there might not be resources available to cover its initial expenses. However, by earmarking savings obtained from greening efforts to fund other environmental initiatives, such problems can be reduced, and at best; keep energy and waste measures self funded (Creighton 1999, p. 44). Another solution is for a university to use a shared saving plan.[8] Such programs are particularly applicable for electrical efficiency programs with quick financial payback. As equipment for energy saving and waste reducing initiatives can be expensive, a cheaper solution for a university is to lease the equipment. Grants and gifts from private companies, governments, and foundations, can also be used to cover initial capital investments. The University of Illinois was assigned more than $600,000 in funding from its state to cover the costs of its recycling program (Creighton 1999, p. 45), and in Hamburg, Germany the City-State's HE institutions can apply for funds assigned by a 'green budget line' (Leal Filho, 1999). Furthermore, some electric utility companies offer rebates[9] to subsidise the installation of energy efficiency measures. This constitutes opportunities for HE institutions to significantly reduce their costs (Creighton 1999, p. 43).

Numerous studies have designated the lack of financial resources as a significant barrier to greening (for example Riera 1996, Meyerson and Massey 1995, and Creighton, 1999). After all, there is little or no doubt, that devices like BEMS' are expensive. Particularly regarding greening measures with long-time payback periods can it be comprehensible that HE

[8] A shared saving plan implies that the relevant environmental initiative is financed by a third party. The university then pays the loan based on the calculated savings that result from the initiatives (Creighton 1999, p. 43).

[9] Rebates are cost-effective for power companies because the new technologies reduce the demand for electricity, efficiently gaining capacity for additional electricity users in a way that is less expensive than by building additional generating capacities (Creighton 1999, p. 43).

institutions may be reluctant. However, focusing on the sampled institutions, it can nevertheless be suggested that parts of this barrier may in fact be more due to a lack of knowledge, or as Leal Filho (1999 p. 23), puts it; 'a misconception, not based on facts', than actual budgetary constrains. It seemed like energy and waste reducing initiatives were prejudiced to be prohibitively expensive, although a minimum of investigation of possible alternatives had taken place. I.e. a lack of awareness regarding the financial benefits that prudent energy and waste management can involve, seemed to exist.

The lack of environmental awareness

The lack of environmental awareness was considered significant because people do not know *how* to act sustainable. In other words, investing in waste and energy reducing devices has no meaning unless people know *how* and *why* it should be carried out. Decision-makers must be familiar with the benefits of greening to establish environmental policies and to invest in green devices, and academics must realise the necessity of being 'green' role models to their students. Furthermore, students must be made aware of how their habits and choices on campus influences the institutions' own environmental 'footprint', before a change towards environmentally sustainable behaviour can be expected to take place. For encouragement, people should also be informed of achievements, savings, and successes that have taken place in a greening process. The importance of raising environmental awareness at HE institutions is now being recognised from various bodies; The UK Sustainable Development Education Panel (1999, p. 13), notes that:

> All further and higher educational institutions should have staff fully trained and competent in sustainable development, and should be providing all students with relevant sustainable development learning opportunities.

Numerous ways of raising environmental awareness within a HE institution exist. An institution can therefore probably reach far in finding effective ways of awareness- raising by applying the human capital, i.e., the knowledge and skills that humans possess (Neumayer 1999, p. 9) of its own campus. Behaviour analyses have shown that habits can be changed through public education (Creighton, 1999).

Various forms of 'visual' means (such as stickers, newspapers, etc.) and open lectures, can be effective ways of communicating environmental concerns. Such measures have proved

effective at several HE institutions. The Liverpool John Moores University applies a website and a monthly newspaper to inform students and staff about environmental gains and areas that need improvement (Forum for the Future, 1999b). A HE institution in Italy presents weekly seminars on environmental issues to its staff. The seminars are popular and have generated the creation of groups that meet and discuss ways of greening the institution (Leal Filho 2000, p. 189). In order to raise environmental awareness on waste management, the University of Bath created a guidance booklet informing about its importance and the requirements for legal compliance. It also provided guidance on disposal routs for waste materials and on waste classification (Forum for the Future, 1999a).

Although there is little doubt that measures like open lectures and information in newspapers are effective means for raising awareness, it can be questioned whether such initiatives provide the knowledge necessary for students to understand the complexity of environmental problems and their solutions (Creighton 1999, p. 226). Cortese (1992) maintains that the best way to increase awareness enough to move in the direction of a sustainable development, is to integrate environmental concerns into all relevant disciplines. Teaching environmental issues as part of courses can ensure that students pay attention and learn, as environmental issues are 'tied up' to subjects they have chosen to study. Cortese's ideas have been embraced by a number of HE institutions (Creighton 1999, p. 227). The University of Edinburgh has integrated environmental perspectives into its courses (including those that do not have an environmental focus) by representing subjects using environmental examples, case studies highlighting environmental concerns, and creating essay questions allowing students to examine environmental implications (Forum for the Future, 1999c).

Some of the interviewees suggested that students should be 'employed' as advocates for green issues. Such a 'bottom-up' approach might be effective as students probably feel freer to criticise campus actions and decisions than academics and staff. As 'customers' at their HE institutions, students furthermore have a lot of power for demanding the accomplishment of greening initiatives. Students acting as 'green' examples to their fellow students might also be effective, as the attitude comes from peers, and not just from staff, 'telling people what to do'. At the Yale University, a student environmental center with the aim of increasing student environmental awareness and leadership was established in 1992. The center was so successful that it managed to raise funds, and organise the 'Campus Earth Summit' in 1995.

Students can also be used as a resource by assisting staff in performing environmental actions. At the University of Wisconsin-Madison, programs have been established where students work together with academics and staff to reduce environmental impacts related to energy use and solid waste disposal (Heinz Family Foundation 1995, p. 24). Such initiatives can both be cost-effective, and teach students analytical problem solving skills that can be of use to address ecological challenges they might face later in life (Smith 1993, p. *ix*). However, as students are busy with their studies, it might be difficult to find volunteers. A solution could be to offer extra credits to students undertaking 'green' work at their campus.

However, as much as students' 'bottom-up' advocacy is necessary in raising awareness, a 'top-down' approach where the academics serve to promote environmental literacy, is believed to be an essential component for change. As the academics are the people who students look up to, they have a unique power to inspire students to follow their example. Related to energy and waste management, academics can act as role models by turning off lights, printing double paged copies, allowing students to hand in papers electronically, and so on.

Several authors have addressed the lack of environmental awareness within campus communities as an obstacle to greening (for example Riera 1996, Meyerson and Massey 1995, and Creighton 1999). The consensus is that people must be educated before a change can take place. As for the sampled institutions, a double set of morals seems to exist. On the one hand, they all considered the lack of awareness to prevent a greening process within energy and waste management from taking place. On the other hand however, practically nothing had been done to raise environmental awareness. Furthermore, as numerous measures for how to raise awareness were suggested during the interviews, the topic appeared to be one that had been given some thought. By no means claiming that the importance of environmental education was ignored by the institutions, it can however be suggested that a lack of commitment and willingness to act, existed when it comes to teaching stakeholders the importance of green behaviour. In other words, as much as the lack of environmental awareness is a barrier to greening, not undertaking any efforts to raise it, represents a barrier in itself.

Cultural Barriers

The majority of interviewees considered the 'campus culture' to be another important barrier to undertaking energy and waste reducing measures. It was claimed that a general lack of interest towards environmental improvements predominated their HE communities. Students and staff were described as careless, while the academics were considered uninterested and too busy with their own work to participate in a greening process. Of course, cultural and awareness barriers are inter-linked. Someone who is baised against or at least not interested in environmental issues will most likely also not be aware of many benefits of environmental improvement measures.

Several authors (for example Allen 1999, Van Ginkel 1996, Riera 1997, and Cortese 1999) have determined campus culture as an obstacle to greening. Criticism is mainly levelled against faculty and administration, which are described as conventional and hard to change.

What then does it take to change campus culture into one of environmental stewardship? People need to change their everyday choices towards environmental alternatives. Because such choices involves repetitious rather than a single changes, they require a continuos need for self-restraint, and might therefore be considered as one of the most challenging components of campus greening (Creighton 1999, p. 273).

Collective action and commitment are also essential components for progress towards a change in campus culture. Studies have proved the involvement of students and staff an effective mean in the self-greening of HE institutions (Higher Education Funding Council, 1998). In other words, academics cannot be excluded from participating because they are busy with research and lecturing, nor can students be excepted because of exams and course work. Because all members of a campus community are part of creating the environmental impacts resulting from an institution's operations, they are all responsible for acting to reduce such impacts.

However, the problem of 'campus culture' is in many ways closely related to the lack of environmental awareness. If people are to understand that their everyday personal choices and institutional actions can have long-term, detrimental environmental consequences, they have to be made aware of the importance of a healthy environment. After all, behavioural change,

and thereby a change in culture, cannot be expected to take place unless people understand the benefits and importance of doing so.

Urban Location as a Barrier to Greening

The urban location of the sampled institutions was considered much less of a barrier than the other aspects discussed so far. Urban location can amount to a barrier to greening due to the restricted space available for waste disposal and the lack of space for the construction of new and more energy efficient buildings. One interviewee claimed that as only one of their buildings had a backyard for waste storage, the environmental impacts resulting from transporting waste to this location would probably be more significant than those currently resulting from not recycling. A way to ease this problem could for example be for the institutions to reduce the number of parking places available to its students and staff, and thereby provide more space for recycling containers. The institutions could also seek co-operation with neighbours and their local communities for storage and transport of waste. Regarding the lack of space for the construction of new buildings, Creighton (1999, p. 8) asserts that the environmental impacts resulting from such construction probably exceed those of renovating already existing ones. Furthermore, several energy saving devices are cost efficient with short payback periods.

The urban location was also suggested to be a reason for the lack of student environmental commitment. It was claimed that students probably preferred spending their spare time on the numerous recreational facilities that London offers than on campus, and therefore they did not have the same attachment and responsibility towards their university as they perhaps would, if they spent more time there. As one of the students put it: “my university is not a place where students spend their spare time, they go there for the lectures, that is all. As they do not feel connected to the campus, nor do they feel responsible for the impacts resulting from it”.

There is no question that a lack of space can complicate waste management, particularly recycling, which requires relatively huge containers. Installing energy efficient devices in old buildings constructed at a time when energy was inexpensive and resource conservation unknown, might also represent a difficulty. However, having an urban location cannot be considered a valuable excuse for not undertaking efforts to reduce some of the most significant environmental impacts resulting from a HE institution. As much as a successful

implementation of greening initiatives requires specific facilities and financial resources, it also requires commitment, ingenuity, and a rethinking of priorities, to be successful.

How can Barriers to Greening be Reduced or Overcome?

The third set of results to be presented, gives an overview of the diversity of suggestions, provided by the interviewees, concerning ways to reduce, or possibly overcome barriers to greening within solid waste and energy management. A common feature for the suggestions, were their focus on initiatives for raising environmental awareness. Coding and categorising the various responses gave rise to the following categories:

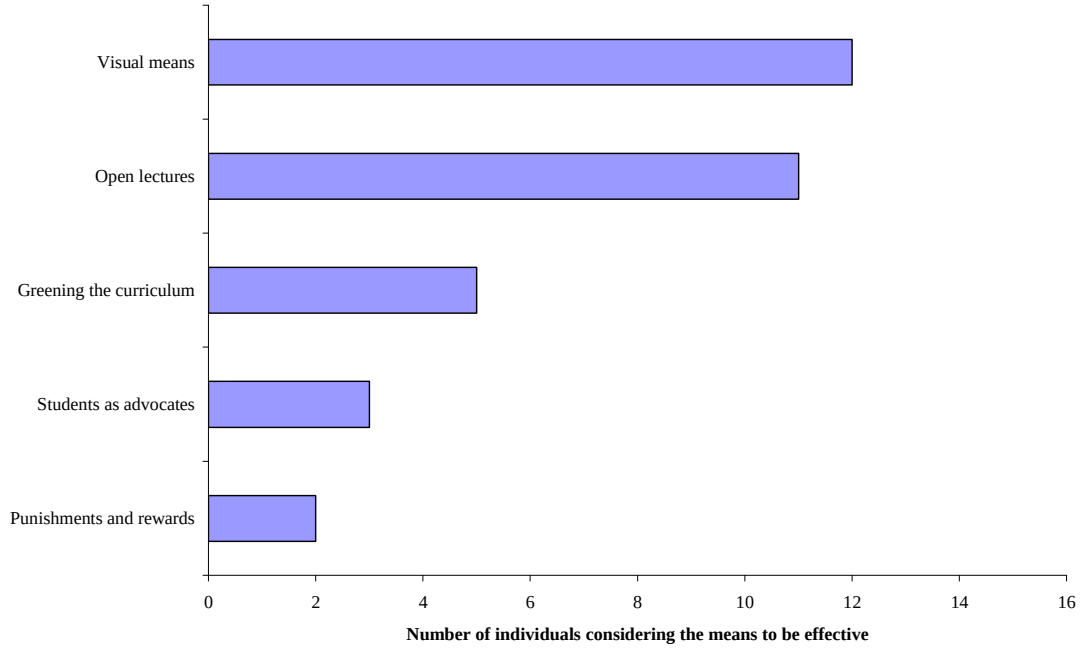
- Open lectures – lectures on environmental issues open to all members of a campus community
- Visual means – 'eye catching' articles to disseminate environmental knowledge, suggested media were:

- Campus newspapers
- The internet and e-mails
- Posters
- Films
- Students' handbooks
- Leaflets
- Stickers telling people to turn off the lights, close water taps etc.
- Visible green recycling bins with informing text
- Signs

- Greening the curriculum – integrating environmental issues into all disciplines
- Students as advocates – 'employing' students to promote the importance of greening
- 'Punishments and rewards'- punishing 'unsustainable' environmental behaviour with such as charges, and rewarding 'green' behaviour, for example with office equipment for staff, and credits for students

Figure 4.3 provides an overview of the suggested measures and the number of individuals attaching importance to these.

Figure 4.3 Measures for how environmental awareness can be raised at campus



Conclusions

This study has attempted to perform an overall evaluation of how far a sample of higher educational institutions have reached with respect to greening within the areas of solid waste and energy management. The study has also determined what these institutions consider the most important barriers to further greening, and suggested measures for how such barriers can be reduced, or possibly overcome.

The study found that although the sampled institutions were not at ground zero with respect to greening, their overall environmental performance was relatively poor. Despite the fact that measures to improve energy and solid waste management had been carried out, such initiatives were not implemented throughout the various campuses. It seems like only greening initiatives that involve quick financial payback are prioritised. Renewable energy had not been installed by any of the institutions, due to their long payback periods. The fact that colleges and universities are institutions that normally stay in businesses for long periods of time, and therefore are in a position where long-term thinking can be financially beneficial, did not seem to be a matter of consideration. Undertaking greening initiatives because it can benefit the environment and teach and demonstrate environmental stewardship, did not appear to be a driving force. In other words all measured carried out were cost related.

The most important barriers to further greening were found to be:

- Financial – the lack of financial resources
- Awareness – the lack of environmental education
- Cultural – a non-environmental attitude prevailing at campus
- Urban – the lack of space for storing waste and constructing new, more energy efficient buildings

The lack of financial resources was considered the most significant barrier to greening. It was maintained that although energy saving and recycling devices were preferred, they mainly had to remain 'a goal for the future' due to their costs. However, it can nevertheless be suggested that parts of this barrier may in fact be more due to a lack of knowledge, or misconceptions, and an institutional reluctance to change, than actual budgetary constrains.

The lack of environmental awareness was considered significant because people do not know *how* to act sustainable. In other words, investing in waste and energy reducing devices has no meaning unless people know how and why it should be carried out.

The problem with 'campus culture' was described as the prevailing indifference towards environmental improvements. Students and staff were described as careless, while academics were considered too busy with their own work to participate in a greening process.

The urban location of the sampled institutions was described as a barrier because it implied restricted space for waste disposal and for the construction of new and more energy efficient buildings. However, adverse environmental impacts from the construction of new buildings might actually exceed those of renovating already existing ones (Creighton 1999, p. 8). An urban location is not an excuse for not undertaking efforts to reduce some of the most significant environmental impacts resulting from a HE institution.

It is believed that the most important measures for reducing or overcoming the established barriers to greening, is to raise environmental awareness within campus communities. I.e. sustainable behaviour cannot be expected to take place unless people understand the benefits and importance of doing so. Effective means for communicating environmental concerns can be various forms of 'visual' means and open lectures. However, greening the curriculum is

believed to be more effective, as environmental issues are 'tied up' to subjects students have chosen to study. Collective action is further a measure of importance.. Because all members of a campus community are part of creating its environmental impacts, they are all responsible for undertaking actions to reduce such impacts. Although the biggest opportunities for creating environmental change within energy and waste management naturally fall in the domain of operations departments and administrative offices, together, students, staff and academics also have the potential to make an impact (Creighton, 1999).

However, to achieve a 'green' university that uses resources efficiently, creates little or no waste, and takes full responsibility for any waste that it does generate, a fundamental change in the thinking behind routine decisions of university administration, staff, faculty and students is needed (Creighton, 1999). Although such a goal might seem overwhelming, universities may find that once a greening process is set in motion, it can be incremental, and support and reinforce further actions to take place.

The findings from this study are not believed to be characteristic for energy and waste practices only. As the barriers found mainly relate to 'unsustainable' human behaviour and on institutional reluctance to change, similar difficulties might probably rise with the implementation of other greening initiatives that requires a change in peoples' everyday choices[10]. Nor is it believed that the findings concern the sampled institutions solely. Rather, they confirm what has been maintained by previous research; a general reluctance to greening seems to exist within the tertiary sector today. More needs to be done; so that colleges and universities will understand that greening has numerous advantages, and thereby start to vigorously pursue environmental initiatives at their campuses. As institutions for teaching and research, with their huge influence and resources, their sustainability efforts, both large and small, are likely to extend far beyond the institution's walls.

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[10] The barrier related to a general lack of financial resources is also believed to be significant concerning other greening initiatives.

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