Appendix D1
Communication matrix questionnaire 2001-02 and results

The questionnaire was used to gather data regarding the present arrangements for energy management in HE institutions. Institutions were asked to consider the ten prompts under each element and then to tick those that most closely represented their institution's arrangements.

The results for each element of the communication matrix questionnaire 2001-02 are given below. Institutions could tick more than one box. The detailed results cover strategic policy framework, management responsibilities, motivating and marketing and training arrangements. A summary of the results is given in section 1 of the main text, *Utilities management in the HE sector*.

It is suggested that institutions use the prompts listed below to assess the effectiveness of their energy management arrangements (see Appendix D2 checklist 3 – *Communication matrix questionnaire checklist*). Realistic targets should then be identified to monitor performance over the next three to five years in respect of the following objectives:

- complying with legislation
- alignment with good management practice
- achievement of value for money.

Strategic policy framework

Questionnaire

A1: Energy efficiency issues are recognised, but they are addressed in an ad hoc fashion.

A2: Energy efficiency guidance has been drafted, but only for use by departmental technical and energy management staff.

A3: Some written guidelines exist on energy management, but there is no formal and approved energy policy.

A4: An energy policy has been formulated by an energy manager or senior departmental manager, but it has not been formally adopted by the institution.

A5: Effective energy management arrangements, that also include water management, have been documented within an approved utilities policy.

A6: A formal utilities policy has been signed by the head of the institution, but it is not part of a wider environmental strategy.

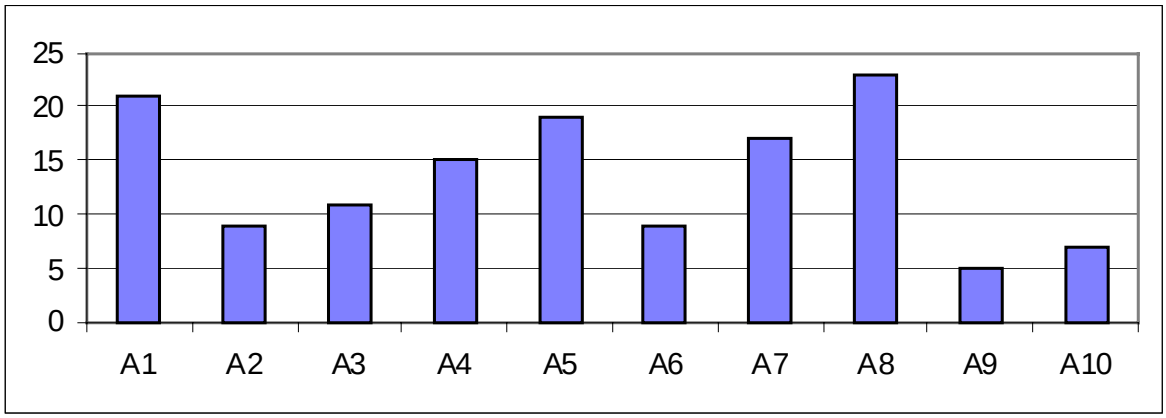
A7: Some consideration has been given to environmental issues, but no formal environmental policy or management system is in place.

A8: The utilities policy has been integrated within the institution's broader approach to implementing an environmental strategy.

A9: The utilities policy is embedded in an environmental strategy that includes SMART (Specific, Measurable, Achievable, Relevant, Timely) objectives, defined targets, and an agreed implementation programme and timetable.

A10: The environmental strategy and utilities policy are reviewed and updated at least every three years by a senior committee of the institution.

Results



Total number of replies = 56

Management responsibilities

Questionnaire

B1: Responsibility for energy costs and consumption is essentially a departmental administrative task.

B2: Promotion of energy efficiency is undertaken on ad hoc basis only by estates and departmental technical staff.

B3: Energy management is a part-time/shared responsibility for someone in the estates/facilities management department only.

B4: Estates department staff allocate some time, resources and expertise to preparing energy proposals, but there is no formal annual programme.

B5: Responsibility for energy/utilities management lies solely in the estates department and it is not widely shared or promoted within the institution.

B6: An energy manager has been appointed to task the procuring and monitoring of utilities consumption, and the promoting of energy efficiency.

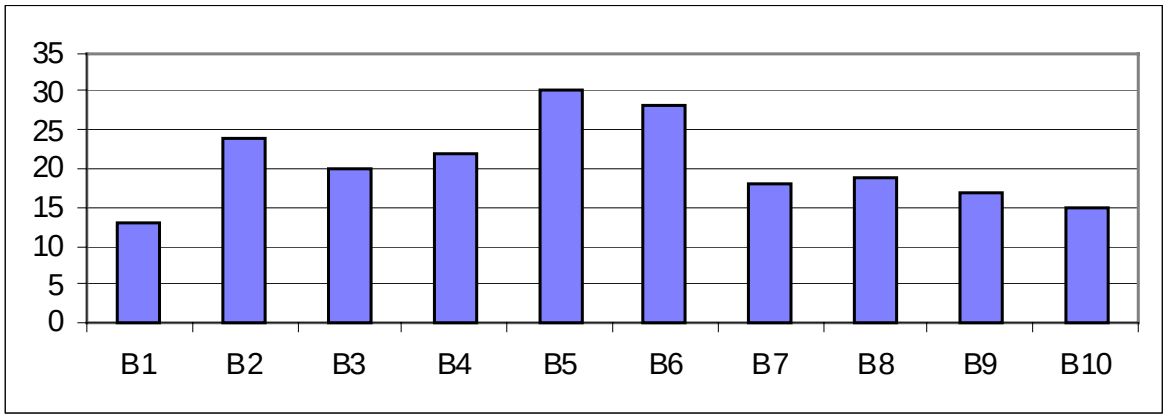
B7: The energy manager reports to a standing committee that has 'energy users' representation.

B8: The energy manager liaises with finance staff to present energy projects to the institution's main estates and/or senior management committee.

B9: The senior management team takes a proactive approach that fully supports the role of the energy management team within a sustainability strategy.

B10: Utilities monitoring, management and reporting are fully integrated into the senior management committee cycles, with positive feedback being given to the energy management team.

Results



Total number of replies = 56

Motivating and marketing

Questionnaire

C1: Contact with users limited to occasional exhortations to 'Save It'.

C2: Some promotion of energy issues, but nothing regular or targeted.

C3: Management information, reporting and guidance on energy efficiency opportunities circulated in ad hoc manner with no clear strategy or formal programme.

C4: Some ad hoc staff awareness training by estates staff, but not integrated into staff development programme.

C5: Contact with major users through ad hoc committee, chaired by senior departmental manager.

C6: Energy/environmental committee used as main channel for management reporting together with direct contact with major users.

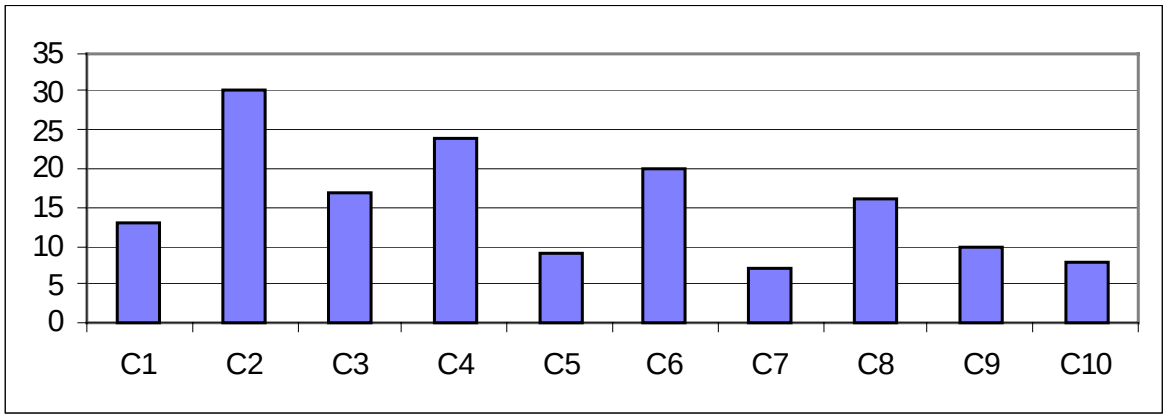
C7: Regular programme of publicity for staff awareness – including induction.

C8: Formal and informal channels of communication and management reporting regularly exploited by energy and environmental staff.

C9: Clear delegation of responsibility for utilities consumption with targets, monitoring and management reporting feedback to large users.

C10: The value of environmental protection and energy efficiency and the performance of utilities management are marketed within the institution and outside it.

Results



Total number of replies = 56

Training arrangements

Questionnaire

D1: Keeping up to date on energy efficiency is not an important consideration for estates and departmental technical staff.

D2: Trade journals and manufacturers' literature provide the main source of information for estates and departmental technical staff on energy efficient products and technologies.

D3: Professional and technical journals are scanned on an ad hoc basis for information on the latest developments in energy efficiency.

D4: Limited attempts are made to inform departmental technical staff of the techniques and benefits of energy efficiency.

D5: Limited training opportunities available for estates, departmental technical and energy management staff to develop and acquire appropriate skills in support of their energy management responsibilities.

D6: Trade journals, literature and other sources are studied for energy implications when replacing and purchasing new equipment for the institution.

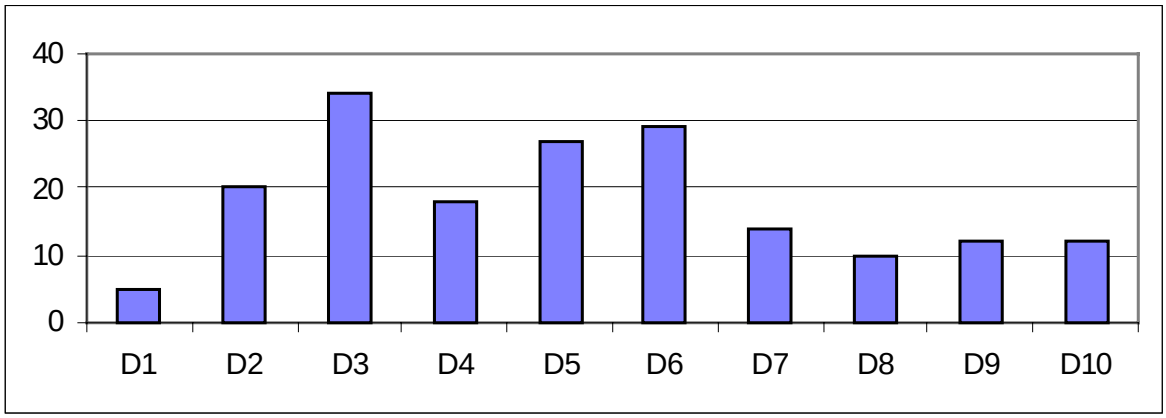
D7: Specific training provided for departmental technical and energy management staff to manipulate data and provide appropriate energy management information.

D8: Specific training provided for departmental technical and energy management staff to evaluate energy projects, using investment appraisal and whole life costing tools.

D9: The institution provides an active technical library, containing both web based and printed environmental and domestic/non-domestic energy efficiency materials.

D10: Continuous and comprehensive professional development is arranged for all estates, departmental technical and energy management staff within the institution.

Results



Total number of replies = 56

Appendix D2
Checklists and other resources

This appendix contains a range of tools and information to help HEIs develop their energy management policies. These are:

1 Energy management good practice self-assessment checklist

This good practice checklist is based on existing energy and environmental good management practice, identified within a number of higher education institutions (HEIs). It has been produced as a guide for senior managers and others responsible for the management of energy, and internal auditors of HEIs. Other people may also find it useful, including members of governing committees, budget holders, professional advisers and external auditors.

The checklist is designed to promote good practice in managing energy, and could be of value in the following ways:

- to help senior managers, audit committees and governing bodies assess the effectiveness of their HEI's present energy management arrangements
- to help managers responsible for the operational arrangements for energy management within HEIs
- to help auditors (internal and external) and professional advisers in their reviews of HEIs' energy management arrangements
- to help HEIs maximise the benefits they achieve from the management of energy, for example, identifying energy saving measures; producing better, more credible information
- to support generally the quality and credibility of energy management arrangements in the HE sector.

How to use the checklist

The checklist is divided into sections, each with key questions on energy management arrangements. A Yes/No answer is requested, but space has been provided for comments on present arrangements and suggestions for areas for development or improvement. The checklist may also be used to identify priorities for implementing changes to the current management arrangements for energy.

Institutions may wish to use the checklist as follows:

- for **members of governing committees, senior management and energy management teams**, to conduct a quick review using only the key questions, or those from specific sections only
- for **internal auditors and/or other professional advisers** to 'walk through' the checklist with relevant institutional staff. This could be a full review of all the questions, or a more limited review of only key questions/specific sections
- for **energy management teams** to go through all the questions or, those from specific sections only.

Once the review is complete, a plan could be prepared detailing the action to be taken in response. This could be presented to the senior management team (or committee overseeing this area) for its consideration and/or approval. The senior management team could then receive periodic reports on progress towards achieving the action plan. The exercise could be repeated in short form at any time; but more thoroughly in line with the renewal of energy contracts, reviews of strategic policy arrangements for energy, and so on. It could be repeated annually or less often, say, every three years.

As indicated in Appendix H, *External drivers for integrating sustainability into estates management in the HE sector*, the future agenda for energy and environmental issues will increasingly be directed by legislation over the next five years. The actions identified in the following checklist will help institutions to develop a strategy that: addresses the legislative requirements that are being formalised now; helps promote a greater awareness of energy issues within the institution; and saves money.

The checklist covers:

- risk management – legislation, corporate social responsibilities etc (question 1)
- sustainability policy – strategic arrangements (questions 2 to 6)
- allocating responsibility for managing energy consumption (questions 7 to 12)
- communication with energy users (questions 13 to 17)
- supporting energy awareness by training users (questions 18 to 19)
- business planning (question 20)
- investment appraisal methods (questions 21 to 28)
- project funding (questions 29 to 39).
- procurement arrangements (questions 40 to 44)
- surveys, planning, audits and reviews (questions 45 to 52)
- management information and systems (questions 53 to 65)

The checklist should be adapted to meet the needs of the institution. Further information regarding the issues raised may be found in Appendix E, *Glossary, bibliography and additional sources*.

1 Energy management good practice self-assessment checklist

Recommended energy management actions		Key Action? – Yes/No	Suggestions for improvement as part of the present energy management arrangements?	Comments/priorities for implementation
Risk management – legislation, corporate social responsibilities etc				
1	Risk management processes in place for compliance with legislation, corporate social responsibilities and other issues relating to energy management (see Appendix D2, *Energy management risk prompt list*)			
Sustainability policy – strategic arrangements				
2	Strategic arrangements for energy apply to the management of all utilities – including water – as part of a sustainability policy (see section 2 of the main text *'Sustainability framework for the HE sector'*)			
3	Sustainability policy is updated in line with changes to the institution's corporate plan and corporate social responsibilities strategy			
4	Sustainability policy is supported by an energy plan for implementing and monitoring clearly defined annual objectives and performance measures			
5	Sustainability policy and energy plan clearly define corporate and individual responsibilities – for the institution, senior management team, staff and students			
6	Regular risk management reviews are undertaken in respect of the institution's utilities arrangements (see Appendix D2, *Communication matrix questionnaire checklist*, questions A1 to 10)			
Allocating responsibility for managing energy consumption				
7	Strategic responsibilities for energy and environmental issues have been			

Recommended energy management actions		Key Action? – Yes/No	Suggestions for improvement as part of the present energy management arrangements?	Comments/priorities for implementation
	identified			
8	There is senior management commitment to continuous improvement in the management of energy and related issues			
9	Operational responsibilities for energy management have been assessed (see Appendix D2, *Communication matrix questionnaire checklist*, questions B1 to 10)			
10	Energy user liaison representatives have been appointed throughout the institution			
11	Formal arrangements have been implemented for identifying energy targets, monitoring and management reporting, as part of allocating responsibilities at strategic and operational management levels			
12	The value of environmental protection, energy efficiency and the performance of utilities management are marketed within the institution and outside it			
<u>Communication with energy users</u>				
13	There is regular contact with all users concerning energy management			
14	The production and dissemination of management information, and the reporting and guidance on energy efficiency opportunities, is part of a formal energy communications programme			
15	The energy and environmental strategies of the institution are underpinned with a communications programme that involves all students and staff			
16	The effectiveness of marketing and awareness actions for different energy users are regularly assessed and updated as necessary (see Appendix D2,			

Recommended energy management actions		Key Action? – Yes/No	Suggestions for improvement as part of the present energy management arrangements?	Comments/priorities for implementation
	Communication matrix questionnaire checklist, questions C1 to 10)			
17	Free government publications and 'create your own' energy awareness materials are used as part of the energy communications programme for all students and staff			
<u>Supporting energy awareness by training users</u>				
18	Energy awareness training for students and staff is undertaken by estates staff, as part of integrated staff development programmes (see Appendix D2, *Communication matrix questionnaire checklist*, questions D1 to 10)			
19	Professional energy training is provided for all estates staff (and others) who have specific and defined roles regarding energy management			
<u>Business planning for energy projects</u>				
20	Business plans are prepared for all major energy projects and investments (see Appendix D2, *Business case template*)			
<u>Investment appraisal methods</u>				
21	Investment appraisal methods are used to evaluate energy efficiency projects (see Appendix D2, *Appraising investment decisions checklist*)			
22	Payback criteria are applied to all energy projects below £25,000 and/or where payback period/economic life is less than 5 years			
23	There is an annual budget for energy management projects			
24	Investment criteria have been identified for all energy projects and other capital projects between £25,000 and £100,000 and/or where payback			

Recommended energy management actions		Key Action? – Yes/No	Suggestions for improvement as part of the present energy management arrangements?	Comments/priorities for implementation
	period/economic life is between 5 to 10 years			
25	A comprehensive investment appraisal is undertaken for all energy projects and other capital projects over £100,000 and/or where payback period/economic life is over 10 years			
26	The investment appraisals of all new-build and refurbishment opportunities include utilities, maintenance and other running costs (see Appendix D2, *Repair or replace decisions checklist*)			
27	The institution takes full account of all benefits, including those which may not have an identifiable direct cost benefit			
28	The payback/investment criteria used for energy projects are regularly reviewed			
Project funding				
29	All no cost/low cost energy efficiency measures have been identified and implemented (see Appendix D2, *Energy savings measures schedule)*			
30	There are funding processes in place and resources available to increase energy efficiency savings			
31	Over the last 5 years, investment has been made by the institution to increase the energy efficiency/management of its premises			
32	The institution proposes to increase its investment in energy efficiency/management of its premises over the next 5 years			
33	Changes have been implemented in the past for funding energy projects			
34	The institution makes available funding from capital, revenue or borrowing for			

Recommended energy management actions		Key Action? – Yes/No	Suggestions for improvement as part of the present energy management arrangements?	Comments/priorities for implementation
	low risk projects with paybacks of less than one year			
35	The institution formally considers funding energy projects from capital budgets, even if very short-term returns are not evident			
36	Energy projects compete for capital funding along with other business opportunities			
37	Energy projects do not have to meet more stringent requirements for return on investment than other projects			
38	The institution discriminates positively in favour of 'green' schemes			
39	Environmental projects compete equally with other core business opportunities for funding			
<u>Procurement arrangements</u>				
40	Reviews have been undertaken of purchasing arrangements for all utilities			
41	Energy fuel types, supply and tariff arrangements, tender and contract terms/arrangements are regularly documented, monitored and re-assessed, as part of the institution's energy management review processes			
42	The institution's energy purchasing arrangements allow it to: ▪ respond to market conditions ▪ convert to alternative fuels when appropriate			
43	Arrangements are in place to facilitate liaison between energy, finance and purchasing staff, regarding the negotiation and monitoring of energy contracts			
44	The institution is an active and full member of a purchasing consortium for its utilities supplies			

Recommended energy management actions		Key Action? – Yes/No	Suggestions for improvement as part of the present energy management arrangements?	Comments/priorities for implementation
<u>Surveys, planning, audits and reviews</u>				
45	Energy walkabouts and utilities surveys are conducted by experienced staff/consultants on buildings and plant equipment, to identify energy measures likely to deliver the greatest savings			
46	The utilities' monitoring and analysis arrangements are used to identify possible areas for energy efficiency and savings			
47	Lists of identified high/low cost energy project opportunities are retained, to facilitate their implementation			
48	Utilities surveys are regularly undertaken and the survey findings are published. Key actions identified following the surveys are reported upon as part of the implementation of a management action plan			
49	Energy staff are required to identify and assess the most energy efficient option in all capital (new-build), refurbishment, minor works and major maintenance project proposals and plant replacement decisions, to mitigate potentially detrimental energy implications			
50	Energy staff seek to identify all projects where energy efficiency can be improved at a marginal cost			
51	Life-cycle costs are taken into account when approving energy efficiency options			
52	Life-cycle costs decisions are identified and approved for environmental projects			

Recommended energy management actions		Key Action? – Yes/No	Suggestions for improvement as part of the present energy management arrangements?	Comments/priorities for implementation
<u>Management information and systems</u>				
53	The institution has access to adequate management information (ie, correct format, easily available and assessed), to support energy saving proposals			
54	Performance achievements of utilities management (ie against identified targets/benchmarks) are reported effectively to users			
55	Information is retained to help demonstrate whether previous investment in energy efficiency has been worthwhile			
56	Information is available to develop a case for energy project funding			
57	Promising energy proposals are presented to senior management			
58	There is an annual report on energy for the senior management team and/or a senior committee. (The report would include published trend data on utilities' consumption and cost. The report would be one of a number of self-assessment actions for energy performance established by the institution)			
59	The institution has access to a comprehensive energy management information system (EMIS) to: ▪ set targets/benchmarks ▪ monitor consumption ▪ identify faults ▪ quantify savings ▪ provide budget tracking ▪ utilities reporting			

Recommended energy management actions		Key Action? – Yes/No	Suggestions for improvement as part of the present energy management arrangements?	Comments/priorities for implementation
60	The institution's management information system enables/provides identification of: ▪ past energy savings ▪ opportunities for energy project investment, to meet the institution's environmental requirements/criteria			
61	The EMIS captures all cost-reporting based on energy invoice details			
62	Monitoring and targeting (M&T) reports are based on supply meter data			
63	M&T reports are based on sub-metered supply data for individual premises/plant equipment, for major consumers and elsewhere if cost-effective			
64	The institution has considered accounting for energy consumption at user departmental levels			
65	Energy staff are involved in budget setting			

2 Energy management risk prompt list

This energy risk prompt list has been compiled from information provided by several institutions.

The risks in the prompt list are for guidance only: the list is not exhaustive and should not be used as a surrogate risk framework. The guidance on how each risk could be addressed is indicative only; each institution should carefully consider its own risk response and the most appropriate control processes and early warning mechanisms. The format used is also illustrative – institutions may wish to produce more detailed descriptions, assign responsibilities to specific individuals and so on. The illustrative use of certain specifics, such as posts and committees, does not imply any requirement that they should exist.

Further advice regarding other risks is available on the HEFCE web-site under Good practice/Risk management.

2 Energy management risk prompt list

Energy management				
Risk element		*Contributing factors*	*Mitigating actions*	*Early warning mechanisms*
Em1	Fail to determine and communicate an appropriate and focused sustainability strategy. Failure to set and achieve energy management performance targets and objectives reflected in corporate plans. Damage to reputation.	• Poor awareness of emerging issues, such as 'corporate social responsibility' • Forthcoming European 'energy related' directives • Government environmental policy changes • Ill-defined strategic objectives and planning arrangements • Lack of appropriate M&T system • Inability to interpret energy consumption/utilisation data	• Periodic reviews by a senior committee(s) [such as the audit committee; an environmental and energy (sustainability) committee]; including follow-up of actions identified • Strategic and operational monitoring and oversight by the senior management group • Implementation of sustainability policy • Professional advisory/update arrangements	• Not setting and the non-achievement of performance targets (eg, carbon emission reductions) • Internal/external comments or complaints • Possible qualifications in annual reports/financial statements • Collation of data for (and interrogation of) the Estates Management Statistics database
Em 2	Failure to comply with statutory requirements (UK legislation and European directives) leads to prosecution and/or closure of some buildings. Disruption to teaching and research facilities. Damage to reputation.	• Poor understanding/awareness of environmental and energy 'legislative drivers' • Inadequate metering and sub-metering arrangements (including non-retention/monitoring of readings) • Poor energy management and monitoring arrangements	• Implementation of good practice arrangements • Regular review of legislation requirements • Appointment of energy teams • Better communication between energy managers, and exchange of good practice as part of Energy ShareFair network	• Awareness of changing statutory requirements • Review of strategic planning arrangements • Failure to identify/obtain European and UK funding eg Community Energy projects

Energy management				
Risk element		*Contributing factors*	*Mitigating actions*	*Early warning mechanisms*
Em 3	Introduction of energy 'taxation' policies by Government. Punitive costs incurred, resulting in a reduction of available resource.	• Additional financial costs incurred • Failure to plan and identify mitigating actions • Poor understanding/awareness of legislation	• Implementation of energy saving measures • Setting of energy performance targets and benchmarking • Responding to legislation in a timely way, to avoid higher implementation costs	• Market intelligence obtained by membership of energy purchasing consortiums and Energy ShareFair networks • Press releases by government agencies • Increase in statutory inspections/visits
Em 4	Potential liabilities attached to energy contracts. Failure to effectively assess energy requirements forming part of energy contracts. Significant costs incurred not included in financial plans (budgets). Failure to check and monitor invoices and accounts from energy supplier. Reduction in available resources.	• Inadequate legal and procurement arrangements • Inadequate information about energy contracts • Inappropriate metering and sub-metering arrangements • Management information not provided/and or not on a timely basis • Failure of energy supplier to make agreed adjustments and corrections to energy invoices and accounts • Failure to set and monitor energy budgets	• Access to best management practice, advice and information through membership of energy purchasing consortiums and Energy ShareFair networks • Regular reviews of energy contracts – register of contracts; review of 'break' clauses in energy contracts • Review of energy invoicing, budgeting and accounting • Implementation of an appropriate M&T system (and acting on reports)	• Significant (unplanned/not provided for) costs incurred in energy contracts • Results of periodic purchasing reviews – for example, late invoicing by energy supplier; high proportion of estimated accounts (and their continued submission) from energy supplier • Review findings of management information/reporting arrangements

Energy management				
Risk element		*Contributing factors*	*Mitigating actions*	*Early warning mechanisms*
Em 5	Energy supplier under-performance. Disruption to energy supplies. Disruption to teaching and research facilities. Unable to operate.	• Business continuity arrangements not in place • Poor energy contract and project management arrangements • Inadequate management information • Failure to take references for energy supplier/contractor • Poor response by energy supplier to customer service queries and failure to act upon requests agreed with the institution	• Implementation of business continuity and risk management plans • Responsibility for contract/project management assigned to energy team • Regular reporting to management • Appropriate metering and sub-metering arrangements (including the retention and monitoring of readings)	• Articles in trade press • Adverse comments/reports from insurers • Failure of equipment • Complaints from staff/students • Late invoices from suppliers • High proportion of estimated accounts from supplier
Em 6	Under-investment in buildings, plant and equipment. Inability of the institution to function properly. Disruption to teaching and student accommodation.	• Lack of resources • Failure to allocate funds to support long term maintenance programmes	• Estates committee reviews • Regular building condition surveys • Implementation of planned and long-term maintenance programmes • Introduction of funding arrangements for energy projects (including the re-investment of energy savings) • Benchmarking of energy, maintenance and other occupation costs	• Annual reporting by energy teams • Complaints by students/staff • Deterioration and poor physical condition of buildings plant and equipment • Poor maintenance arrangements • Abnormal increases in energy consumption and cost

Energy management				
Risk element		*Contributing factors*	*Mitigating actions*	*Early warning mechanisms*
Em 7	Inadequate/lack of consideration of energy saving measures during the building design stages for new-build, refurbishment and major maintenance projects. Failure to identify, prioritise and fund appropriate energy saving measures. Loss of energy savings. Failure to meet legislative requirements. Failure to provide services to students.	• Inadequate metering and sub-metering arrangements • Non-adoption of life cycle costing arrangements for energy management arrangements • Failure to develop business case proposals for energy projects • Lack of awareness of legislation – current and forthcoming future requirements • Adopting a reactive approach rather than proactive approach to energy issues • Extensive retro-fitting of energy saving measures	• Preparation of business case for energy projects • Post-implementation reviews of energy projects • Timely reports to senior management team • Follow-up of regular energy walkabouts/utilities surveys • Implementation of an appropriate M&T system (and acting on reports) • Successful in obtaining European/UK funding for environmental and energy projects	• Inadequate energy budget – reduction • Expensive proposals for retro-fitting of energy saving measures • Significant growth in costs linked to energy contracts • Complaints by students or staff • Unregulated growth in energy consumption/utilisation

3 Communication matrix questionnaire checklist

Recommended energy management actions	Part of present energy arrangements? Yes/No	Suggestions for improvement as part of the present energy management arrangements?	Comments/priorities for implementation
Strategic policy framework:			
A1: Energy efficiency issues are recognised, but they are addressed in an ad hoc fashion. A2: Energy efficiency guidance has been drafted, but only for use by departmental technical and energy management staff. A3: Some written guidelines exist on energy management, but there is no formal and approved energy policy. A4: An energy policy has been formulated by an energy manager or senior departmental manager, but it has not been formally adopted by the institution. A5: Effective energy management arrangements, that also include water management, have been documented within an approved utilities policy. A6: A formal utilities policy has been signed by the head of the institution, but it is not part of a wider environmental strategy. A7: Some consideration has been given to environmental issues, but no formal environmental policy or management system is in place. A8: The utilities policy has been integrated within the institution's broader approach to implementing an environmental strategy. A9: The utilities policy is embedded in an environmental strategy that includes SMART (Specific, Measurable, Achievable, Relevant, Timely) objectives, defined targets, and an agreed implementation programme and timetable			
Management responsibilities:			

Recommended energy management actions	Part of present energy arrangements? Yes/No	Suggestions for improvement as part of the present energy management arrangements?	Comments/priorities for implementation
B1: Responsibility for energy costs and consumption is essentially a departmental administrative task. B2: Promotion of energy efficiency is undertaken on ad hoc basis only by estates and departmental technical staff. B3: Energy management is a part-time/shared responsibility for someone in the estates/facilities management department only. B4: Estates department staff allocate some time, resources and expertise to preparing energy proposals, but there is no formal annual programme. B5: Responsibility for energy/utilities management lies solely in the estates department and it is not widely shared or promoted within the institution. B6: An energy manager has been appointed to task the procuring and monitoring of utilities consumption, and the promoting of energy efficiency. B7: The energy manager reports to a standing committee that has 'energy users' representation. B8: The energy manager liaises with finance staff to present energy projects to the institution's main estates and/or senior management committee. B9: The senior management team takes a proactive approach that fully supports the role of the energy management team within a sustainability strategy. B10: Utilities monitoring, management and reporting are fully integrated into the senior management committee cycles, with positive feedback being given to the energy management team.			
Motivating and marketing:			
C1: Contact with users limited to occasional exhortations to 'Save It'.			

Recommended energy management actions	Part of present energy arrangements? Yes/No	Suggestions for improvement as part of the present energy management arrangements?	Comments/priorities for implementation
C2: Some promotion of energy issues, but nothing regular or targeted. C3: Management information, reporting and guidance on energy efficiency opportunities circulated in ad hoc manner with no clear strategy or formal programme. C4: Some ad hoc staff awareness training by estates staff, but not integrated into staff development programme. C5: Contact with major users through ad hoc committee, chaired by senior departmental manager. C6: Energy/environmental committee used as main channel for management reporting together with direct contact with major users. C7: Regular programme of publicity for staff awareness – including induction. C8: Formal and informal channels of communication and management reporting regularly exploited by energy and environmental staff. C9: Clear delegation of responsibility for utilities consumption with targets, monitoring and management reporting feedback to large users. C10: The value of environmental protection and energy efficiency and the performance of utilities management are marketed within the institution and outside it.			
Training arrangements:			
D1: Keeping up to date on energy efficiency is not an important consideration for estates and departmental technical staff. D2: Trade journals and manufacturers' literature provide the main source of information for estates and departmental technical staff on energy efficient products			

Recommended energy management actions	Part of present energy arrangements? Yes/No	Suggestions for improvement as part of the present energy management arrangements?	Comments/priorities for implementation
and technologies. D3: Professional and technical journals are scanned on an ad hoc basis for information on the latest developments in energy efficiency. D4: Limited attempts are made to inform departmental technical staff of the techniques and benefits of energy efficiency. D5: Limited training opportunities available for estates, departmental technical and energy management staff to develop and acquire appropriate skills in support of their energy management responsibilities. D6: Trade journals, literature and other sources are studied for energy implications when replacing and purchasing new equipment for the institution. D7: Specific training provided for departmental technical and energy management staff to manipulate data and provide appropriate energy management information. D8: Specific training provided for departmental technical and energy management staff to evaluate energy projects, using investment appraisal and whole life costing tools. D9: The institution provides an active technical library, containing both web based and printed environmental and domestic/non-domestic energy efficiency materials. D10: Continuous and comprehensive professional development is arranged for all estates, departmental technical and energy management staff within the institution.			

4 Business case template

Institutions may find the following template helpful in setting out the economic costs and benefits (tangible and intangible) for energy related projects. The template should be regarded as complementary to the institution's own investment appraisal procedures and should therefore be adapted as necessary.

Preparing a business case

The following are the key elements that would normally be found within a business case.

a. Executive summary

This should summarise the key points of the proposal and should include explicitly the resources that are being requested and the benefits that will accrue.

b. Description of the project/investment

This would comprise a short but precise description of the project. It should summarise for management why the proposal is being brought forward (draw particular attention here to any compliance/health and safety issues, if relevant, and to linkages with the strategic priorities, institutional drivers), the nature of the investment/project (ie what is being purchased/requested), what it will do and the benefits it will bring, and where it will impact within the institution. This last point is important in allowing senior management to judge the spread of benefits.

c. Current position

In this section, the proposer should give any relevant background knowledge that the readers will require, plus a brief description of what happens currently. On reading this section, it is important that senior management is able to judge whether what is proposed is a replacement/part-replacement or new investment altogether. If it is a proposal for a replacement and it is essential, then make this clear – for example, in the case of a capital replacement proposal, by indicating the current state of the existing equipment.

d. Options appraisal

In this section of the business case, detail the alternative options that have been considered, including that of doing nothing. The primary purpose of the options appraisal phase is to select a solution which optimises value for money within the overall constraints of affordability and achievability. Here it is important to highlight the additional benefits that each option might bring – it is suggested that these need to be considered across the whole lifetime of the project. Any assumptions made about the external operating environment should be included here.

For each option, list any assumptions made, benefits analysis, financial analysis, sensitivity analysis and risk analysis. From these, it should be possible to do an economic analysis ie compare costs with anticipated benefits and so derive value-for-money comparisons.

The financial analysis needs to take account of the total outlays for the project. These may include, for example, one-off capital outlays, revenue costs and professional fees for advisers. On the positive side, the proposer needs to identify the financial benefits that will flow. These may come in different forms, for example, as savings that will accrue from making the investment (for example, CHP), ongoing current actual revenue savings, sale of existing assets. It is also important to include the residual value of new assets at the end of the investment appraisal period. As expenditure and savings may occur throughout the time period of the investment proposal, adjustment will have to be made for the relative cost of money into the future – this is done by discounting net future cash flows back to the present day. Finance staff in institutions will be able to advise should energy managers require assistance.

The sensitivity analysis is critical and may relate to all aspects of the proposal, for example, costs, returns, capital machinery performance and savings. Essentially, what the sensitivity analysis does is to get the proposer thinking about the range in which costs and returns might lie. For example, anticipated energy savings may vary by plus or minus 10 per cent, and either could have a bearing on the attractiveness of an investment option for senior management. For both benefits and risks, it is important to consider both quantifiable and non-quantifiable aspects – for the non-quantifiable aspects, some scoring mechanism is needed to assess relativity between the options, for example, high, medium, low.

Finally, taking account of the options analysis, a preferred option is proposed.

In evaluating the benefits associated with energy management projects, it is suggested that whole life costing (or life cycle cost analysis) is the most appropriate and effective tool to use.

e. Monitoring and evaluation

Once a preferred option has been identified, it is usual to indicate how the overall project will be monitored and evaluated. Within this, the proposer may wish to consider ways of monitoring expenditure and savings, and how the overall effectiveness of the project will be measured. Although monitoring of expenditure in the period of getting the project up and running may be fairly easy to identify, less easy may be monitoring ongoing net savings that may accrue from the investment. This is because other factors may impinge on savings, such as efficiency ratings of ageing plant and equipment; therefore some measure needs to be determined to take these into account.

5 Appraising investment decisions checklist

Important sub tasks would be proposed under each of the headings below. Further guidance may be found in Appendix D2, *Business case template* and in the Bibliography – '*Appraising investment decisions' (HEFCE 99/21)* and *'Investment decision making: a guide to good practice' (HEFCE 2003/17).*

		Key Task? – Yes/No	**Part of present energy management arrangements? – Yes/No**	**Further actions identified**
	<u>Specify the objectives</u> • How does this appraisal relate to the strategic aims of the institution? • Is the problem clearly defined? • Are the objectives supported by adequate background information, such as a strategic plan?			
	<u>Identify the options</u> • Has a sufficiently wide range of options been considered? • Has the 'do nothing' or 'do minimum' option been explicitly considered? • Have all realistic procurement options been appraised (including PFI and other innovative forms of procurement)			
	<u>Value the costs, benefits, timing, risks and uncertainties</u> • Has account been taken of all the direct costs and benefits accruing to the institution? • Are there any wider considerations? • Have all relevant costs, income streams and benefits (over the life of the project) been included?			

		Key Task? – Yes/No	Part of present energy management arrangements? – Yes/No	Further actions identified
	• Has allowance been made for running costs over the life of the project? • Have maintenance costs over the life of the project been taken into account? • Does the appraisal take account of assets that are already owned (opportunity costs)? • Does the valuation of the property represent the opportunity cost? • Is there any double-counting of costs and benefits? • What allowance has been made for non-financial aspects? • Have uncertainties in key assumptions been identified and tested? • Have risks been assessed and valued?			
	<u>Analyse the results</u> • Has the net present value been calculated for each option? • Are the price base and the base date for discounting explicitly defined? • Has an appropriate discount rate been used? • Are all costs expressed in real terms? • Is there a relative price effect to take into account?			
	<u>Assess affordability</u> • Has the impact on the institution's overall financial position been assessed? • Can the institution accept the best and worst case scenarios? • Does the preferred solution require HEFCE approval?			

		Key Task? – Yes/No	Part of present energy management arrangements? – Yes/No	Further actions identified
	<u>Presentation of results</u> • How does the chosen option compare with the alternatives? • Are the results set out clearly, in an appraisal report, in a logical order and with all relevant assumptions made clear? • Are tables available showing the details of costs and benefits for all options? • Do they show the effects of risks? • Do they show the influence of sensitivities? • Is the overall financial impact clear?			
	<u>Monitoring and evaluation</u> • Is provision made for monitoring project performance? • Are proposals included in the appraisal report for evaluating the project and its performance once implemented? • Is the timescale for evaluation defined?			

6 Repair or replace decisions checklist

This checklist is designed to help institutions decide whether to repair or replace building fabric, installed equipment, and service elements and components. The checklist should be modified to meet the specific requirements of the institution.

Considerations	**Options**	**Repair** (Tick box	**Replace** only **one** per section)
Age: Consider the age of the element/component in relation to its expected economic life.			
Age is less than expected economic life	Consider repair, if condition is very satisfactory [*or replace reference to condition with 'repair before replacement'*].		
Age is at or close to expected economic life	Consider repair and/or partial replacement, if condition is satisfactory in part.		
Age is more than expected economic life	Consider replacement, if condition is very unsatisfactory.		
Condition: Assess the current condition, as well as any underlying trend in condition, of the element/component in relation to its operating performance.			
Current overall condition, and the underlying condition trend, is very satisfactory and consistent	Continue to repair as necessary. Priority is low.		
Current condition, and the underlying condition trend, is satisfactory in part and therefore subject to qualification (which should be stated, either in regard to the element's/ component's condition and/or its rate of deterioration)	Consider repair and/or partial replacement. Priority is medium to high. Repair as generally required, but consider replacing worst parts and, if appropriate, start to plan for replacement in part, or complete. If the rate of deterioration indicates, then appraise condition more frequently. If repair is not cost-effective, then replace.		
Current overall condition, and the underlying condition trend, is very unsatisfactory (giving cause for concern that the trend in the rate of deterioration is rapid and/or hazardous and/or liable to contravene legislation)	Replace as a high priority.		

Considerations	Options	Repair (Tick box	Replace only **one** per section)
Maintenance costs: Ascertain the current level of maintenance expenditure on the element/component as a proportion of its capital cost, and whether life-cycle costs indicate that replacement provides clear cost-benefits.			
Maintenance costs are low	Continue to repair.		
Maintenance costs are average	Consider repair and/or partial replacement. Repair as generally required, but consider replacing worst parts and, if appropriate, start to plan for replacement in part, or complete. If the rate of deterioration indicates, then appraise condition more frequently. If repair is not cost-effective, then replace.		
Maintenance costs are high	Replace, if life-cycle costing indicates positive cost-benefits.		
Energy cost-benefits: Identify the current level of energy consumption cost of the element/component as a proportion of its operating costs, and whether energy cost-savings indicate that overall replacement is cost-effective.			
Energy cost-benefits are high	Replace, if positive cost-benefits indicated.		
Energy cost-benefits are average	Consider repair and/or partial replacement, as appropriate.		
Energy cost-benefits are low	Continue to repair.		
Technology and design opportunities: Evaluate the continued 'fitness for purpose' of the element/component and whether developments in technology and design indicate that overall replacement provides clear cost-benefits.			
Fitness for purpose is very satisfactory	Continue to repair.		
Fitness for purpose is satisfactory	Consider repair and/or partial replacement, as appropriate.		
Fitness for purpose is unsatisfactory	Replace.		
Spare parts availability and cost: Confirm that spare parts for the element/component are readily available at a reasonable cost.			
Spare parts are readily available at a reasonable cost	Consider repair, if other factors indicate cost-benefits.		
Spare parts are not readily available at a reasonable cost	Replace, even if other factors indicate otherwise. Circumstances would indicate that advances in technology, etc, have taken place.		

Other comments:

Summary

Considerations	**Findings** (Indicate findings, whether repair or replace, for each of the completed sections above)	**Risk** (on a scale of 1 – 5, where 5 is greatest)	**Priority** (on a scale of 1 – 9, where 9 is highest)	**Final decision**
Age				
Condition				
Maintenance costs				
Energy costs				
Technology and design				
Spare parts				

Actions

Supplier	
Purchase Order No	
Date	

Signed:…….....
Date:…….....

Notes

7 Energy savings measures schedule

The following measures, classified by payback period, are some suggested items that could be part of an energy savings strategy.

Payback period	Boiler room, heating system and other measures	
Free measures	▪ Eliminate unnecessary running of boilers at weekends ▪ Eliminate holiday heating ▪ Ensure that controls are set to provide the temperatures you want at the times you need, and that the temperatures comply with current statutory requirements	▪ Reduce domestic hot water temperatures* ▪ Isolate immersion water heaters during holidays ▪ Use swimming pool cover where fitted ▪ Replace 38mm fluorescent tubes with high efficiency 26mm tubes as the former expire (if you have switch start fittings)
Short payback (less than 2 years)	▪ Recommission optimiser and heating controls ▪ Check that boiler air/fuel ratio is correct (as part of regular maintenance) ▪ Fit boiler sequence controls ▪ Repair leaks on distribution mains ▪ Reduce use of supplementary electric heaters ▪ Install, repair or replace thermostats ▪ Insulate domestic hot water cylinder ▪ Provide additional heating controls for individual heaters	▪ Reset domestic hot water thermostat* and time switches and make tamperproof ▪ Blank off unused air grilles behind radiators ▪ Seal unused chimneys and ventilation stacks ▪ Fit reflective foil behind radiators ▪ Install time-switches for swimming pool circulating pumps ▪ Replace tungsten lighting with compact fluorescent lamps
Medium payback (2 – 5 years)	▪ Install modern instruments to control boiler burners and measure flue gas composition ▪ Discontinue night set-back and install optimiser ▪ Install thermostatic boiler controls ▪ Improve/repair thermal insulation on the boiler ▪ Fit an optimiser and/or compensator ▪ Install a Building Energy Management System ▪ Install dual fuel burners to boiler ▪ Insulate pipework to heating system ▪ Fit timeclocks to hot water immersion heaters ▪ Replace central hot water boiler with point-of-use gas or off-peak electric heaters ▪ Fit thermostatic radiator valves ▪ Replace on-peak electric convector heaters with off-peak storage	▪ Fit timeclocks to fan convector heaters ▪ Improve controls to storage radiators ▪ Install manual swimming pool cover ▪ Fit self-closing devices to external doors ▪ Draught-strip external doors and windows ▪ Insulate loft spaces to current standards ▪ Install cavity wall insulation ▪ Install spray taps (soft water areas only) and automatic valves to showers ▪ Install water economy equipment to WC and urinal cisterns ▪ Install heat pump heat recovery system to swimming pool ▪ Control run times for extract fans ▪ Rearrange switching of light fittings

Payback period	Boiler room, heating system and other measures	
Long payback (typically 5 – 10 years)	▪ Improve zoning of the heating system ▪ Install new condensing boiler ▪ Replace electric storage and water heaters with gas-fired heaters ▪ Install draught lobby to main entrance ▪ Install double glazing ▪ Fit secondary double glazing ▪ Install occupancy sensors to control lighting	▪ Replace old fluorescent fittings with modern efficient fittings , e.g. high frequency fluorescent fittings ▪ Insulate existing swimming pool roof and walls ▪ Install automatic swimming pool cover ▪ Replace excessive areas of glazing with insulated infill panels

* Statutory compliance

The following measures, classified by services function, are some suggested items that could be part of an energy savings strategy of the institution as part of its management arrangements.

Electrical plant

- Better use of tariffs – day/night rates etc
- Power factor correction
- Plant scheduling and maximum demand control
- Motor size reduction
- Motor speed reduction
- High efficiency electric motors
- Variable speed drives for electric motors
- Application of flat belts for electric drives
- Transformer selection and sizing
- Efficient utilisation of lift equipment and operational controls
- Mains-borne signalling to control lighting, M&E plant and so on

Lighting systems

- More efficient lighting systems – slim fluorescent tubes, compact fluorescent units and so on
- Lighting control to include photocell, acoustic, movement, time, pull cords and so on
- High frequency lighting
- Microprocessor based lighting control systems
- Lighting switching arrangements – configure with room layout and so on
- Appropriate lighting levels – not excessive
- Cleanliness of luminaires
- Reflector and silvered type light fittings

Boilerplant

- Improvement to combustion efficiencies
- Use of condensing boilers
- Installation of economisers, waste heat recovery units and so on
- Improvement to boiler plant management and operating procedures
- De-centralisation of boilers
- Use of high efficiency boilers
- Reduction in boiler operating pressure
- Reduction in standing heat losses from boilers
- Installation of new and improved controls – optimised start and stop, compensated circuits and so on
- Installation of sequence boiler firing controls

- Installation of flue baffles
- Boiler replacement
- Installation of summer boiler
- Fuel conversion changes and alternative fuel strategy
- Full automation, ie, oxygen trim controls
- Re-commissioning of controls
- Pipework and fittings insulation

Fuel storage and handling systems

- Oil tank insulation
- Oil temperature controls improvements

On site power production

- Combined heat and power
- Peak demand reduction ('lopping') using stand-by power generation

Distribution systems

- Distribution pipework and fittings insulation
- Removal of redundant pipework
- Steam trap operation
- Improvements to condensate recovery
- Insulation of pipework fittings and valves, and so on
- Reduction in energy losses by repairing leaking distribution pipework
- Destratification systems
- Re-commissioning of controls

Space heating systems

- Improvements to existing space heating controls
- Removal of 'on peak' supplementary (secondary) electric heating
- Improvements to zoning of space heating
- Replacement of existing space heating systems with more efficient alternatives, such as radiant heating systems
- Introduction of improved space heating controls
- Use of an energy management system
- Use of a building management system
- Installation of thermostatic radiator valves
- Fitting of reflective foil behind radiators
- Re-commissioning of controls

Domestic hot water systems (DHW)

- Improvements to existing DHW controls
- Introduction of improved DHW controls
- Changing centralised DHW generation to local electric/gas heating systems
- Use of tap restrictors
- Installation of showers rather than baths
- Re-commissioning of controls

Air conditioning and mechanical ventilation

- Heat recovery for space heating, pre-heating of DHW
- Improvements to existing heating, ventilating, and air conditioning (HVAC) controls
- Introduction of improved HVAC controls
- Better use of speed control for ventilation plant
- Investigation of speed control for ventilation plant
- Free cooling
- Sequence control of cooling tower fans and condenser pumps
- Night time purge
- Air quality control – to vary air ventilation rates
- Alternative cooling systems in line with Building Regulations revision L
- Re-commissioning of controls

Building fabric

- Reduction in air infiltration rates
- Improvements to building insulation
- Installation of secondary glazing
- Improvement to draught stripping
- Better utilisation of space
- Installation of fast acting doors
- Installation of air curtains

Catering

- Replacement of existing equipment
- Improvements to management (use by staff) techniques – avoiding excessive pre-heating of catering equipment, operation of freezers/fridges and so on

Swimming pools

- Use a pool cover
- Investigate combined heat and power
- Investigate heat pumps
- Investigate use of condensing boilers
- Effective space and pool water temperature control

Incineration

- Heat recovery
- Fuel change
- Plant replacement

Compressed air

- Leakage in compressed air systems
- Control of air compressors
- Centralisation or de-centralisation of compressed air plant
- Replacement of compressor plant
- Heat recovery

Water systems

- Reduction in leakage rates
- Recycling of water
- Installation of water conservation devices
- Better use of water tariff
- Reduce water outlet temperature in-line with HS(G) 70, if appropriate

Chiller/cold store plant

- Space utilisation
- Heat recovery
- Sequence and load control
- Temperature control
- Insulation

Utility management

- Installation of Building Energy Management Systems
- Initiation of formal M&T programme
- Energy awareness programme and good housekeeping programmes
- Energy-conscious design incorporated into new-build and refurbishment projects
- Energy efficiency improvement tasks included in planned maintenance contracts
- Electricity purchasing review
- Natural gas purchasing review
- Water tariff alterations, ie, non-return to sewer allowance
- Cold water saving devices including tap restrictors, WC cistern dams, urinal flush controllers