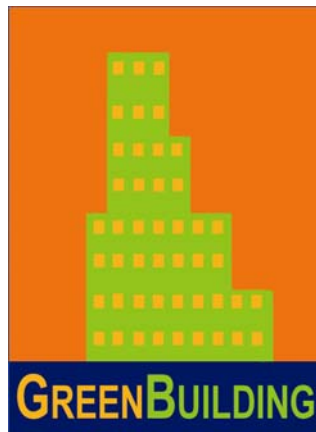




EUROPEAN COMMISSION
DIRECTORATE-GENERAL JRC
Institute for Environment and Sustainability
Renewable Energies Unit

Ispra, 14 December 2004

**THE EUROPEAN
GREENBUILDING PROGRAMME**
Guidelines for Energy Management
Version 1.0



Contents

1. Introduction to the Guidelines for Energy Management document	1
2. Inventory of Energy related Management Policies	3
3. Assessment of possible energy saving Management Policies.....	4
4. Action plan.....	9
5. Annual Report.....	10

1. Introduction to the Guidelines for Energy Management document

This document is subsidiary to the Green Building Programme (GBP) "Partner Guidelines". The **Guidelines for Energy Management** is an important element of the GreenBuilding programme and is supposed to aid participants in making energy aspects an element of management priorities at every step of the life cycle of a building. This guidelines describes energy related Management Policies and how Partners can integrate them into their Action Plans¹. An energy management policy is required by each Partner. In particular, the Guidelines explains what a Partner does for each of the following steps of participation:

- **Inventory** of energy related management policies and practices
- **Assessment** of the applicability of possible energy policies and practices
- **Action plan**, that defines the management policies and practices that the Partner has decided to institute, in order to reduce operating costs.
- **Annual report** of progress on the Action Plan.

Superior energy management is good business. Recent research suggests that leaders in energy management are able to achieve superior financial performance. Whether your business is commercial, industrial, or institutional, energy is part of your value chain and managing it strengthens your bottom line. Based on the successful examples, these guidelines for energy management can assist organizations in improving their energy and financial performance while distinguishing them as an environmental leader.

The Commission recognises that changes in Management Policies and Practices can involve complex strategic or operational parameters. Therefore, a Partner may adopt, modify or ignore any of the elements of this Guidelines, as the Partner deems appropriate. The nature and the format of any commitment and of reporting is up to the Partner. However every Partner shall submit when applying for the GreenBuilding programme its Energy Management Policy and the Action Plan.

Achieving and maintaining optimal energy related operating costs is not a "one shot" operation. Organizations seeing the financial returns from superior energy management continuously strive to improve their energy performance. Their success is based on regularly assessing energy performance and implementing steps to increase energy efficiency. No matter the size or type of organization, the common element of successful energy management is commitment. Organizations make a commitment to allocate staff and funding to achieve continuous improvement. To

¹ Refer to the "Partner Guidelines" for an explanation of terms such as "Partner", "action plan" and "commitment".

establish their energy program, leading organizations form a dedicated energy team and institute an energy policy. Energy considerations shall be integrated at different levels of the organisation activities and management and into many different procedures. An overall goal shall be established². The overall goals can be expressed in the environmental policy. More explicit targets and procedures need to follow.

- Overall goals —————> Environmental policy
- Energy targets —————> Energy purchasing policy
 - > O&M policy
 - > Recommendations for the design of new buildings and systems
 - > Recommendations for building refurbishment
 - > Recommendations for equipment purchasing
 - > Recommendations for facility management

In deciding on the applicability of improved Management Policies, Partners might use the following questions as guidelines:

- **What is at stake?** What are the company annual energy costs? If known, what proportion is in electricity, heat, cooling? What are the non-cost implications, in terms of improved working conditions etc, reduced pollution, enhanced recognition as environmental leader?
- **Who is responsible?** Is overseeing energy costs assigned to a particular post within the company structure? Note that in a large company, this might be a full time occupation for one, or even several, persons. Does the company dispose of sufficient competence (internally, or through outside service providers) to evaluate energy savings measures and to implement successfully an energy policy?

To establish their energy program, leading organizations form a dedicated energy team³ and institute an energy policy.

Establish an Energy Team

Decisions affecting energy use are made every day by people. Creating an energy team helps to integrate energy management. In addition to planning and implementing specific improvements, the team measures and tracks energy performance and communicates with management, employees and other stakeholders. The size of the energy team will vary depending on the size of your organization. In addition to the Energy Director who leads the team and possible dedicated energy staff, consider including a representative from each operational area that significantly affects energy use, such as:

² Examples of overall goals could be a certain reduction of the CO2 emission caused by the company energy use, the decrease of energy consumption per unit of output, or the increase of energy efficiency, the ranking in the top league among competitor companies in term of energy use.

³ Establish an the Energy Team executes energy management activities across different parts of the organization and ensures integration of best practices. It may also be useful to appoint an Energy Director, who sets goals, tracks progress, and promotes the energy management program.

- Engineering
- Purchasing
- Operations and Maintenance
- Building/Facilities Management
- Environmental Health and Safety
- Corporate Real Estate and Leasing
- Construction Management
- Contractors and Suppliers
- Utilities

2. Inventory of Energy related Management Policies

A first step in investigating the applicability of improved Management Policies is to establish an "Inventory" of the current status of integration of energy considerations into existing policies and practices, concerning each phase of the building and system life cycle: design; construction; component and systems choice; procurement; installation; commissioning; operation and maintenance, facility management. If the company is already following an energy management (e.g. for Danish or Swedish companies) or environmental system (e.g. ISO 14000) this could be used to formulate the action plan. Policies and practices should be evaluated according to the following criterion.

"Does this policy take into account long term operating costs in general, and energy costs in particular? Does the current practice optimise service rendered as compared to long term costs?"

Policy area	Inventory results
	Does the policy/procedure include energy consideration? If so, in what way?
Environmental policy	
Internal design procedures	
Equipment Purchasing and Service Procurement practices	
Facility Management	
Operation and Maintenance practices	
Profitability Criteria (long term)	
Energy use measurement	
Energy use cost accounting	
Construction and Refurbishment procedures	

3. Assessment of possible Energy Management Policies

All partners in the GreenBuilding programme have to adopt an Energy Management Policy, with the aim at creating a positive trade off between:

- **effort**, both human and financial, in the form of better design, investment in higher performance equipment, improved installation, re-commissioning, optimal operation and maintenance procedures, facility management;
- **profitability**, both directly, through **energy savings**, and indirectly, **through higher quality and reliability**, or through **positive publicity and lower environmental impact**.

The Inventory (see above) will have identified areas where modifying existing policies and practices lead to energy savings and lower environmental impact. In order to take appropriate measures to save energy, steps to integrate energy into management priorities could be considered⁴:

- Define management responsibilities for maintaining buildings and systems at optimal energy consumption levels

⁴ Energy Auditing, Monitoring and Targeting (EAM&T) is a proven management methodology for creating defining and following up on management responsibility for energy consumption.

- Install energy metering equipment at the appropriate operational level (building, floor, system, cost centre, ...) in order to identify specific measures to save energy;
- Assess performance by evaluating energy use for all major facilities and functions in the organization and establishing a baseline for measuring future results of efficiency efforts. Establish systems for gathering and tracking energy use data.
- Institute appropriate energy cost reporting, so as to facilitate monitoring of energy consumption;
- Integrate energy costs into profit centre cost accounting, on the basis of measured energy consumption.

Institute an Energy Policy

An Energy Policy provides the foundation for successful energy management. It formalizes senior management's support and articulates the organization's commitment to energy efficiency for employees, shareholders, the community and other stakeholders.

Successful organizations have energy policies that:

- Have a clear, measurable objective that reflects the organization's commitment, culture and priorities.
- Establish accountability and institute a chain-of-command, define roles in the organization, and provide the authority for personnel to implement the energy management plan.
- Ensure continuous improvement and include provisions for evaluating and updating the policy to reflect changing needs and priorities.
- Promote goals and provide a context for setting performance goals by linking energy goals to overall financial and environmental goals of the organization.
- Involve key people in policy development to ensure buy-in.
- Communicate the policy to all staff and employees, and encourage them to get involved.
- Establish reference points for measuring and rewarding good performance.

Assessing energy performance helps companies to:

- Categorize current energy use by fuel type, operating division, facility, product line, etc.
- Identify high performing facilities for recognition and replicable practices.
- Prioritize poor performing facilities for immediate improvement.
- Understand the contribution of energy expenditures to operating costs.
- Develop a historical perspective and context for future actions and decisions.

A second category of possible management action concerns integrating energy considerations into each step of the life cycle, by:

- Explicitly integrating energy performance criteria into internal design and construction procedures
- Integrating life cycle costing into competitive bidding processes

- Requiring equipment suppliers and service providers to specify the energy performance of their equipment or service in real operation;
- Instituting company wide purchasing policies on specific energy efficient technologies (for instance require EFF1 motors, pumps in the top procurement class, triple glazed windows, etc). Specify these technologies in calls for tender offers;
- Integrating energy considerations into operation & maintenance practices.
- Carry out continuous building commissioning;
- Motivate all staff and employees to energy savings and to contribute to the company energy and environmental goals

Life cycle costing

Directly or indirectly, evaluating the balance between effort and payback will involve some form of "life cycle costing" (LCC). This means integrating long term costs into the management decision process. Applying LCC can be simple or complex, for instance:

- simple rule of thumb. To evaluate competing options for an equipment purchase, compare:

$$\text{Initial purchase price} + 3 \times (\text{annual energy cost for the option})$$
- Net Present Value. Carry out a full discounted cash flow analysis, integrating cost elements such as energy, maintenance, decommissioning at end of life, etc.

The choice of the appropriate LCC method will of course depend on the size and complexity of a particular investment decision. Furthermore, in today's competitive business environment, most companies outsource at least some aspects of the design, construction, equipment installation, operation and maintenance of buildings. Thus LCC must be applied both to internal decision processes and to purchasing and outsourcing practices. The GBP "Tool box" offers examples of possible LCC tools.

Recommissioning

Recommissioning is essentially the same process as commissioning, but applied to existing building's equipment such as HVAC, controls, and electrical systems. When standardized maintenance and energy management procedures fail to fix chronic building problems, recommissioning provides a systematic approach for discovering and solving them. Recommissioning entails the examination of actual building equipment systems operation and maintenance procedures for comparison to intended or design operation and maintenance procedures.

Recommissioning capitalizes on heating, cooling, and electrical load reductions by continually monitoring energy consumption to optimize energy performance and savings. Recommissioning can be a cost-effective retrofit in itself, sometimes generating more savings than the cost of the retrofit measure. This can result in additional savings other than direct energy cost reductions. For example, a recommissioning may help avoid the need to install new or additional equipment, resulting in capital savings. In the recommissioning phase, you will continue to implement numerous cost-effective strategies to reduce your heating, cooling, and electrical loads, and your overall energy consumption, while improving occupant comfort.

The recommissioning chapter will help you understand if the building is operating as intended and if current operational needs are being met. It will help you identify improper equipment performance, opportunities for saving energy and money, and strategies for improving performance of the various building systems.

Possible Ways to Save Energy

- Calibrate building controls such as thermostats and occupancy sensors.
- Adjust operating schedules to ensure equipment is on only when necessary.
- Check for leaking or improperly functioning steam traps.
- Clean heat exchanger tubes in the condenser, evaporator, and boiler to maintain

optimal efficiency.

Possible Management Decisions

- Recognize building tune-up as an opportunity to reduce energy costs and regain or improve comfort.
- Allocate time and funding to a building tune-up separately from your ongoing maintenance budget.
- Explore available financing options if in-house funds are not available.

Of course, possible savings will have to be compared to the investment of precious time and money. Many of the actions implemented in an energy management policy do not require additional investment, and are usually the lowest cost option to reduce energy consumption and increase energy efficiency. The results of the assessment might take a form similar to the following table.

Policy area	Assessment results			
	Specific proposed action	Estimated annual direct and indirect savings	Investment cost (1)	Annual O&M cost (1)
Environmental policy		-	-	-
Internal design procedures				
Equipment Purchasing and Service Procurement practices				
Operation and Maintenance practices				
Energy use measurement				
Energy use cost accounting				
Construction and Refurbishment procedures				
Profitability Criteria (long term)				

(1) Investment and O&M costs are estimates of changes in costs, with respect to what would have been spent without Partner commitment. This may be, for instance, additional investment for higher performance equipment, or increase/decrease in maintenance costs. It may also cover the cost of changing some management practices.

Of course, the cost and savings calculations proposed can rarely be carried out precisely for general policy and practice issues: they will generally be limited to qualitative or order of magnitude estimates.

4. Action plan

When your company implements a new or improved energy related Management Policies, this shall be integrated into your Green Building Programme "Action plan", indicating the measures you have decided to implement, and the time scale for implementation. Such an action plan might be presented as follows.

Policy area	Specific policy or practice improvement	Time table ⁽¹⁾	Expected reduction (tonnes CO ₂ /year)
Environmental policy			
Internal design procedures			
Equipment Purchasing and Service Procurement practices			
Operation and Maintenance practices			
Energy use measurement			
Energy use cost accounting			
Construction and Refurbishment procedures			
Profitability Criteria (long term)			

(1) **Time table.** The time scale at which the action will be implemented. This might be a specific period or date, or might depend on some other action, for instance, creation of an annual environment report, or as part of the ISO 14000 accreditation process.

Implement the Action Plan

People can make or break an energy program. Gaining the support and cooperation of key people at different levels within the organization is an important factor for successful implementation of the action plan in many organizations. Reaching the goals frequently depends on the awareness, commitment, and capability of the people who will implement the projects defined in the action plan.

In addition to implementing the technical aspects of the action plan, organization shall consider the following:

- Create a communication plan and develop targeted information for key audiences about your energy management program.
- Raise awareness and build support all levels of your organization for energy management initiatives and goals.
- Build capacity through training, access to information, and transfer of successful practices, procedures, and technologies, can expand the capacity of the staff.

- Motivate and create incentives that encourage staff to improve energy performance to achieve goals.
- Monitor energy performance by using the tracking system developed as part of the action plan to track and monitor progress regularly.

5. Provide recognition to those who helped the organization achieve the results motivates staff and employees and brings positive exposure to the energy management program. Annual Report

Your company shall make an Annual Report to the Commission on progress made in carrying out the Action Plan. If so, the following reporting format could be used with progressive updating on an annual basis. The two left hand columns are copied from the Partner's Action Plan.

Action Plan		Annual report for year 20xx
Actions decided upon	Time scale for action	Progress on action, and comments where appropriate