**THE EUROPEAN
GREEN BUILDING PROGRAMME**

**Office Equipment Technical Module**



**Contents**

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## 1. Introduction

By becoming a GreenBuilding Partner, your company can demonstrate its commitment to significantly reduce the energy consumption in its non-residential buildings which are participating in this effort.

In the following, you may find assistance for your process of assessing and realising the energy efficiency potentials in the area of Office Equipment.

The energy consumption for information technology (IT) increased relevantly in the last years. A further rising of about 40 % within the next 10 years is predicted [ISI 2003]. Thus, office equipment becomes one of the most relevant energy consuming sectors in office buildings – and ranges commonly between 20 % and 40 %. On the other hand savings about 40 up to 50 % are economical feasible and will reduce the energy costs about 200 € per workplace within the 5-year lifetime of the equipment [Energy-Star].

The full energy saving potentials can be achieved only by reducing the power consumption in every mode (operating, standby/sleep and off mode) and decreasing the total hours of the mode with higher power consumption or the total operating hours. Thus, the procurement of energy efficient office equipment as well as energy efficient use of existing equipment is necessary. Intelligent office equipment with high efficient power management can support the rational use of energy in buildings, but nevertheless the direct interaction between user and office equipment puts a relevant role to all user specific measures.

## 2. Inventory of systems

As a first step towards identifying applicable energy savings measures, a GB Partner should establish an **inventory** of the office equipment and major operating parameters. The Inventory is established in 3 phases.

### a) System Description

The following devices and system groups should be included in the inventory with number of every branch/type:
- PC, laptop and monitor and LCD panels
- Printer, printer-fax and fax machine and multifunctional device
- Copier and scanner
- Mailing machine
- Server
- WLAN and LAN routers
- Audio equipment and beamers
- Telephones and telephone switchboard
- Battery devices (wireless mice, switchboard)

## b) Measurement of parameters

The office equipment electricity consumption usually is not measured separately. Considering the amount of appliances, a detailed measure of every single appliance is not applicable. These devices and systems are described separately with the following data:

- Description of installation and status power management
- Power consumption and average hours per year in:
    - Operation mode
    - Standby/sleep mode
    - Off mode
- Verification by random tests during typical days e. g. with simple energy measure devices (plug in devices).

The specifications referring to power consumption and power management can be given by the IT or by the procurement department[1]. Specifications referring to backup facilities as UPS and the calculation of energy consumption for IT specific air conditioning will be given by the technical division (see technical modules UPS and air conditioning).

Use the Energy-Star "Energy Calculator" for a realistic estimation of the average hours per year and probably for further calculations. Information referring to the power consumption of the most devices is given by the Energy Star database [Energy-Star].

## c) Indicators of system performance

After estimation of the total energy consumption for IT, the calculation of the specific indicators helps to evaluate the efficiency of the installed technologies. The following indicators are customary. Typical values for these indicators are given in the following table.

| Indicator | Typical value | Target value |
|---|---|---|
| 1. IT energy consumption related to gross floor area[2] | 19 kWh/m²*a | 7 kWh/m²*a |
| 2. IT energy consumption related to number of employees[3] | 770 kWh/employee*a | 440 kWh/employee*a |
| 3. Share of total IT energy consumption to total electricity consumption | 30 % | 25 % |

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[1]  If they can not provide these information, they should ask for all relevant data in the next call for tender.
[2]  Own calculation based on [Greeneffect 2005]
[3]  Own calculation based on [ISI 2003]

The use of the indicators is helpful under the following condition:

1. Total IT energy consumption related to gross floor area of office buildings; is the most useful indicator for typical office buildings
2. Total IT energy consumption related to number of employees in office buildings; is more useful, when number of employees is changing and in untypical buildings with office structures
3. Share of total IT energy consumption to total electricity consumption, is helpful to define the relevance of measures in the IT sector

## 3. Assessment of energy saving technical measures

Energy savings are possible in several steps:

1. Selection of energy efficient product
2. Selection of energy efficient devices in defined product group
3. Check power management and user specific saving potentials

Of course, the feasibility of particular measures, and the extent to which they might save money, depends upon the size and specific nature of your operation. Only an assessment of the system and of your company's needs can determine which measures are both applicable and profitable. This could be done by a qualified energy consultant with IT experiences or by qualified in-house engineering staff.

The assessment conclusions will identify the measures which are applicable to your IT system, and will include an estimate of the savings, the cost of the measure, as well as the payback time. The assessment conclusions should include hints for procurement of the equipment via purchase or leasing. Assessment results are confidential in house data and have not to be reported to the Commission, whereas the action plan bases directly on the conclusions

The definition of energy efficiency measures in IT in the early planning stage can result in a significant reduction of loads for air conditioning and UPS, and thus, can optimise the efficiency for both, investments and operation costs (see technical modules UPS and air conditioning). Additionally the duplex printing and paper saving in general are important measures to save energy for paper production as well as to reduce operation costs. An important label for ergonomic matters is the TCO-label and for environmental issues the European ECO label.

The following tables show the potentially significant energy savings measures which might be applicable to your IT landscape. In each table, the measures are presented beginning with those that have a large potential impact and are the easiest to implement.

### *Step 1: Selection of energy efficient product - Examples*

| Pos. | Description of measure | Saving potential |
|---|---|---|
| 1 | Notebooks replacing an average desktop PC and CRT monitor save energy and reduce the load for UPS and air conditioning if planned in the early planning stage | 50 – 80 % |
| 2 | Flat screen monitors (LCD) replacing equivalent conventional monitors save energy | About 50 % |
| 3 | Centralised multi-function devices replacing separate single-function devices save energy, but only if the multi-function will be used | Up to 50 % |
| 4 | Centralised printer (and multi-function devices) replacing personal printer save energy, when well dimensioned for the application | Up to 50 % |

### *Step 2: Selection of energy efficient devices in defined product group - Examples*

| Pos. | Description of measure | Saving potential |
|---|---|---|
| 1 | The specific appliance dimension for the realistic application is the most relevant factor for energy efficiency | Not to be quantified |
| 2 | Use of Energy-Star criteria as minimum criterion for call for tender will prevent the purchase of inefficient devices | 0 – 30 % compared to state of the art |
| 3 | Use criteria of Group for Energy Efficient Appliances (GEEA) as reference criterion for the call for tender will support the purchase of efficient devices | 20 - 70 % compared to state of the art |
| 4 | Selection of office equipment with hard switch can avoid power consumption in off mode | Up to 20 % |
| 5 | Make sure, that the power management is part of the specification in the call for tender and that it is configured by installation of the new appliances | Up to 30 % |

### *Step 3: Check power management and user specific saving potentials - Examples*

| Pos. | Description of measure | Saving potential |
|---|---|---|
| 1 | The power management should be initiated in all devices | Up to 30 % |
| 2 | Screensaver do not save energy and, thus, should be replaced by a quick start of standby/sleep mode | Up to 30 % |
| 3 | Use of a switchable multiway connector can avoid power consumption in off mode for a set of office equipment for night and absence | Up to 20 % |
| 4 | To switch off monitors and printers in breaks and meetings reduce energy consumption in standby mode | Up to 15 % |

More detailed hints are given by the EU Energy-Star programme [Energy-Star] and more specialised within the project "IEA Copier of the Future" [IEA].

## 4. Action Plan

Your company's Action Plan for office equipment, as proposed in the form below, should indicate:

- the measures you have decided to implement, and the time scale for implementation;
- the reasons for excluding the other measures.

The Action Plan for office equipment is presented to the Commission. After approval of all relevant action plans your organisation will be recognised as a GB Partner.

| Energy Savings Measures | Feasibility [1] | Specific Actions [2] | % Covered [3] | Time table [4] | Expected savings [5] (MWh/year) |
|---|---|---|---|---|---|
| *Selection of energy efficient product* | | | | | |
| Notebook replacing desktop PC | | | | | |
| LCD monitors replacing CRT | | | | | |
| Multi-function devices replacing separate single-function devices | | | | | |
| Centralised printer replacing personal printer | | | | | |
| | | | | | |
| | | | | | |
| *Selection of energy efficient devices* | | | | | |
| Specific dimension | | | | | |
| Use of Energy-Star criteria | | | | | |
| Use of GEEA criteria | | | | | |
| Hard switch | | | | | |
| Power management configuration | | | | | |
| | | | | | |
| | | | | | |
| *user specific saving potentials* | | | | | |
| Initiate power management | | | | | |
| Replace screensaver by standby/sleep mode | | | | | |
| Use of switchable multiway connector | | | | | |
| | | | | | |
| | | | | | |

(1) **Feasibility.** Indicate obstacles to application by one or more of the following codes:
  NA      Not applicable for technical reasons
  NP      Not profitable

NC          Not considered, because evaluation would be too expensive
If this field is left blank, the measure is considered to be both applicable and profitable.

(2)  **Specific Actions.** Several specific actions may be adopted to implement one energy saving measure. For instance, selection of laptops in case of replacements of PCs.

(3)  **% Covered.** If the Partner's proposed commitment do not covers the total range of devices. Specify the indicator used, as by: "%"; "%kW"

(4)  **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 "When server is replaced", or "When leasing contract has to be renewed".

(5)  **Expected savings** in MWh/year. This will often be an estimate, based on generally accepted practice.

## 5. Reporting

The Report to the Commission specifies progress made in carrying out the Action Plan, and will comment on any new or amended initiatives. The following reporting form should be used with progressive updating. The two left hand columns are copied from the Partner's Action Plan as approved by the Commission.

| Approved Action Plan | | Report for year 20xx |
|---|---|---|
| Actions decided upon to implement energy savings measures | Agreed upon time scale for action | Progress on action, as percentage achieved, and comments where appropriate (1) |
| *Selection of energy efficient product* | | |
| Action 1 | | |
| Action 2 | | |
| … | | |
| *Selection of energy efficient devices* | | |
| … | | |
| *user specific saving potentials* | | |
| … | | |

(1)    The **percentage achieved** could refer to an indicator such as the proportion of systems in the scope of the Action Plan for which the specific action has been completed.

Partners may find it useful to produce the following Synthesis of the results of commitment to the GreenBuilding Programme. They are invited (but not required) to submit the Synthesis to the Commission.

| Report synthesis | | |
|---|---|---|
| | Since commitment | This year |
| Percentage of actions in Action Plan completed | | |
| Estimated total investment for Plan (000 EUR) (1) | | |
| Estimated change in non energy O&M costs (000 EUR) (1) | | |
| Estimated energy savings (MWh) (2) | | |
| Number of workplaces | | |
| Indicative energy related IT costs per workplace (Euros/workplace) (3) | | |

(1)    **Investment and O&M** (operation & maintenance) costs are estimates of changes in costs, with respect to what would have been spent without Partner commitment to the GreenBuilding Programme. This may be, for instance, additional investment for higher performance equipment, or increase/decrease in maintenance costs.
(2)    **Energy savings** are estimated by calculating the implementation of the measures as well as increasing/decreasing number of equipments.
(3)    **Energy related IT costs per workplace** is a relevant indicator of the efficient use of IT

## References:

[Energy-Star] website of the European Energy Star programme providing the database with Energy-Star products, the Energy Calculator and the actual Energy-Star criteria; www.eu-energystar.org

[IEA] http://www.energystar.gov/index.cfm?c=copiers.copier_future

[GEEA] website of Group for Energy Efficient Appliances GEEA providing the actual criteria; www.efficient-appliances.org

[Greeneffect 2005] Documentation of the EU ALTENER project „Greeneffect – saving electricity in office buildings and purchasing green electricity; www.greeneffect.org

[ISI 2003] Fraunhofer ISI: The influence of modern IT appliances generation on the energy consumption in Germany until the year 2010, January 2003 analysis for the German Federal German Ministry for Economics and Labour; http://www.isi.fhg.de/pr/2003de/pri05/pri05.htm

[TCO] www.tcodevelopment.com

[ECO label] European ECO label www.eco-label.com

## Annex

The assessment should, for each of the measures in tables 1, 2 and 3, evaluate applicability and profitability. This might take a form similar to the following table.

| Energy saving measures | Assessment results | | | | |
| --- | --- | --- | --- | --- | --- |
| | Specific proposed action | Estimated annual savings | Investment cost | Annual O&M cost | Estimated payback time (months) |
| *Selection of energy efficient product* | | | | | |
| Action 1 | | | | | |
| Action 2 | | | | | |
| *Selection of energy efficient devices* | | | | | |
| … | | | | | |
| … | | | | | |
| *user specific saving potentials* | | | | | |
| … | | | | | |