

THE DANISH ELECTRICITY SAVING TRUST

# PURCHASING GUIDELINES

MAKING IT EASY FOR ALL ORGANISATIONS TO PURCHASE  
ENERGY EFFICIENT PRODUCTS AND SAVE MONEY

# 08

- IT AND OFFICE EQUIPMENT
- CONSUMER ELECTRONICS
- NETWORK EQUIPMENT AND SERVERS
- LIGHTING
- VENTILATION
- CIRCULATOR PUMPS
- MOTORS
- LARGE APPLIANCES
- WATER COOLERS
- FOOD AND DRINK VENDING MACHINES
- VIEW ELECTRICITY CONSUMPTION  
AND ENERGY SAVING EQUIPMENT

The Danish Electricity Saving Trust recommends that all public sector institutions and private companies follow the Purchasing Guidelines. Purchases based on these guidelines comply with the purchasing requirements laid down in the Danish Energy Authority's Circular on improving energy efficiency in government institutions, and in the new voluntary agreements covering energy savings in the municipalities.



ELSPAREFONDEN

# CONTENTS



<b>For all professional purchasers</b>	<b>page 3</b>
<b>Purchasing requirements</b>	<b>page 5</b>
<b>Computers and monitors</b>	<b>page 6</b>
<b>Photocopiers and printers, etc.</b>	<b>page 8</b>
<b>Network equipment and servers</b>	<b>page 10</b>
<b>Other office equipment</b>	<b>page 12</b>
Electric height adjustable desks	
Cordless telephones	
Mobile phones	
External power supplies	
Battery chargers	
<b>Consumer electronics</b>	<b>page 14</b>
TVs	
VCRs and DVDs	
Simple digital and analogue converters and set-top boxes	
Audio systems and separates	
<b>Lighting</b>	<b>page 16</b>
Lighting systems	
Light sources	
Lighting control	
<b>Ventilation, motors and circulator pumps</b>	<b>page 18</b>
<b>Large appliances, water coolers and food and drink vending machines</b>	<b>page 20</b>
Fridges and freezers	
Washing machines	
Dishwashers	
Tumble dryers	
Ovens	
Professional fridges and freezers	
Water coolers	
Coffee makers	
Food and drink vending machines	
<b>View electricity consumption and energy saving equipment</b>	<b>page 22</b>
View electricity consumption	
Energy measurer	
AutoPowerOff	

The Purchasing Guidelines are valid for 2008. See purchasing requirements with full description of scope and definitions, including changes in relation to the 2007 Guidelines at [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb)

## Comments or questions

Please contact us on +45 7026 9009 or by e-mail at [sparel@sparel.dk](mailto:sparel@sparel.dk)

# For all professional purchasers

The Purchasing Guidelines are a useful tool for all those that influence the purchasing process in public sector organisations and institutions. This applies equally to managers, who establish the overall guidelines and responsibilities for energy and purchasing, and those responsible for IT, technicians and others that plan and carry out the purchase of electrically powered devices and equipment.

The Purchasing Guidelines facilitate the organisation of a responsible purchasing policy that takes both finances and the environment into account. They also comply with the legal requirements covering energy efficient purchasing by government institutions, and with the voluntary agreements that similarly apply to purchasing in the municipalities.

The Danish Electricity Trust (hereinafter referred to as the Trust) has calculated that the public sector can reduce its annual electricity bill by EUR 90 – 100 million by purchasing energy efficiently. Energy efficient products normally cost the same price, but if they are more expensive, the difference will be quickly recouped.

## Using the Guidelines

The Purchasing Guidelines describe the requirements applying to energy consumption for a considerable proportion of the electrically powered equipment used in public sector institutions. The Guidelines can be used at many levels in an organisation; in fact they can be used with having to be acquainted with every last detail (see table below). The Guidelines are a useful tool in connection with tenders, and they can also be used to put energy efficient purchasing on the agenda.

Who can use the Guidelines – and how?		
Who	When	How
Managers	Formulating purchasing policies and business plans for organisations	Incorporate targets for energy efficient purchasing, and specify that all purchases must comply with the requirements in the Trust's Purchasing Guidelines
Staff responsible for energy	In a dialogue with managers and purchasers	Refer to the Purchasing Guidelines with the message that it is easy and financially advantageous to purchase energy efficiently
Staff responsible for purchasing in large organisations	Large purchases and tenders	Copy the requirements from the Purchasing Guidelines into the tender specifications, and insist that offers can only include products that comply with the requirements
Purchasers, technicians, staff responsible for operations, and similar persons in smaller institutions	Purchasing of low volume or individual products, components, etc.	Inform suppliers or shops that products must comply with the Purchasing Guidelines. Show them the Purchasing Guidelines or refer them to <a href="http://www.elsparefonden.dk/indkoeb">www.elsparefonden.dk/indkoeb</a> Choose products based on the specifications, choose products featured on the Trust's product lists or choose products with the Trust's Energy Saving Label. See more at <a href="http://www.elsparefonden.dk/indkoeb">www.elsparefonden.dk/indkoeb</a> When in doubt, request a copy of the Guidelines from the Trust



The Trust's Energy Saving Label

## FURTHER INFORMATION

- See the circular on improving energy efficiency in government institutions at [www.ens.dk/sw27798.asp](http://www.ens.dk/sw27798.asp).
- See the agreement on energy savings in the municipalities at [www.elsparefonden.dk/kommuner](http://www.elsparefonden.dk/kommuner).

# Requirement to follow Purchasing Guidelines

All municipal and government institutions must purchase energy efficient equipment based on the Purchasing Guidelines. The requirements covering energy efficient purchasing by the municipalities were incorporated in a voluntary agreement concluded in October 2007 between the then Danish Ministry of Transport and Energy and Local Government Denmark (KL). The requirements covering energy efficient purchasing by government institutions were laid down in a 2005 circular on improving energy efficiency in government institutions. The circular also included the requirement that institutions should publicise their energy consumption, and covered areas such as energy efficient behaviour and the implementation of financially viable energy saving projects.

The Purchasing Guidelines apply to the purchase of both new equipment and new components for existing systems – a new ventilator for an existing ventilation system, for example. The requirements also apply to equipment installed in institutions supplied under other types of agreements, such as leasing contracts.

## SKI (National Procurement Ltd – Denmark)

The framework contracts produced by SKI include a comprehensive selection of products bearing the Trust's Energy Saving Label listed in SKI's electronic database of energy efficient products. These products conform to the requirements specified in the Trust's Purchasing Guidelines. By choosing products with the Energy Saving Label, purchasers in public sector institutions can ensure that the products purchased conform to the legal requirements in the circular on energy efficiency in government institutions, and to the voluntary agreement covering the municipalities.

Purchases are not required to be put out to tender if they are made through SKI. Read more at [www.ski.dk](http://www.ski.dk) (mostly in Danish).

## Government purchasing

All government institutions are required to use SKI purchasing agreements for areas covered by common government tenders. This applies to products such as computers, monitors, printers, multifunction photocopiers, electric height adjustable desks and servers. See further information at [www.statensindkob.dk](http://www.statensindkob.dk) (only in Danish).

## Product lists

Many products now feature on product lists established by the Trust, which make it easy to find and choose specific energy efficient products. All the products on the Trust's product lists fulfil the requirements in the Purchasing Guidelines. The product lists cover categories such as lighting fittings, energy saving bulbs, computers, monitors, circulator pumps, large domestic appliances, professional fridges and freezers, and energy saving equipment. The Trust is planning to introduce product lists covering TVs, printers and photocopiers in 2008. See product lists at [www.elsparefonden.dk](http://www.elsparefonden.dk)

## Remember to check lifetime running costs

Buying electrically powered equipment the cost also involves paying the cost of the electricity used over the equipment's lifetime. So remember to calculate the total costs – including the lifetime electricity costs – to arrive at the best overall price. The Trust has developed a new 'total price calculation' tool, which will be available soon at [www.elsparefonden.dk/totalprisberegnen](http://www.elsparefonden.dk/totalprisberegnen) (only in Danish). See also list of new purchasing tools below.

## Purchasing products not featured in the guidelines

For products not covered by the Purchasing Guidelines, the Trust recommends that you ask about power consumption in the On and Standby modes, and choose one of the products with the lowest consumption. Standby consumption should not exceed 1 watt. For further information please contact the Trust's Customer Advice service on: +45 7026 9009 or by e-mail at [sparel@sparel.dk](mailto:sparel@sparel.dk)

## New purchasing tools pending

The Trust has developed five new tools to help purchasers who want to implement or professionalise their energy saving purchasing processes. The tools (only in Danish) are: Process Guide, Potential Savings Calculator, Status Analysis, Purchaser Questionnaire and Total Price Calculator. For further information, go to [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb)

## Purchasing requirements

The pages that follow list the purchasing requirements for the equipment concerned. The requirements are valid for one year and cover electrical equipment most commonly found in offices and other public sector institutions. The requirements are compiled by the Trust primarily on the basis of well known international schemes. The starting point for the requirements on energy efficiency is that they can be fulfilled by 20% of the products on the market. The requirements are presented in tables, together with information about conditions and other relevant data shown beneath the table. Additional information on the purchasing requirements is available at [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) (only in Danish). All the product group pages include a box with good advice, which can lead to extra savings when purchasing and operating equipment. A separate box contains additional information and other relevant details on the Trust's product lists and websites.

### The requirements cover the following products groups:

- IT and office equipment
- Consumer electronics
- Network equipment and servers
- Lighting
- Ventilation
- Circulator pumps
- Motors
- Large appliances
- Water coolers
- Food and drink vending machines

The requirements for broadband equipment, TVs and set-top boxes have been amended compared with those featured in the 2007 Purchasing Guidelines. The 2008 Guidelines also include requirements for new products such as UPS systems (power protection for servers) and lighting control systems. In addition, the Guidelines contain information on devices that display electricity and energy saving equipment, and how these devices can help provide an overview of electricity consumption and possible savings.

## Background to the purchasing requirements

The Trust has compiled the requirements for energy efficient purchasing based on a number of international energy labelling schemes listed below:

- Compulsory EU energy labelling scheme ([www.ens.dk/sw11492.asp](http://www.ens.dk/sw11492.asp))
- Energy Star ([www.eu-energystar.org](http://www.eu-energystar.org) og [www.energystar.gov](http://www.energystar.gov))
- GEEA (Group for Energy Efficient Appliances, [www.efficient-appliances.org](http://www.efficient-appliances.org))<sup>1</sup>
- EU Code of Conduct ([re.jrc.ec.europa.eu/energyefficiency](http://re.jrc.ec.europa.eu/energyefficiency))
- CEMEP (European Committee of Manufacturers of Electrical Machines and Power Electronics, [www.cemep.org](http://www.cemep.org))
- Europump ([www.europump.org](http://www.europump.org))

The requirements are specified to ensure that there are enough electrical appliances to choose between, and that the appliances that fulfil the requirements are the most energy efficient.

### NOTES

<sup>1</sup>Although GEEA no longer exists, the Trust has used requirements established by GEEA for 2007 on the basis that it considers the requirements to be still relevant.

# Computers and monitors

Because there is such a large variation in power consumption for computers and monitors, you can halve the consumption by choosing energy efficiently when buying or replacing equipment. Savings of up to EUR 135 can be made for every unit over the life of the equipment. You can save most by choosing laptop computers instead of stationary models. Always buy flat screen monitors and replace the old CRT monitors with the new versions.



## COMPUTERS

Conform to Energy Star specifications effective from 20 July 2007

Equipment type	On <sup>(1)</sup> Watt	Sleep <sup>(2)</sup> Watt	Standby <sup>(3)</sup> Watt	Delay before sleep Minutes	Other requirements
Stationary computers <sup>(4)</sup>					
Category A <sup>(5)</sup>	50.0	4.0 – 4.7 <sup>(10)</sup>	2.0 – 2.7 <sup>(10)</sup>	30	(11) (12)
Category B <sup>(6)</sup>	65.0	4.0 – 4.7 <sup>(10)</sup>	2.0 – 2.7 <sup>(10)</sup>	30	(11) (12)
Category C <sup>(7)</sup>	95.0	4.0 – 4.7 <sup>(10)</sup>	2.0 – 2.7 <sup>(10)</sup>	30	(11) (12)
Notebook computers					
Category A <sup>(8)</sup>	14.0	1.7 – 2.4 <sup>(10)</sup>	1.0 – 1.7 <sup>(10)</sup>	30	(11) (12)
Category B <sup>(9)</sup>	22.0	1.7 – 2.4 <sup>(10)</sup>	1.0 – 1.7 <sup>(10)</sup>	30	(11) (12)

The requirements apply to standard types of personal computers. Power consumption and times are the maximum permitted for energy efficient equipment. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description of categories and requirements.

- (1) On is the idle mode immediately after power-up with the computer running the operating system, etc., but excluding user activity. Monitor is switched off on integrated and notebook computers.
- (2) Sleep mode is a power saving mode which the computer (but not server) automatically enters after a period of inactivity, and 'wake' facility which quickly allows programmes and documents stored in memory (RAM) to be recalled.
- (3) Computer is in Standby (off mode) when the user switches off in the normal way via the operating system.
- (4) Includes integrated computers with monitor, smaller desktop-derived servers and game consoles.
- (5) Category A: Standard types of desktop office and home computers.
- (6) Category B: Powerful computers with multi-core processor(s) and minimum of 1 gigabyte of system memory.
- (7) Category C: Powerful computers with multi-core processor(s), graphic card, RAM, hard disk and TV and video capability.
- (8) Category A: Standard types of notebooks in offices and homes.
- (9) Category B: Powerful notebook computers with graphic card.
- (10) The highest level requires additional functionality for network card WOL (Wake on Lan).
- (11) Computer must switch off separate or built-in monitor within 15 minutes of user inactivity.
- (12) Internal or external power supplies must be energy efficient, e.g. minimum 80% efficiency for internal power supplies, and conform to the Trust's requirements for external power supplies.

## WORKSTATIONS

Conform to Energy Star specifications effective from 20 July 2007

Equipment type	Typical power consumption <sup>(1)</sup> Watt	Delay before sleep Minutes	Other requirements
Workstations	0.35 x (maximum power <sup>(2)</sup> ) + 5 x no. of hard disks <sup>(3)</sup>	30	(4) (5)

The requirements apply to computers sold as workstations and conform to Energy Star's definition for workstations. Power consumption and time are the maximum permitted for energy efficient equipment. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

- (1) Typical consumption calculated as: 0.1 x power in Standby + 0.2 x power in Sleep + 0.7 x power in On mode at idle.
- (2) Maximum power as measured in tests per Energy Star test methods.
- (3) Number of installed hard disks on workstation.
- (4) Computer must switch off separate or built-in monitor within 15 minutes of user inactivity.
- (5) Internal or external power supplies must be energy efficient, e.g. minimum 80% efficiency for internal power supplies, and conform to the Trust's requirements for external power supplies.

## MONITORS

Conform to Energy Star specifications effective from 1 January 2006

Equipment type	On Watt	Sleep <sup>(1)</sup> Watt	Standby <sup>(2)</sup> Watt
Resolution (O) < 1 megapixel	23	2	1
Resolution (O) ≥ 1 megapixel	28 x O <sup>(3)</sup>	2	1

The requirements apply to standard computer monitors connected to mains electricity. Power consumption is the maximum permitted for energy efficient equipment. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

- (1) Computer power management function puts monitor to Sleep.
- (2) Monitor is in Standby (off) mode when turned off using the on-off switch.
- (3) O is horizontal x vertical resolution in megapixels. Example: 1280 x 1024 resolution equals 1.31072 megapixels. Maximum power consumption is 36.7 W (1.31072 x 28 W).

## GOOD ADVICE ON PURCHASING AND OPERATING EQUIPMENT

- Choose notebook computers and flat screen monitors. Typically, these consume less than half as much current compared with desktop computers and CRT monitors.
- Choose computers and monitors with the lowest power consumption costs over their lifetime. The most efficient examples use less than half as much power compared with the most inefficient. Check running costs over their operational lifetime at [www.elsparefonden.dk/it](http://www.elsparefonden.dk/it)
- Make sure that computers and monitors are programmed to switch to Sleep mode after 5 to 30 minutes of inactivity using the operating system's 'Control Panel' power management options.
- Use an AutoPowerOff (Elsparaskinne) plug bank that automatically switches off any connected equipment (e.g. monitor, printer, etc.) when the computer is switched off or after a period of inactivity. See page 22.
- Wherever possible, use special server software that can close down a computer when it is not in use on a network.
- Make users aware that they need to remember to switch off computers and monitors before they go home, and switch off monitors when they go to meetings or to lunch.
- Remember that notebook computer docking stations use power on Standby and use extra current when powered up. Ask about the amount of power used and choose a product with low standby consumption.

## FURTHER INFORMATION

- See purchasing requirements with full description of scope and definitions at [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb)
- View the product lists covering computers and monitors from suppliers that have entered into a voluntary agreement with the Trust, with a declaration that they comply with the requirements relating to energy efficient purchasing at [www.elsparefonden.dk/it](http://www.elsparefonden.dk/it)
- Learn more about energy efficient purchasing and operation of computers and monitors at [www.elsparefonden.dk/it](http://www.elsparefonden.dk/it)
- Read more about the AutoPowerOff plug bank, and where it can be sourced, at [www.elsparefonden.dk/elsparaskinner](http://www.elsparefonden.dk/elsparaskinner)
- View good advice on office layouts in the Trust's 'Indretningsvejledning 08' (only in Danish).

# Photocopiers and printers, etc.

Photocopiers, printers, fax machines and scanners are often hidden power guzzlers in the office because most of the time they sit around waiting without producing anything. If equipment is not configured to switch to energy saving mode, or if the power consumption is too high in the energy saving mode, it can easily add several hundred Euros per machine to the annual electricity bill.

8  
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\*Last user? Please switch off machine!!

## PHOTOCOPIERS, PRINTERS, MULTIFUNCTION AND FAX MACHINES WITH RAPID FUSING TECHNOLOGY, AND STANDARD FORMAT DIGITAL DUPLICATORS

Conform to Energy Star specifications effective from 1 April 2007

Equipment type	Typical power consumption kWh/week	Other requirements
Photocopiers, printers, fax machines, digital duplicators Monochrome Speed (H) ≤ 12 pages per min. Speed (H) 12 – 50 pages per min. Speed (H) > 50 pages per min. Colour Speed (H) ≤ 50 pages per min. Speed (H) > 50 pages per min.	1.5 0.20 x H – 1 0.80 x H – 31 0.20 x H + 2 0.80 x H – 28	(1) (2) (3) (1) (2) (3) (1) (2) (3) (1) (2) (4) (1) (2) (4)
Multifunction machines Monochrome Speed (H) ≤ 20 pages per min. Speed (H) 20 – 69 pages per min. Speed (H) > 69 pages per min. Colour Speed (H) ≤ 32 pages per min. Speed (H) 32 – 61 pages per min. Speed (H) > 61 pages per min.	0.20 x H + 2 0.44 x H – 2.8 0.80 x H – 28 0.20 x H + 5 0.44 x H – 2.8 0.80 x H – 25	(1) (2) (3) (1) (2) (3) (1) (2) (3) (1) (2) (4) (1) (2) (4) (1) (2) (4)

The requirements apply to products connected to mains electricity or a data link. Printer technologies covered include: electro photography, direct thermal, solid ink, dye sublimation, thermal transfer and stencil. Power consumption is typically based on weekly consumption measured according to the test method and is the maximum permitted for energy efficient equipment. If the machine has a digital front end powered by the machine, the power used by the controller in active mode is deducted from the machine's weekly consumption. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

- Where a machine is powered by an external power supply covered by the Trust's purchasing requirements, the power supply must comply with these requirements.
- Where a machine is supplied with a digital front end with a separate power supply, the device must comply with the Trust's requirements for computers.
- Photocopiers, printers and multifunction machines (monochrome) with speeds of 15 to 44 pages per minute must be supplied with an automatic duplexing unit as a standard function or as an add-on at the time of purchase. Automatic duplex must be a standard feature on machines that print 45 or more pages per minute.
- Photocopiers, printers and multifunction machines (colour) with speeds of 20 to 39 pages per minute must be supplied with an automatic duplexing unit as a standard function or as an add-on at the time of purchase. Automatic duplex must be a standard feature on machines that print 40 or more pages per minute.

## OTHER PRINTERS, PHOTOCOPIERS, MULTIFUNCTION MACHINES, FAX MACHINES AND FRANKING MACHINES

Conform to Energy Star specifications effective from 1 April 2007

Equipment type	Sleep <sup>(1)</sup> Watt	Standby Watt	Other requirements
Printers, multifunction and fax machines (standard format; inkjet)	3	1 – 2 <sup>(2)</sup>	(4) (5) (6)
Printers (standard format; stencil and similar)	6	1 – 2 <sup>(2)</sup>	(4) (5) (6)
Printers, multifunction machines (large format; inkjet)	13		(4) (5) (6)
Printers (large format; electro photography, direct thermal, solid ink, dye sublimation, thermal transfer and stencil, etc.)	54		(4) (5) (6)
Photocopiers and multifunction machines (large format; electro photography, direct thermal, solid ink, dye sublimation, thermal transfer)	58		(4) (5) (6)
Printers (small format; electro photography, inkjet, direct thermal, solid ink, dye sublimation, thermal transfer and stencil, etc.)	3	1 – 2 <sup>(2)</sup>	(4) (5) (6)
Scanners (all formats)	5	1 – 2 <sup>(2) (3)</sup>	(4) (5) (6)
Franking machines (monochrome; electro photography, direct thermal, thermal transfer, inkjet)	3		(4) (6)

The requirements apply to products connected to mains electricity or a data link. Power consumption is based on the maximum permitted for energy efficient equipment measured according to the test method. If the machine has a digital front end powered by the machine, the power used by the controller in active mode is deducted from the machine's Sleep mode consumption. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

- If the product has one or more extra functions, the maximum threshold for Sleep mode can be increased depending on the function.
- 2 watts if fax is built-in.
- Standby requirement does not apply to large format scanners.
- If a machine is powered by an external power supply covered by the Trust's purchasing requirements, the power supply must comply with these requirements.
- If a machine is supplied with a digital front end with a separate power supply, the device must comply with the Trust's requirements for computers.
- Products must be supplied with the Sleep mode set to activate within a given period of time depending on the size of the machine.

### GOOD ADVICE ON PURCHASING AND OPERATING EQUIPMENT

- Try to choose equipment that meets rather than exceeds your needs.
- Choose machines which warm up quickly to operational mode and with good energy-saving functions.
- If the product has an external power supply fitted, the power supply must comply with the requirements for power supplies shown on page 13.
- Whenever possible, choose a model with duplex functionality (double-sided printing and/or copying). Configure the equipment to automatically print or copy in duplex, or persuade staff to use the duplex feature. Several tons of paper can be saved over the machine's lifetime, with twice as much space available on the shelves.
- Make sure that machines are configured with Sleep mode set to activate automatically in the shortest possible time acceptable in relation to warm-up time.
- Check whether you need to have a conventional fax machine in situations where you can use a multifunction machine with a built-in fax or a fax modem on a server, which is permanently switched on anyway.
- Choose a scanner that has a separate on-off switch. Where this is not possible, connect the scanner to a separate plug which users can easily switch on and off, once persuaded to do so.
- Set the timer controls to switch off machines automatically at the end of the working day, or influence user behaviour so the last person leaving the office turns off all machines.

### FURTHER INFORMATION

- See purchasing requirements with full description of scope and definitions at [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb)
- Read about power saving options at [www.elsparefonden.dk/spareindstillinger](http://www.elsparefonden.dk/spareindstillinger)
- View good advice on printer room layouts in the Trust's 'Indretningsvejledning 08' (only in Danish).

# Network equipment and servers

Network equipment and servers account for a large proportion of the total electricity consumption in office buildings because equipment is generally always on. It is possible to save up to half the electricity used through energy efficient purchasing and good server room layouts without compromising operational and IT security. The Trust has not yet formulated any purchasing requirements for servers, cooling systems for server rooms and other equipment. However, we recommend that you take advantage of the good advice listed below concerning purchasing and operation.

## UPS FOR SERVERS

(uninterruptible power supply, power protection for servers) Specifications conform to EU Code of Conduct version 1.0a – 22 December 2006

UPS mode	For UPS double conversion in the basic configuration with the classification "VFI-S" ... <sup>(1)</sup>	For all VI and VFI UPS except "VFI-S ..." <sup>(1)</sup>	For all VFD UPS <sup>(1)</sup>
UPS range: ≥ 10 – < 20 kVA			
25% of nominal power	83% <sup>(2)(3)</sup>	88% <sup>(2)(3)</sup>	93% <sup>(2)(3)</sup>
50% of nominal power	89% <sup>(2)(3)</sup>	92% <sup>(2)(3)</sup>	95% <sup>(2)(3)</sup>
75% of nominal power	90.5% <sup>(2)(3)</sup>	92.5% <sup>(2)(3)</sup>	95.7% <sup>(2)(3)</sup>
100% of nominal power	91% <sup>(2)(3)</sup>	92.5% <sup>(2)(3)</sup>	96% <sup>(2)(3)</sup>
UPS range: ≥ 20 – < 40 kVA			
25% of nominal power	84% <sup>(2)(3)</sup>	88.5% <sup>(2)(3)</sup>	93.5% <sup>(2)(3)</sup>
50% of nominal power	89.5% <sup>(2)(3)</sup>	92.5% <sup>(2)(3)</sup>	95.5% <sup>(2)(3)</sup>
75% of nominal power	91% <sup>(2)(3)</sup>	93% <sup>(2)(3)</sup>	96.3% <sup>(2)(3)</sup>
100% of nominal power	91.5% <sup>(2)(3)</sup>	93% <sup>(2)(3)</sup>	96.5% <sup>(2)(3)</sup>
UPS range: ≥ 40 – < 200 kVA			
25% of nominal power	86.5% <sup>(2)(3)</sup>	89% <sup>(2)(3)</sup>	94% <sup>(2)(3)</sup>
50% of nominal power	90.5% <sup>(2)(3)</sup>	93% <sup>(2)(3)</sup>	96% <sup>(2)(3)</sup>
75% of nominal power	92% <sup>(2)(3)</sup>	93.5% <sup>(2)(3)</sup>	96.7% <sup>(2)(3)</sup>
100% of nominal power	92% <sup>(2)(3)</sup>	93.5% <sup>(2)(3)</sup>	97% <sup>(2)(3)</sup>
UPS range: ≥ 200 kVA			
25% of nominal power	89% <sup>(2)(3)</sup>	91.5% <sup>(2)(3)</sup>	95% <sup>(2)(3)</sup>
50% of nominal power	92% <sup>(2)(3)</sup>	94.5% <sup>(2)(3)</sup>	97% <sup>(2)(3)</sup>
75% of nominal power	93% <sup>(2)(3)</sup>	94.5% <sup>(2)(3)</sup>	97.7% <sup>(2)(3)</sup>
100% of nominal power	93% <sup>(2)(3)</sup>	94.5% <sup>(2)(3)</sup>	98% <sup>(2)(3)</sup>

Requirements cover Uninterruptible Power Supplies (UPS) based on configurations connected to three phase electricity over 10 kVA at 400/230 V. The energy efficiency is the minimum permissible for the equipment covered based on values measured under normal load according to EN 62040-3 ed. 1.0 b:1999, Annex AA. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

- (1) See EN 62040-3 ed. 1.0 b:1999 for definition and classification.
- (2) Additional loss of between 0.5% and 3.6% is allowable in respect of additional isolation transformer depending on UPS range and load on transformer. The maximum allowable loss of 3.6% applies to UPS of less than 40 kVA at 100% of transformer output. The minimum allowable loss of 0.5% applies to UPS of more than 500 kVA at 25% of transformer output. Values must be measured in accordance with EN 62040-3 Annex AA.
- (3) Depending on load, additional loss of between 0.6% and 2.5% is allowable when using additional equipment to achieve harmonic current at levels exceeding those defined in IEC 61000-2-2, 61000-3-2 and 61000-3-12. Highest loss is allowable at 100% output.

## BROADBAND EQUIPMENT

Specifications conform to EU Code of Conduct version 2 – 17 July 2007

Equipment type	On Watt	Off Watt	Other requirements
ADSL/VDSL modem powered by USB	1.5 <sup>(1)(2)</sup>	0	<sup>(10)</sup>
ADSL modem <sup>(3)</sup>	6.0 <sup>(1)(2)</sup>	0.3	<sup>(10)</sup>
VDSL modem <sup>(4)</sup>	8.0 <sup>(1)(2)</sup>	0.3	<sup>(10)</sup>
Simple Cable modem <sup>(5)</sup>	7.0 <sup>(1)(2)</sup>	0.3	<sup>(10)</sup>
WLAN access point <sup>(6)</sup>	6.0	0.3	
VoIP-Device (ATA og VoIP handset)	5.0	0.3	
Additional Colour-Display TFT QVGA and VGA <sup>(7)</sup>	+3.5		
Smaller printer server	5.0	0.3	
Small hubs og switches <sup>(8)</sup>	5.0	0.3	
Routers <sup>(9)</sup>	10.0	0.3	

Requirements cover all types of equipment conforming to the EU Broadband Equipment Code of Conduct, although only for equipment used by consumers. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

- (1) Up to 2 watt allowed for each additional function for the following equipment types: WLAN 802.11a/b/g, FXO, FXS/VoIP, hub/switch for up to four ports, DECT, Bluetooth.
- (2) Up to 3W allowed for an additional WLAN 802.11n function.
- (3) Up to and including the following parts and functionalities: 1 DSL, 1 Ether net 10/100, 1 USB 1.1/2.0, Router, NAT and firewall.
- (4) Up to and including the following parts and functionalities: 1 DSL, 1 Ether net 10/100/1000, 1 USB 1.1/2.0, Router, NAT and firewall.
- (5) Up to and including the following parts and functionalities: 1 WAN, 1 Ethernet 10/100, 1 USB 1.1/2.0, Router, NAT and firewall.
- (6) With 802.11a/b/g/n-standard.
- (7) Typically found in VoIP-Device. Display must reduce its intensity whenever possible. This can reduce the additional allowed consumption by 50%.
- (8) For devices with up to 8 Ethernet 10/100/1000 ports.
- (9) For devices with up to 9 (1 WAN and 8 LAN) Ethernet 10/100/1000 ports.
- (10) DSL modem should support network power management, e.g. ADSL2 and ADSL2+.

## GOOD ADVICE ON PURCHASING AND OPERATING EQUIPMENT

- Check the power consumption of server equipment and choose types with low consumption. Typically, by saving 1 kWh on the server equipment, you can save 1.5 kWh for the whole server room, in as much that it is also possible to save electricity running the cooling system.
- Implement server consolidation, where programmes and functions are combined on fewer servers and disk drives so that the total number of servers and disk drives can be reduced.
- Switch off the equipment that is not in use, and move equipment that does not require cooling out of the room.
- Locate the server room in a cool room that receives no warm air from outside, but conversely with the possibility of using the warm air from the server room to heat colder surrounding areas.
- Use the free cooling principle, where external cold air is used to cool the server room. Typically, power consumption in this situation can be halved.
- Ensure that the cold air from the cooling system is ducted as directly as possible to the equipment that requires cooling, without it being mixed with the warm air given off by the equipment.
- Ensure that the condenser element of the cooling system is placed in a suitably cold and shaded area that allows the air to circulate freely.
- Increase the temperature in the server room to the maximum allowable in terms of safety margins. Power savings of 1 – 3% can be achieved for every degree that the temperature is increased.

## FURTHER INFORMATION

- View the Trust's new project guidelines for energy efficient server rooms (only in Danish).
- See purchasing requirements with full description of scope and definitions at [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb)
- Read more recommendations about server rooms in the Trust's 'Good advice for saving electricity in the server room' and at [www.elsparefonden.dk/serve](http://www.elsparefonden.dk/serve)
- Read more about energy efficient server room layouts in the Trust's 'Indretningsvejledning 08' (only in Danish).
- Find information on the EU Broadband Equipment Code of Conduct and UPS equipment at [re.jrc.ec.europa.eu/energyefficiency](http://re.jrc.ec.europa.eu/energyefficiency)



# Other office equipment

Most offices have electric height adjustable desks, cordless and mobile telephones and many small devices with separate power supplies. Taken individually these devices do not consume much power, but if there are many the amount of wasted power can be significant.

## ELECTRIC HEIGHT ADJUSTABLE DESKS

Specifications established by the Danish Electricity Saving Trust

Equipment type	Standby Watt	Delay before standby <sup>(1)</sup> Minutes
All	2	5

The requirements apply to all electric height adjustable desks. Standby consumption is the maximum permitted for energy efficient equipment. Delay before Standby is the maximum allowed. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

(1) The requirements cover the elapsed time after the desk has come to rest before Standby mode is activated.

## CORDLESS AND MOBILE TELEPHONES

Conform to Energy Star specifications for power supplies effective from 1 January 2005 combined with GEEA 2007 criteria for Standby

Equipment type	Standby <sup>(1)</sup> Watt	No-load <sup>(2)</sup> Watt
All	1	0.5

The requirements apply to chargers and base stations for cordless phones and chargers for mobile phones for normal use in offices and homes. Power consumption is the maximum permitted for energy efficient equipment. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

(1) Phone is connected to the charger or base station, is fully charged and is not in use.  
 (2) Consumption by power supply with phone or base station not connected.

## EXTERNAL POWER SUPPLIES AND BATTERY CHARGERS

Conform to Energy Star specifications effective from 1 January 2005 as amended per note 3 below

Equipment type Maximum power output Watt	Active mode <sup>(1)</sup> Efficiency %	No-load <sup>(2)</sup> Watt
$0 < \text{Power} \leq 1$	$49 \times \text{Power}$	0.50
$1 < \text{Power} < 10$	$9 \times \ln(\text{Power}) + 49$	0.50
$10 \leq \text{Power} \leq 49$	$9 \times \ln(\text{Power}) + 49$	0.75
$49 < \text{Power} \leq 75$	84	0.75
$75 < \text{Power} \leq 250^{(3)}$	80	0.75

The requirements apply to external power supplies and battery chargers (supplied with appliance or separately) for normal use in offices and homes. Power consumption is the maximum permitted for energy efficient equipment, but efficiency is the minimum allowed. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

(1) Average efficiency, which is the minimum allowed for energy efficient equipment. 'Ln(Power)' is the natural logarithm of efficiency, which is the maximum power output in watt.  
 (2) No device connected.  
 (3) Conforms to power factor correction per EN61000-3-2 standard. Adapted per Energy Star.

### GOOD ADVICE ON PURCHASING AND OPERATING EQUIPMENT

- Use an AutoPowerOff plug bank to switch off electric height adjustable desks, separate power supplies and other devices that only need to operate when the computer is switched on.
- If the product has an external power supply, the power supply must comply with the above requirements for power supplies.
- New Energy Star specifications are pending for external power supplies and battery chargers. Consider basing your purchases on the new requirements once they come into force. The new requirements will be available at [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb)
- Switch off electric height adjustable desks if the desk height is the same every day.
- One indication of an inefficient power supply is that it is large and heavy, and that it gets hot when switched on. The power used when it is switched on or in Standby is therefore higher than it should be.

### FURTHER INFORMATION

- See purchasing requirements with full description of scope and definitions at [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb)
- More information on Energy Star specifications for external power supplies and battery chargers available at [www.energystar.gov](http://www.energystar.gov)



# Consumer electronics

Today, the TV market is dominated by LCD and plasma flat screen models. One thing that they all have in common is that power consumption increases with the screen size when switched on. Other types of consumer electronics such as set-top boxes for example often have high power consumption in both Standby and On modes, so it is well worth looking for the energy efficient versions.

14  
15

## VCRs AND DVDs

Specifications established by the Trust based on GEEA 2007 specifications

Equipment type	On Watt	Standby Watt	Delay before Standby Minutes
Playing and recording	15 <sup>(1)</sup>	2.5	
Playing only	11	1	30 <sup>(2)</sup>

The requirements apply to VCRs and DVDs connected to mains electricity. Power consumption and time is the maximum permitted for energy efficient equipment. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

(1) Only applies to traditional cassette-tape VCRs.

(2) Applies to period commencing from time that media (tape, DVD, etc.) have finished playing.

## AUDIO SYSTEMS AND SEPARATES

Specifications established by the Trust based on GEEA 2007 specifications

Equipment type	Standby Watt	Delay before Standby Minutes
Integrated audio systems	1	
Audio separates	1 <sup>(1)</sup>	30 <sup>(2)</sup>

The requirements apply to audio systems and separates connected to mains electricity. Power consumption and time are the maximum permitted for energy efficient equipment. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

(1) If function is available.

(2) Applies to period commencing from time that media (DVD, tape, etc.) have finished playing.

## TVs

The requirements conform to Energy Star specifications for TVs (Version 3.0)

The specifications have been updated in line with the Danish version of the 2008 Purchasing Guidelines, which now include the new Energy Star specifications for TVs.

Equipment type	Screen size Area A Inches <sup>2</sup>	Maximum On mode power consumption <sup>(1)</sup> Watt (A expressed in inches <sup>2</sup> )	Passive standby <sup>(3)</sup> Watt	Other requirements
Vertical resolution ≤ 480 pixels	All	0.120 x A + 25 <sup>(2)</sup>	1	(4) (5)
Vertical resolution > 480 pixels	A < 680	0.200 x A + 32 <sup>(2)</sup>	1	(4) (5)
Vertical resolution > 480 pixels	680 ≤ A < 1045	0.240 x A + 27 <sup>(2)</sup>	1	(4) (5)
Vertical resolution > 480 pixels	A ≥ 1045	0.156 x A + 15.1 <sup>(2)</sup>	1	(4) (5)

The specifications apply to TVs connected to mains electricity irrespective of type. The specifications vary depending on vertical resolution and screen area. Power consumption displayed is the maximum permitted for energy efficient equipment. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

(1) Product is switched on and main functions are operational (produces picture and sound).

(2) Screen size must be expressed in square inches. For 16:9 format TVs, A = 0.4273 x D<sup>2</sup> (where D is the diagonal in inches).

(3) Product is plugged in, but does not operate main functions. Can be switched to another mode with remote controller, and by a signal from an internal device (clock timer, etc.).

(4) If the product has an external power supply fitted, the power supply must comply with the specifications for power supplies shown on page 13.

(5) TVs delivered to consumers must be set up with Standby mode set to the lowest level of power consumption when the TV is on Standby.

## SIMPLE DIGITAL TO ANALOGUE CONVERTERS AND SET-TOP BOXES

Specifications conform to EU Code of Conduct on Digital TV Service Systems – Version 6 – 17 December 2007

Equipment type	On Watt	Active standby <sup>(1)</sup> Watt	Passive standby <sup>(2)</sup> Watt
Simple digital to analogue converter			
Terrestrial aerial, cable network and Internet DSL			
Basic converter	7 <sup>(5)</sup>		2 <sup>(6)</sup>
With HD <sup>(3)</sup> , SD format <sup>(4)</sup>	11 <sup>(5)</sup>		2 <sup>(6)</sup>
With HD, HD format	12 <sup>(5)</sup>		2 <sup>(6)</sup>
Satellite			
Basic converter	10 <sup>(5)</sup>		2 <sup>(6)</sup>
With HD <sup>(3)</sup> , SD format <sup>(4)</sup>	14 <sup>(5)</sup>		2 <sup>(6)</sup>
With HD, HD format	15 <sup>(5)</sup>		2 <sup>(6)</sup>
Digital set-top box			
Terrestrial aerial		6 <sup>(7)</sup>	3 <sup>(8)</sup>
Cable network		7 <sup>(7)</sup>	3 <sup>(8)</sup>
Satellite		8 <sup>(7)</sup>	3 <sup>(8)</sup>
Internet DSL		6 <sup>(7)</sup>	3 <sup>(8)</sup>

The specifications apply to simple digital to analogue converters and set-top boxes connected to mains electricity. Power consumption is the maximum permitted for energy efficient equipment. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

(1) Product is plugged in, but does not operate main functions. Can be switched to another mode with remote controller, with a signal from an internal device (clock timer, etc.), and via external signal (aerial, etc.). Product can receive a limited amount of data from an external signal (aerial, etc.).

(2) Product is plugged in, but does not operate main functions. Can be switched to another mode with remote controller, and via signal from an internal device (clock timer, etc.).

(3) High definition.

(4) Standard definition.

(5) Increase above lowest threshold allowed for extra components such as tuner, ADSL modem etc., per EU Code of Conduct.

(6) Increase of 1 watt allowed for products with hard disk per EU Code of Conduct.

(7) Increase above lowest threshold allowed for extra components such as hard disk, tuner, ADSL and Docusis modem, different interfaces, etc., per EU Code of Conduct. The maximum increase is 15 watt. However, MPEG4 and multi-decoder platforms are allowed 20 watt. The figure for cable network set-top box with Docusis modem and VOIP functionality is 22 watt.

(8) Must be fulfilled if function available on appliance.

## GOOD ADVICE ON PURCHASING AND OPERATING EQUIPMENT

- Remember that large flat screen TVs use a considerable amount of power when they are switched On. Ask about power consumption when buying new equipment, and choose an appliance with low power consumption when switched On, and standby consumption not exceeding 1 watt.
- Choose a system that meets rather than exceeds your needs.
- Ask whether Standby is automatically activated after a period of inactivity, and how much time elapses before this happens.
- A TV's power consumption depends on how bright the screen is. Ensure that the brightness is not greater than recommended by the supplier. Try to reduce the brightness and see whether the picture is still satisfactory.
- If the product has an external power supply fitted, the power supply must comply with the specifications for power supplies shown on page 13.
- Switch off TV when not using its main functions. Use an AutoPowerOff plug bank that turns off equipment connected to the TV when the TV is switched off.
- Choose energy efficient TVs from the product list to be launched in spring 2008, and look for TVs bearing the Energy Saving Label.

## FURTHER INFORMATION

- See purchasing requirements with full description of scope and definitions at [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb)
- Find information on the EU Code of Conduct at [re.jrc.ec.europa.eu/energyefficiency](http://re.jrc.ec.europa.eu/energyefficiency)

# Lighting

In many places, lighting systems provide a poor light and use too much electricity, but it is possible to have better lighting and halve the power consumption by replacing the old equipment. Because lighting systems are often an investment over a 10 to 20-year horizon it is important to choose an energy efficient system. Otherwise electricity bills can be very expensive in the long term. If the lamps and fittings are not replaced, then it is a question of choosing the most efficient light sources. LEDs (Lighting Emitting Diodes) are developing very rapidly, and functionality is continually improving with more and more possible uses. LED light sources now have the same level of efficiency as energy saving bulbs. When purchasing new lighting it can therefore be worth considering the use of LED lighting. The Trust has produced a new brochure with information and inspiration on LEDs called 'Lysdioder til belysning 2008 – status for fremtidens lyskilder' (LEDs for lighting 2008 – status on light sources of the future). The brochure (only in Danish) can also be downloaded at [www.elsparefonden.dk](http://www.elsparefonden.dk)

## LIGHTING SYSTEMS

Equipment type	Power consumption <sup>(1)</sup> W/m <sup>2</sup>	Other requirements
Offices	10	(2) (3) (4) (5)
Daycare centres	10	(2) (3) (4) (5)
Classrooms	8	(2) (3) (4) (5)
Access areas	5	(2) (3) (4) (5)
Other locations		(2) (3) (4) (5)

The specifications apply to lighting systems installed in normal office locations, where the fittings and lighting quality are not required to exceed the official standards. Power consumption is the maximum permitted for energy efficient equipment. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

- (1) Power consumption includes the power consumed by the components controlling the lighting, and is per square metre of floor area.
- (2) System must have lighting control in the form of movement sensors to ensure that lights are only switched on when people are in the room. Rooms with adequate daylight must have daylight sensors so that the lighting system is adjusted in relation to the amount of available natural light.
- (3) Must fulfil legal requirements, including Danish Standard DS 700 covering artificial lighting in workplaces.
- (4) Lighting systems should be designed and documented using recognised and integrated calculation tools such as, for example, FABA Light 4 ([www.faba.dk](http://www.faba.dk)).
- (5) Must have energy efficient fittings with an efficiency rating of at least 50%.

## LIGHTING CONTROL

Specifications established by the Danish Electricity Saving Trust

Equipment type	No-load loss Watt/function	Other requirements
All	1 <sup>(1)</sup>	(2) (3)

The specifications apply to all types of lighting control for rooms and are the maximum power consumption permitted for energy efficient equipment. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

- (1) Specifications apply per lighting control device or function.
- (2) In Denmark, users are advised to follow the SBI recommendations no. 220 to ensure the functionality of energy efficient lighting control in connection with installing lighting equipment. The recommendations contain good advice on establishing function requirements, tenders, controls, etc.
- (3) Choosing an experienced installer of lighting control systems is recommended.

## LIGHT SOURCES

Specifications conform to Energy Label A per compulsory EU energy labelling scheme

Equipment type	Energy label
All, where fitting design and requirements for light quality permit	A <sup>(1)</sup>

The specifications apply to normal types of lighting sources where the fitting design and lighting quality requirements permit the use of energy label A-rated light sources. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

- (1) The Trust's list of energy saving bulbs features bulbs which also fulfil the requirements for light quality and longevity.

## GOOD ADVICE ON PURCHASING AND OPERATING EQUIPMENT

- Carry out a thorough survey before choosing a lighting system. Involve the users and, where necessary, a lighting consultant.
- Consider whether the fixtures and fittings can be arranged differently in order to make the best possible use of daylight.
- Use the Danish Electricity Saving Trust's diagnostic tools that can help assess existing lighting and calculate the economics of installing a new system.
- Use an integrated calculator tool, for example, FABA Light 4.0 to make light and energy calculations for the new system. FABA Light consists of a general energy calculator tool, which calculates the total electricity consumption of lighting in a building, together with the fact that the lighting is designed and documented in compliance with the Danish Enterprise and Construction Authority's building regulations. Data can be exported from FABA Light to the SBI Be 06 program, which follows the official Danish method of arriving at the total energy framework calculation in relation to the building regulations.
- Follow SBI recommendations no. 220 to ensure the functionality of energy efficient lighting control in connection with installing lighting equipment. The recommendations contain good advice on establishing requirements for functionality, tenders, controls, etc.
- Consider dividing the system into zones based on daylight conditions, and tailoring the lighting to user needs in terms of light distribution, intensity and quality.
- Use a combination of basic lighting from the lighting system and individual energy efficient work lights.
- Working lamps should be fitted with compact fluorescent lamps (CFLs) and with electronic ballast units.
- If you choose halogen table lamps for design or size reasons, then these should be the low voltage type where the on-off switch is on the 230 volt side (before the power supply) to avoid standby consumption. Low wattage light sources should be used in light fittings, which must be asymmetric (oblique light instead of straight be down).
- Power supplies for halogen working lamps must be energy efficient. If there is only on on-off switch on the low voltage side or no switch at all, standby consumption should not exceed 1 watt.
- Choose fittings that are robust, easy to clean, well screened (i.e. users do not see the light source), flexible and with an output that suits the room. Also, always view a sample light fitting that is switched on.

## FURTHER INFORMATION

- See purchasing requirements with full description of scope and definitions at [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb)
- Read more about lighting systems for offices and institutions at [www.elsparefonden.dk/belysning](http://www.elsparefonden.dk/belysning) which is also where you can download our diagnostic self-check and financial calculator tools.
- Go to [www.elsparefonden.dk/belysningsystemer](http://www.elsparefonden.dk/belysningsystemer) for an overview of energy efficient lighting systems for offices, day care centres, classrooms, and access areas. View some of the lighting systems in the Trust's demo rooms.
- Find information on the FABA Light integrated calculator tool at [www.faba.dk](http://www.faba.dk) (only in Danish).
- Read more about efficient lighting control in the SBI recommendations no. 220.
- View good advice on lighting and energy efficient layouts in the Trust's 'Indretningsvejledning 08' and at [www.elsparefonden.dk/indretning](http://www.elsparefonden.dk/indretning) (only in Danish).
- Read more about LED lighting in the Trust's brochure 'Lysdioder til belysning 2008 – status for fremtidens lyskilder' (LEDs for lighting 2008 – status on light sources of the future) (only in Danish) and at [www.elsparefonden.dk](http://www.elsparefonden.dk)
- View the Danish Enterprise and Construction Authority's building regulations at [www.ebst.dk/br08.dk/BR07/0/54/0](http://www.ebst.dk/br08.dk/BR07/0/54/0) (only in Danish).



# Ventilation, motors and circulator pumps

In many locations, ventilation is very poor in rooms and power consumption is excessive. Nonetheless, it is possible to improve ventilation and reduce the electricity bill. Furthermore, circulator pumps and motors are often not matched to requirements and thus consume far more power than necessary.

18

19



\*Put in storage!

## VENTILATORS

Conform to 'Sparventilator®' specifications of the Danish electricity supply companies

The specifications have been updated in line with the Danish version of the 2008 Purchasing Guidelines.

Equipment type	Coefficient <sup>(2)</sup> %	Other requirements
Radial ventilators (centrifugal ventilators) and axial ventilators <sup>(1)</sup>		
Shaft power ≤ 0.5 kW	76	(3)
Shaft power 0.5 – 1 kW	78	(3)
Shaft power 1 – 3 kW	79	(3)
Shaft power 3 – 10 kW	80	(3)
Shaft power 10 – 20 kW	81	(3)
Shaft power 20 – 50 kW	82	(3)
Shaft power 50 – 100 kW	83	(3)
Shaft power > 100 kW	84	(3)
Room ventilators <sup>(1)</sup>		
Shaft power 0 – 1 kW	72	(3)
Shaft power 1 – 3 kW	73	(3)
Shaft power 3 – 10 kW	74	(3)
Shaft power 10 – 22kW	75	(3)

The specifications apply to ventilators for ventilation systems installed in offices, open spaces, etc. The minimum specification for energy efficient ventilators is that they comply with the requirements specified in the table. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

- (1) Interval stated includes upper threshold figure; e.g. 1 kW output is classified under 0.5 – 1 kW interval.
- (2) The efficiency is the minimum value that a ventilator must achieve at the duty point, which is the point on the efficiency curve relative to the shaft power when the requirement is fulfilled. This is usually around the maximum possible revolutions per minute (RPM), but it can also be at some other point on the curve.
- (3) The ventilator must have a capacity range on the curve for maximum efficiency that, as a minimum, extends from the duty point down to a value equivalent to the duty point minus 50%.

## MOTORS

Specifications conform to band EFF1 per the voluntary agreement between the EU Commission and CEMEP

Equipment type	Efficiency class
All	EFF1 <sup>(1)</sup>

The specifications include all types of motors covered by the agreement between the European Commission and CEMEP. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

- (1) Requirements per band EFF1 as described in the CEMEP Voluntary Agreement.

## CIRCULATOR PUMPS

Specifications conform to energy label A per the voluntary agreement developed by Europump or, if there are no A-rated pumps for the specified type of pump, to the electricity supply companies' requirements for energy saving pumps

Equipment type	Requirements
All	A-rated <sup>(1)</sup>
If no A-rated pump is available for the specified pump type	Meets requirements for energy saving pumps <sup>(2)</sup>

The specification covers all types of pumps included in the voluntary energy efficiency labelling scheme produced by the European pump producers' association (Europump), or as described on the electricity supply companies' list of energy saving pumps. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

- (1) Read about Europump's voluntary energy efficiency labelling scheme at [www.europump.org](http://www.europump.org)
- (2) View the electricity supply companies' requirements and energy saving pump lists at [www.sparepumpe.dk](http://www.sparepumpe.dk)

## GOOD ADVICE ON PURCHASING AND OPERATING EQUIPMENT

- Get a certified ventilation check-up as one element of the Trust's ventilation package. A free meter system with remote reading capacity is supplied with the package, which makes it possible to view power consumption on the Internet and compare it with other systems.
- From 2008, all large air conditioning and ventilation systems in Denmark will be subject to a compulsory ventilation inspection, which must be carried out every five years. This inspection can be included in the Trust's ventilation pack instead of the certified ventilation check-up.
- Ensure that the ventilation system only operates when required. Install a timer control if none is fitted, and check that the installation is matched correctly to demand.
- Ensure that the system's air flow is correctly adjusted so that the ventilation satisfies the required demand.
- Pay particular attention to the filter, ducts, size of the heating surfaces and automatic units so as to improve the SEL factor.
- Ensure that pumps and motors only run when necessary, and that output matches demand.
- Remember to conform to the Danish building regulations covering new ventilation systems. These include requirements that ventilation systems must have a heat recirculation coefficient of at least 65%, and requirements covering the maximum consumption of electricity by ventilation fans operating in constant flow ventilation systems.
- Comply with the Danish building regulations applying to SEL (specific electricity consumption) factor for ventilation systems.

## FURTHER INFORMATION

- See purchasing requirements with full description of scope and definitions at [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb)
- Read more about ventilation systems for offices and institutions at [www.elsparefonden.dk/ventilation](http://www.elsparefonden.dk/ventilation).
- Read more about energy efficient ventilation in the Trust's 'Indretningsvejledning 08' (only in Danish).
- Find more information on the compulsory ventilation inspection at [www.ens.dk/ventilationseftersyn](http://www.ens.dk/ventilationseftersyn) and view the relevant section of the Danish Building Regulations at [www.ebst.dk/br08/BRO7/0/54/0](http://www.ebst.dk/br08/BRO7/0/54/0)
- Read more about pumps for buildings and view product lists at [www.elsparefonden.dk](http://www.elsparefonden.dk) or [www.sparepumpe.dk](http://www.sparepumpe.dk)
- See product list, and read more about energy saving motors at [www.sparemotor.dk](http://www.sparemotor.dk)

# Large appliances, water coolers and food and drink vending machines

It is easy to choose energy saving large domestic appliances by checking the EU's energy label. Requirements covering professional equipment are currently only available for fridges and freezers. Annual running costs for large domestic appliances can be reduced considerably by choosing an energy saving type. Many offices have water coolers and food and drink vending machines that dispense coffee, soft drinks and sweets. These machines are often power guzzlers. The Trust has not yet formulated any purchasing requirements for vending machines, but we can offer expert advice on purchasing and operating them.

## LARGE DOMESTIC APPLIANCES

Specifications conform to A, A+ and A++ compulsory EU energy labelling scheme

Equipment type	Energy label	Other requirements
Fridges, freezers and combinations	A+ eller A++ <sup>(1)</sup>	
Washing machines	A	<sup>(2)</sup>
Dishwashers	A	
Tumble dryers	A	
Ovens (in cookers and built-in separately) <sup>(3)</sup>	A	

The specifications apply to large domestic appliances for household use and covered by the compulsory EU energy labelling scheme for household appliances, etc. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

- (1) A+ and A++ categories in EU energy labelling scheme only apply to fridges, freezers and combined fridge freezers units. Best category for other appliances is A.  
 (2) Choose washing machines with A rated wash and spin cycles.  
 (3) The specifications for ovens comprise electric ovens for household use, including ovens in cookers. Transportable ovens weighing less than 18 kg are not covered.

## PROFESSIONAL FRIDGES AND FREEZERS

Specifications conform to equivalent schemes in the UK

Equipment type	Relative power consumption KWh/48h/m <sup>3</sup>
Fridges 400 and 600 litres 1300 litres	15 12
Freezers 400 and 600 litres 1300 litres	40 36

The specifications apply to fridges and freezers suitable for professional use. Power consumption is the maximum permitted for energy efficient equipment and fulfils the criteria required for inclusion in the Trust's product lists of energy saving refrigeration equipment. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

## COFFEE MAKERS

Specifications established by the Danish Electricity Saving Trust

Equipment type	Requirements
All	Active Sleep function should be activated on delivery. Instructions on activating the Sleep function to be displayed near the machine

Requirements apply to automatic coffee makers and other hot drink machines. See [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb) for full description.

## GOOD ADVICE ON PURCHASING AND OPERATING EQUIPMENT

- Try to choose large domestic appliances that meet rather than exceed your needs.
- Some large domestic appliances have a standby consumption which is not included in the energy label. Check how much power is used and choose types with low consumption.
- Ensure that clothes are thoroughly spin dried. This reduces the drying time and the amount of energy used for drying.
- Consider a natural gas powered tumble dryer if natural gas is available.
- Consider using gas rings or induction plates for food preparation instead of other types of cooking plates.
- Before signing a contract, talk to your supplier about power consumption of food and drink vending machines, and consider whether there are alternative energy saving solutions.
- Wherever possible, only install food and drink vending machines that have Sleep mode, which is activated when the machines are not in use for a set period of time.
- Wherever possible, only install soft drinks vending machines conforming to Energy Star specifications (see [www.energystar.gov](http://www.energystar.gov)).
- Consider whether it is possible to use a tap water flow cooler instead of a bottled water cooler.
- Measure the power consumption of existing vending machines to check whether something needs to be done about the consumption.
- Install clock timers or other types of automatic controllers on food and drink vending machines that do not have the Sleep function, which turn off the machines when they are not in use. However, this should only apply to vending machines that dispense non-perishable foods.

## FURTHER INFORMATION

- See purchasing requirements with full description of scope and definitions at [www.elsparefonden.dk/indkoeb](http://www.elsparefonden.dk/indkoeb)
- Check product lists covering all large domestic appliances and the market's lowest prices at [www.elsparefonden.dk/hvidevarer](http://www.elsparefonden.dk/hvidevarer)
- Check the product lists covering professional fridges and freezers that comply with the energy efficient purchasing requirements at [www.elsparefonden.dk/prof-hvidevarer](http://www.elsparefonden.dk/prof-hvidevarer)
- Read more about EU energy labelling for large domestic appliances at [www.ens.dk/sw11747.asp](http://www.ens.dk/sw11747.asp)
- Read a report on the energy used by refrigerated vending machines at [www.elsparefonden.dk/kaffeautomater-og-andre-forplejningsautomater](http://www.elsparefonden.dk/kaffeautomater-og-andre-forplejningsautomater)
- View information on water consumption, spin functions, and washing and dishwashing capacity of A-rated domestic appliances at [www.elsparefonden.dk/vaskemaskiner](http://www.elsparefonden.dk/vaskemaskiner) and [www.elsparefonden.dk/opvaskemaskiner](http://www.elsparefonden.dk/opvaskemaskiner)



# View electricity consumption and energy saving equipment

This section of the Purchasing Guidelines does not feature particular requirements, but describes tools that make it easier to save by providing greater knowledge of electricity consumption.

Without an overview of electricity consumption, it can be hard to take decisions about purchasing energy efficient equipment and putting electricity savings into practice. To start the saving process, and to help provide an overview of electricity consumption, the Trust has developed an Internet-based tool called 'View electricity consumption' (Se Elforbrug), and the 'SparOmeter' energy measurer.

A large amount of equipment remains switched on when people go home after work, despite the fact that the equipment is no longer required. In order to stop this waste of electricity, the Trust recommends using an AutoPowerOff plug bank, which can automatically switch off devices and other equipment when not in use.

## View electricity consumption

'View electricity consumption' is an effective tool that allows users to follow and have an overview of electricity in public sector institutions and private companies. The tool makes it possible to analyse consumption and compare the consumption in one institution with consumption in other similar institutions. It is much easier to consider savings possibilities having quantified the actual consumption.

## View electricity consumption makes it possible to monitor:

- Hourly electricity consumption up to and including the previous day
- Electricity consumption by day, evening and night for weekdays and at weekends
- Electricity consumption pattern for previous day, week, month or year
- Report analysing the pattern in electricity consumption over previous three months with consumption split by use and time, and with figures for baseline consumption
- Key consumption figures in different types of institutions
- Consumption in similar institutions

Data collected from the electricity supply companies' meters are sent to 'View electricity consumption'. All large consumers of electricity with remotely readable meters can be connected to 'View electricity consumption' free of charge as long as their consumption exceeds 100,000 kWh per year, although this threshold is gradually reducing. Tips on how 'View electricity consumption' can be used to analyse consumption and assess potential savings can be found at [www.elsparefonden.dk/se-elforbrug](http://www.elsparefonden.dk/se-elforbrug)

## SparOmeter energy measurer

The 'SparOmeter' energy measurer is a precise little meter that can help you find out how much power your appliances are using. You can use a 'SparOmeter' to check hidden power consumption in your house, and calculate how much this costs; how much power your old fridge uses; and how much power your notebook docking station uses on Standby. 'SparOmeter' can help reveal hidden consumption and can help find out how much energy can be saved by replacing old inefficient equipment with new energy efficient types. 'SparOmeter' can measure the amount of electricity used by old equipment suspected of using too much energy. The energy measurer also allows users to compare the power used by old and new equipment. A 'SparOmeter' typically costs EUR 40 – 55. Customers can borrow a 'SparOmeter' from many of the Danish electricity supply or service companies, and from local libraries in some municipalities.

## AutoPowerOff plug bank

Contrary to popular belief, computers use power when they are on Standby, which can cost as much as EUR 30 per year. AutoPowerOff is an intelligent plug bank that switches off all peripherals connected to the computer when the computer is turned off. AutoPowerOff is produced in different versions, with and without a USB cable. The AutoPowerOff is just as easy to use as an ordinary plug bank, and can reduce standby consumption without having to turn off numerous switches. An AutoPowerOff for TVs is also available. An AutoPowerOff costs from just EUR 13 and upwards.

22  
23



## FURTHER INFORMATION

- Use [www.elsparefonden.dk](http://www.elsparefonden.dk) to find more information on 'View electricity consumption' and guidance on how to join the scheme.
- Go to [www.elsparefonden.dk](http://www.elsparefonden.dk) for more information about energy saving equipment, for example remote controlled plugs, AutoPowerOff plug banks for TV, 'SparOmeter' with data port, and wireless systems for communication and control.
- Go to the Trust's website to view data for 'View electricity consumption' and see information about consumption in many different institutions.

## GOOD ADVICE ON PURCHASING AND OPERATING EQUIPMENT

- Use 'View electricity consumption' to get an overview of consumption, and where it is worth making an effort.
- Use 'View electricity consumption' to see how much electricity is used at night and to compare consumption with other similar institutions.
- Purchase or borrow a 'SparOmeter' and measure electrically powered equipment in the institution. Discover which equipment is worth replacing.
- Purchase an AutoPowerOff plug bank for all office workplaces and similar locations in which there are several electrically powered appliances.

## The Trust helps to reduce electricity bills

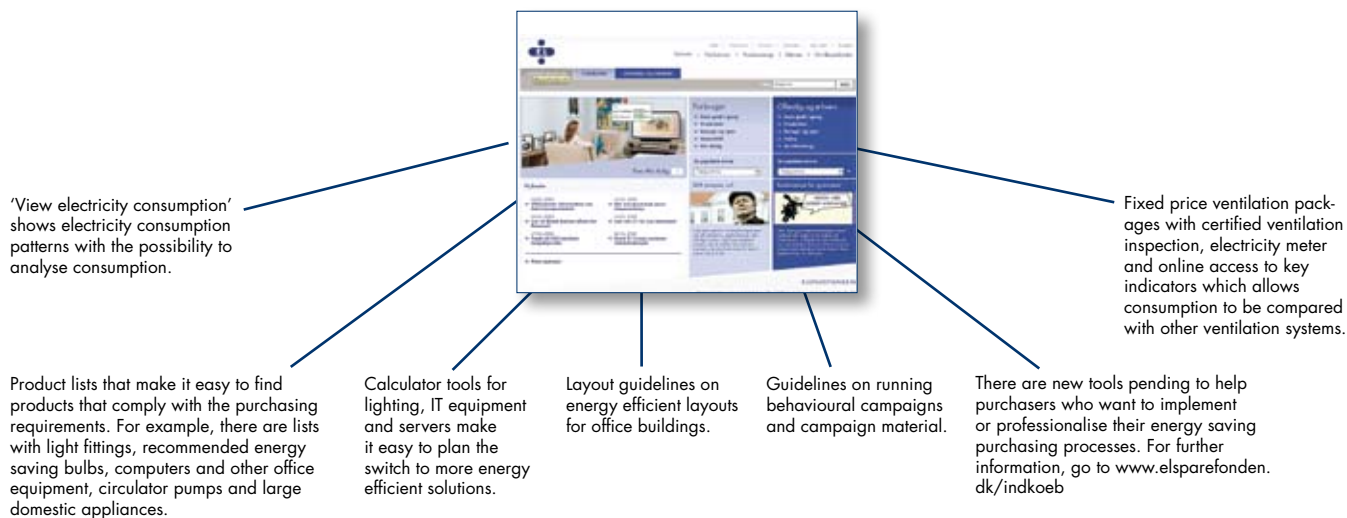
The Trust's Customer Advice service can help public sector institutions reduce their electricity bills. There are many ways of achieving this. For example, more than one-third of all electricity consumed by public sector workplaces is used after 17.00, when all employees have gone home. The Trust has calculated that the Danish public sector could save nearly EUR 94 million worth of electricity every year through energy efficient purchasing. Customer Advice can provide advice and guidance on purchasing, operating and refurbishing some of the following:

- Lighting
- IT and office equipment
- Ventilation, cooling and circulator pumps
- Server rooms
- Large appliances

Ring us or send an e-mail to Customer Advice if you have any questions. Customer Advice has specialists and process advisers who will do everything they can to help. They can also assist with the organisation of the work and can contribute to meetings and theme days about how to save energy.

## Use the Trust's website and tools

The Trust's [www.elsparefonden.org](http://www.elsparefonden.org) website contains helpful information and knowledge about electricity consumption and savings possibilities. The site also provides access to tools developed by the Trust that make it easy to get an overview of your electricity consumption and find out how to make savings.



Tools are continually being developed and improved. Find the latest information about current tools, and possible new tools at [www.elsparefonden.dk](http://www.elsparefonden.dk)

### The Danish Electricity Saving Trust

The Danish Electricity Saving Trust is an independent trust led by a Board appointed by the Danish Ministry of Climate and Energy. The Trust was established in 1997 for the purpose of ensuring electricity savings in the household and public sectors.

The Danish Electricity Saving Trust's Purchasing Guidelines 2008  
Making it easy for all public sector institutions and other organisations to purchase energy efficient products and save money.

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