

AutoPowerOff plug banks – a story with energy saving perspectives

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Abstract

Denmark uses around 35 TWh of electricity per year, with residential dwellings accounting for around 10 TWh of this figure. Standby consumption comprises around 12% of power used in homes. If every Danish home installed AutoPowerOff plug banks, savings exceeding 500 GWh per year would be possible, equivalent to 5% of household electricity consumption, or 1.5% of the total in Denmark.

This paper describes the estimated standby consumption in Danish homes in 2006, and possible energy savings through the use of AutoPowerOff plug banks. The estimates were subsequently used as background information for a 2007-2008 campaign to promote the wider use of these devices in Denmark.

In order to increase the sale of AutoPowerOff plug banks by 1 million units, it was agreed that retail chains selling consumer electronics would include an AutoPowerOff when selling a TV or PC. A nationwide TV advertising campaign was launched featuring the names of participating retailers.

Sales of AutoPowerOff plug banks in the first 7 months of 2008 passed the 515,000 mark, with over 1 million units now installed in 2.5 million Danish households. Annual savings are estimated to be over 80 GWh, equivalent to 40,000 tons of CO₂. This equates to potential savings on an EU-wide basis of more than 7 TWh, or 3.6 million tons of CO₂ in Denmark.

Introduction

In Denmark standby consumption comprises over 10% of the power used by private households [1], and this figure continues to rise [2], [8] despite comprehensive campaigns and a steady stream of information in newspapers, weekly magazines and on websites and national television [9] about savings opportunities and the associated financial and environmental benefits. The increase can be explained partly by the fact that new types of appliances with standby keep emerging, and that the use of existing and new types of appliances with standby is growing [3], [11].

However, this problem could be avoided completely if all appliances were switched off at the wall socket. This can often be a nuisance in situations where devices need to be switched on again because many small devices are either hidden under the desk or behind the TV, or because they may not even have an On/Off switch. So it is easier to leave devices plugged in on the basis that most will revert to some form of standby mode.

If we want to combat standby consumption we will need to consider options that make it easy for the user to switch off a device after use. One good example is an AutoPowerOff plug bank, which allows a master device, e.g. a TV or a PC, to determine whether any connected devices, e.g. VCR, DVD, set-top box, printer, scanner and loudspeakers, should be on or off. This means that if a PC is switched off using the On/Off button or via a programmable menu, or the TV is switched off via the remote control, all the related devices are powered down at the same time. The increased number of appliances mentioned above which are used together with a PC or TV make the installation of an AutoPowerOff plug bank even more relevant because it allows many appliances to be switched off at the same time.



Figure 1. AutoPowerOff plug bank with the Danish Energy Saving Label. Denmark uses around 35 TWh of electricity per year, with residential dwellings accounting for around 10 TWh of this figure. Standby consumption comprises around 12% of power used in homes. If every Danish home installed AutoPowerOff plug banks, savings exceeding 500 GWh per year would be possible, equivalent to 5% of household electricity consumption, or 1.5% of the total in Denmark.



Figure 2. The first AutoPowerOff plug bank with USB connector.

Unfortunately AutoPowerOff plug banks have not become as popular in Denmark as one might wish. This is due to both technical obstacles and limited awareness. In 2006, the Danish Electricity Saving Trust (the Trust) launched a campaign to promote AutoPowerOff plug banks. The results of this campaign are analysed below with an estimate of the total effect on the use of AutoPowerOff plug banks in Denmark.

AUTOPOWEROFF PLUG BANK TECHNOLOGY

Numerous small and bright green lamps are a common sight in offices after hours or in homes when we are asleep or out at work. Few people remember to switch off all their computer equipment when they finish working. This costs both energy and money, and in October 2001 Peter Karbo, a project manager at the Trust, came up with the idea to develop a special

AutoPowerOff plug bank which would help offices and private households save money in the future.

The Trust contacted the Danish Technological Institute for an assessment. This was the start of a cooperation to develop a functional AutoPowerOff plug bank that looked exactly like an ordinary plug bank. The special feature of the AutoPowerOff plug bank was that it was designed to switch off all attached peripherals automatically when the computer was switched off. The first prototype saw the light of day in December 2001.

The Trust wanted to help new energy saving technologies and products gain a foothold in the market, with the intention that these products should be both affordable and widely available. In order to promote the AutoPowerOff plug bank the Trust produced finished product specifications developed in



Figure 3. Examples of TV AutoPowerOff variants.

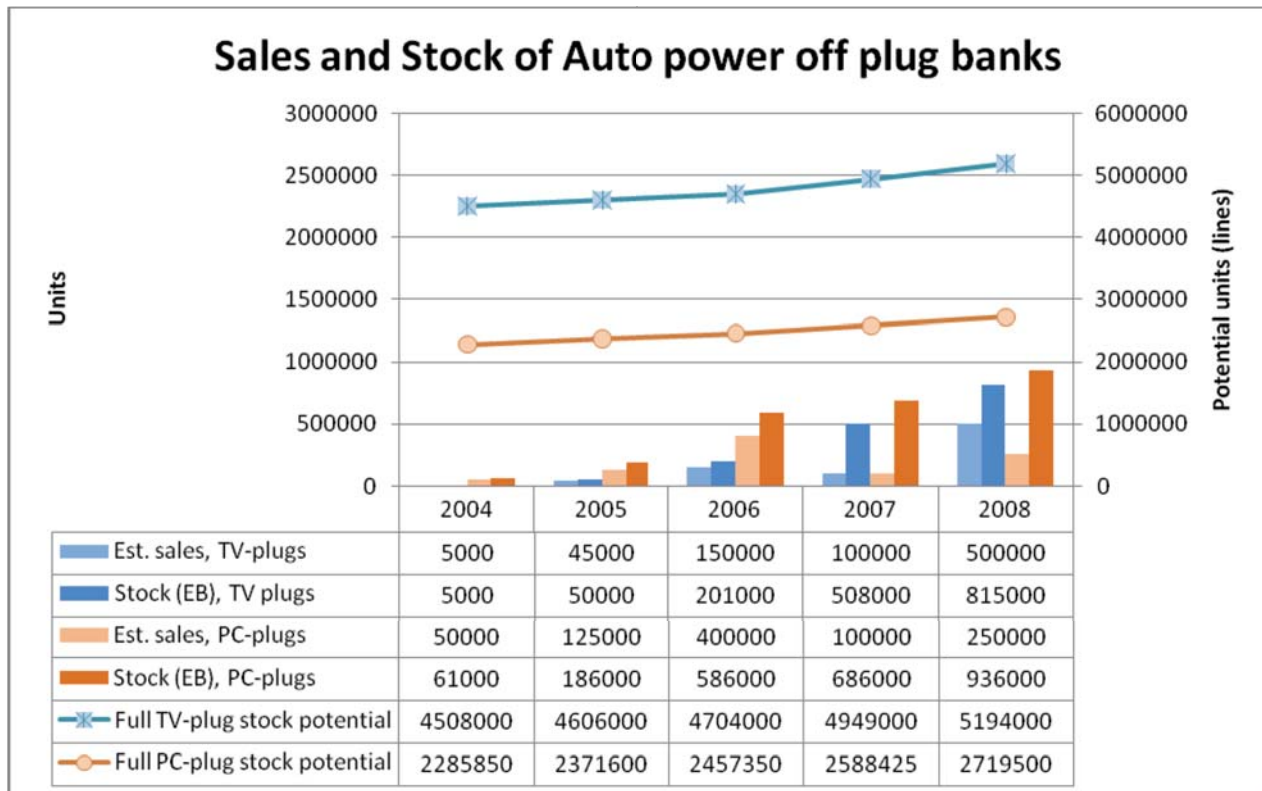


Figure 4. Sales and stock of AutoPowerOff plug banks.

cooperation with the Danish Technology Institute, which carried out the initial development work. The final design, documentation and a prototype were unveiled in August 2003. The Trust's contribution ended there, and the design was offered to the market as freeware. All the material was made available to interested producers. The drawings can be downloaded from the Trust's websites free of charge. Initially, three Danish suppliers launched AutoPowerOff plug banks for PCs before Christmas 2003 [4].

All these early versions were AutoPowerOff plug banks with USB connectors which, when connected to a PC's USB port, could detect whether the port had power or not. If the PC was off and there was no power at the USB port, the AutoPowerOff would be switched off by a relay. All the other peripherals, which would normally have to be switched off individually, were now switched off automatically as a result of being plugged into the sockets of the AutoPowerOff plug bank.

Over the following years this technological solution caused some problems as new PC motherboards with continually powered USB ports were introduced onto the market. Then Windows Vista arrived, which always keeps USB ports continually powered, so actually the market for USB-powered Au-

toPowerOff plug banks is drawing to a close. In the meantime, AutoPowerOff plug banks were launched for use with TVs and associated peripherals connected on the "master/slave" principle. The TV is plugged into a master socket which is capable of detecting when the power supplied to the "master" falls below a specified level – typically 20 Watt – whereupon a relay switches off all the slave sockets into which the peripheral devices are plugged.

These worked well in many cases, but to keep production prices low the technical solution was fairly simple. This meant that in some cases the AutoPowerOff plug banks were "cheated" into believing that the power level was artificially high because of a very low power factor, so they did not switch off the slaves, thereby failing to fulfil the design function [5].

Problems associated with TV AutoPowerOff plug banks are expected to increase with current technologies as increasing numbers of new TVs with a very low standby power flood into homes.

A new generation of AutoPowerOff plug banks are on their way [7], aimed at detecting standby power use for any device plugged into the master socket, which means that they can work with all devices as the master, including PCs, notebooks,

Table 1. Ownership and potential share.

Year	TV-plugs Ownership	TV-plugs Potential share	PC-plugs Ownership	PC-plugs Potential share
2004	0.2%	0.1%	2.5%	2.7%
2005	2.0%	1.1%	7.6%	7.8%
2006	8.2%	4.3%	23.9%	23.8%
2007	20.7%	10.3%	28.0%	26.5%
2008	33.3%	15.7%	38.2%	34.4%

Table 2. Power levels for PC-related appliances in homes (Watts), 'ELMODEL-bolig 2006'.

PC-related appliances		Power level ON		Power level standby			Power level soft OFF		
Appliance	Av.	Max	Min	Av.	Max	Min	Av.	Max	Min
	Watt	Watt	Watt	Watt	Watt	Watt	Watt	Watt	Watt
Desktop PC	70.0	230.0	14.0	5.7	39.0	1.0	4.1	14.0	0.0
Laptop PC	38.0	105.0	19.0	1.7	7.6	0.4	1.0	2.0	0.1
Monitor CRT 14-15"	80.0	115.0	70.0	3.1	5.0	2.0	0.0	0.0	0.0
Monitor CRT 17"	90.0	125.0	75.0	3.2	4.6	1.5	1.2	4.6	0.2
Monitor CRT >17"	115.0	175.0	80.0	4.0	7.3	0.8	1.2	4.6	0.0
Monitor LCD 14-15"	26.0	65.0	11.0	4.0	16.0	1.3	1.8	5.8	0.0
Monitor LCD 17"	26.5	60.0	15.0	3.1	7.8	1.2	2.1	7.5	0.0
Monitor LCD >17"	33.0	77.0	22.0	3.9	8.0	1.7	2.1	4.0	4.0
Printer (inkjet)	13.6	20.0	7.0	1.3	3.0	0.7	0.6	1.0	0.2
Printer (laser)	350.0	570.0	210.0	16.7	45.0	2.0	5.0	11.0	0.0
Scanner	14.0	35.0	2.5	3.5	7.0	1.4	3.0	5.0	0.0
Multifunction machine (inkjet)	18.7	25.0	13.0	2.9	4.0	1.5	0.8	1.0	0.7
Multifunction machine (laser)	800.0	1200.0	650.0	17.8	35.0	8.0	3.5	5.0	3.0
Router/switch	21.0	38.0	14.0	9.3	12.0	4.0	-	-	-
ADSL modem	9.4	12.5	6.6	9.4	12.5	6.6	-	-	-
ISDN modem	8.3	12.0	6.0	8.3	12.0	6.0	-	-	-
Wireless network	7.0	8.0	6.4	7.0	8.0	6.4	-	-	-
Speakers	24.0	90.0	3.0	4.8	12.0	0.5	3.0	5.0	0.0
External modem	8.0	12.0	4.0	8.0	12.0	4.0	3.0	5.0	0.0

TVs, audio equipment, etc. At the same time, the energy consumption of new AutoPowerOff plug banks will be reduced to almost nothing – in contrast with the previous consumption level for older-generation of TV AutoPowerOff plug banks, which was 0.5–1.5 Watt.

Campaign

In 2007 the Trust met with current and potential producers of AutoPowerOff plug banks to inform them of the Trust's campaign. In general the current suppliers welcomed the AutoPowerOff plug bank campaign, while potential producers felt encouraged to start production of AutoPowerOff plug banks meeting the Trust's requirements. Despite their willingness to cooperate the producers had reservations about introducing too many AutoPowerOff plug banks onto the Danish market.

The campaign was launched in autumn 2007 and involved close contact with several major retail chains. These chains were encouraged to offer their customers AutoPowerOff plug banks "free of charge", for instance by throwing in an AutoPowerOff with each purchase of a TV or a computer. In return,

the Trust ran a TV infomercial telling consumers which retail chains were offering free plug banks.

The campaign created considerable awareness for AutoPowerOff plug banks, and soon the retail chains began selling them separately instead of merely handing them out with a computer or TV. Because the producers were reluctant to order large quantities of AutoPowerOff plug banks, retail stores were suddenly unable to replenish their stocks. After the campaign, several major suppliers started importing AutoPowerOff plug banks which rectified most of the supply problems.

Total costs for the 2007-08 campaign amounted to around 1.2 million Euro. Sales of AutoPowerOff plug banks are shown in Figure 4.

The figure 4 illustrates that there is still some way to go before all potential PCs and TVs are equipped with AutoPowerOff plug banks.

It appears that although on average one third of Danish households own a TV AutoPowerOff plug bank in 2008, only about one sixth of TVs are equipped with this type of plug bank.

Table 3. Power levels for TV-related appliances (Watts), 'ELMODEL-bolig 2006'.

TV-related appliances		Power level ON			Power level standby			Power level soft OFF		
Appliance	Av.	Max	Min.	Av.	Max	Min.	Av.	Max	Min.	
	Watt	Watt	Watt	Watt	Watt	Watt	Watt	Watt	Watt	
Colour TV CRT 14"	35.0	47.0	29.0	3.7	4.0	3.1	3.7	4.0	3.1	
Colour TV CRT 26"	79.0	111.0	59.0	3.0	7.0	0.7	3.0	7.0	0.7	
Colour TV LCD 26"	111.0	150.0	90.0	8.0	29.1	0.0	0.8	1.5	0.0	
Colour TV LCD 40"	189	240	169	3.1	6	0.6	0.5	1	0.3	
Colour TV Plasma 42"	307	375	253	3.1	6	0.6	0.6	1.6	0.3	
Colour TV Plasma 50"	407.0	470.0	344.0	3.1	6	0.6	0.6	1.6	0.3	
VCR	17.0	25.0	14.0	3.0	3.5	2.0	1.2	1.5	1.0	
DVD player	10.0	12.0	6.6	4.5	13.0	0.1	4.7	6.9	0.0	
DVD player/recorder	33.9	48.0	27.0	6.1	19.4	1.0	6.1	19.4	1.0	
Set-top-boxes	12.1	30.0	5.3	10.0	30.0	4.4	-	-	-	
Satellite dishes	4.7	15.0	2.0	4.7	15.0	2.0	-	-	-	
Antenna amplifier	3.6	6.0	3.0	3.6	6.0	3.0	-	-	-	
Gaming machines	76.7	197.0	19.3	68.9	180.0	18.1	1.6	2.7	0.1	
Surround sound	50.0	500.0	20.0	5.0	5.0	5.0	5.0	5.0	5.0	
Projector/home cinema	320	980	175	5.1	10	0.5	5.1	10	0.5	

Table 4. Appliances in socket, PC 1.

PC socket 1		
Appliances in socket	%	General ownership%
Printer	88.4	110.0
Speakers	84.8	73.9
Scanner	51.3	17.2
Router/hub/switch	43.0	24.8
External hard drive	28.0	19.0
Screen	17.3	159.0
Lighting	8.8	-
Modem	3.6	12.7
Mouse	2.4	-
Laptop	1.6	63.0
DVD	1.2	100.0
TV/VCR	0.8	302.0
Other	4.0	-
Total	335.3	-

Table 5. Appliances in socket, PC 2+.

PC Socket 2+	
Appliances in socket	%
Speakers	70.7
Printer	58.5
Scanner	35.8
External HDD	22.2
Router/hub/switch	18.8
Screen	15.5
Lighting	4.8
Modem	2.9
Mouse	1.0
Other	1.9
Total	232.1

Danish standby consumption in 2006

Late 2006 a large survey was undertaken to examine the ownership and use of AutoPowerOff plug banks. This was carried out as a part of the regular update of "ELMODEL-bolig", resulting in over 2,000 instances of ownership and usage of AutoPowerOff plug banks as well as many other appliances.

Based on these data, which also appear in the 'ELMODEL-bolig 2006' report "Standby and AutoPowerOff plug banks – the status in Denmark" [1] a number of results were stated for Denmark in 2006 per the following. The power levels are taken

from [6], a supplementary data source report for 'ELMODEL-bolig 2006'.

By using the power levels with usage times from the same source, it is possible to analyse how the AutoPowerOff plug banks can affect standby consumption. Naturally this depends on what is plugged into the AutoPowerOff. Reference [1] provides a calculation of this in 2006, for AutoPowerOff plug banks 1 and 2+, for PC and TV.

I.e. an average of 3.4 appliances per socket, in addition to the one PC plugged into the socket. To compare with the total ownership, e.g. for printers, one should multiply the 88.4% with the

Table 6. Appliances in socket, TV 1.

TV socket 1		
Appliances in socket	%	General ownership %
DVD	80.2	100.0
VCR	70.8	104.5
Surround sound	31.0	28.7
Set-top box	20.4	21.3
Games machine	14.9	32.3
Audio equipment	13.9	-
Media centre	7.8	-
Lighting	7.0	-
Other	2.6	-
Total	248.7	-

Table 7. Appliances in sockets, TV 2+.

TV Socket 2+	
Appliances in socket	%
DVD	36.3
Set-top box	35.5
Audio equipment	27.7
VCR	24.5
Surround sound	13.3
Games machine	8.4
Media centre	5.5
Lighting	5.5
Other	2.8
Total	159.7

PC Socket 1	Situation with out energy saving socket (ESS)								Situation including ESS, controlled by PC, i.e. ON 1								Avg pen. kWh/y	Full pen. kWh/y
	ON Watt	Time Hours/y	Stdby Watt	Time Hours/y	Off-m. Watt	Time Hours/y	Cons kWh/y	C incl. kWh/year	ON Watt	Time Hours/y	Stdby Watt	Time Hours/y	Off-m. Watt	Time Hours/y	Cons kWh/y	C incl. kWh/year		
Printer	81	180	4	5023	2	3557	42.0	37.1	81	180	4	1431	2		20.9	18.4	18,7	21,1
Speakers	24	1611	5	4477	3	2672	68.2	57.8	24	1611	5	0	3		38.7	32.8	25,0	29,5
Scanner	14	52	4	3215	3	2747	20.2	10.4	14	52	4	1559	3		6.2	3.2	7,2	14,0
Router/hub/switch	21	1611	9	5231			82,5	35,5	21	1611	9	0			33,8	14,6	20,9	48,6
External HDD	12	1611	8	4477	3	2672	61,8	17,3	12	1611	8	0	3		19,3	5,4	11,9	42,5
Screen	27	1611	3	4477	2	2672	62,2	10,7	27	1611	3	0	2		42,7	7,4	3,4	19,5
Lighting							0,0								0,0	0,0	0,0	0,0
Modem	8	1611	8	4477		2672	48,7	1,8	8	1611	8	0			12,9	0,5	1,3	35,8
Mouse	4	1611	4	4477		2672	24,4	0,6	4	1611	4	0			6,4	0,2	0,4	17,9
Laptop	38	1369	2	1566	1		54,7	0,9	38	1369	2	242	1		52,4	0,8	0,0	2,3
DVD	10	128	5	3748	5	1783	26,2	0,3	10	128	5		5	1483	8,0	0,1	0,2	18,2
TV/VCR	100	1446			4	3748	157,8	1,3	100	1446	4		2	165	144,9	1,2	0,1	12,9
Other	25	1611	3		3	4477	53,7	2,2	25	1611	3		3	0	40,3	1,6	0,5	13,4
							702,3	175,8							426,5	86,1	89,7	275,8

Figure 5. PC plug 1 savings estimates, ESS denotes Energy Saving Socket aka AutoPowerOff plug bank.

PC Socket 2+	Situation with out energy saving socket (ESS)								Situation including ESS, controlled by PC, i.e. ON 1								Avg pen. kWh/y	Full pen. kWh/y
	ON Watt	Time Hours/y	Stdby Watt	Time Hours/y	Off-m. Watt	Time Hours/y	Cons kWh/y	C incl. kWh/year	ON Watt	Time Hours/y	Stdby Watt	Time Hours/y	Off-m. Watt	Time Hours/y	Cons kWh/y	C incl. kWh/year		
Speakers	24	1611	5	4477	3	2672	68.2	48.2	24	1611	5	0	3		38.7	27.3	20,9	29,
Printer	81	180	4	5023	2	3557	42.0	24.6	81	180	4	1431	2		20.9	12.2	12,4	21,
Scanner	14	52	4	3215	3	2747	20.2	7.2	14	52	4	1559	3		6.2	2.2	5,0	14,
External HDD	12	1611	8	4477	3	2672	61,8	13,8	12	1611	8	0	3		19,3	4,3	9,5	42,
Router/hub/switch	21	1611	9	5231			82,5	15,5	21	1611	9	0			33,8	6,4	9,2	48,
Screen	26,5	1611	3	4477	2	2672	62,2	9,6	26,5	1611	3	0	2		42,7	6,6	3,0	19,
Lighting							0,0								0,0	0,0	0,0	0,
Modem	8	1611	8	5231		2672	54,7	1,6	8	1611	8	0			12,9	0,4	1,2	41,
Mouse	4	1611	4	4477		2672	24,4	0,2	4	1611	4	0			6,4	0,1	0,2	17,
Other	25	1611	3		3	4477	53,7	1,0	25	1611	3		3	0	40,3	0,8	0,3	13,
							469,7	121,8							221,2	60,3	61,5	248,

Figure 6. PC plug 2 savings estimates.

PC plug penetration of 25%, yielding a total of 22% of the printers plugged into an AutoPowerOff plug. This leaves about 88% of the total 110% ownership not in an AutoPowerOff plug.

Figures 5 and 6 show the detailed energy savings for PC AutoPowerOff plug banks 1 and 2+ (here referred to as TV socket energy saving sockets 1, and 2+, respectively). On average socket 1 saves 90 kWh/year, additional sockets in average

62 kWh/year. Applying the maximum and minimum power levels from Table 7, the annual savings can be calculated to range between 24 and 181 kWh/year for socket 1, and between 15 and 126 kWh/year for additional PC plugs.

Figure 7 and 8 show the detailed energy savings for TV energy saving socket 1, and 2+ respectively. On average socket 1 saves 61 kWh/year, additional sockets in average 50 kWh/year.

TV Socket 1	Situation with out energy saving socket (ESS)							Situation including ESS, controlled by TV, i.e. ON 14							Avg pen.	Full pen.		
	ON Watt	Time Hours/y	Stdby Watt	Time Hours/y	OFF-m. Watt	Time Hours/y	Cons kWh/y	C incl. kWh/year	ON Watt	Time Hours/y	Stdby Watt	Time Hours/y	OFF-m. Watt	Time Hours/y	Cons kWh/y	C incl. kWh/year	Diff. kWh/year	Diff. kWh/year
Appliances																		
DVD	34	130	6	3748	6	1783	37,6	30,2	34	130	6		6	1316	12,3	9,9	20,3	25,3
VCR	17	100	3	3748	3	1783	18,3	13,0	17	100	3		3	1346	5,7	4,1	8,9	12,6
Surround sound	50	1446	5	3657	5	3657	108,9	33,8	50	1446	5		5		72,3	22,4	11,3	36,6
Set-top box	12,1	1446	10	7314			90,6	18,5	12,1	1446	10				17,5	3,6	14,9	73,1
Games machines	77	730	69	730	2	4281	113,4	16,9	77	730	69	716	2	0	105,6	15,7	1,2	7,8
Audio equipment	100	840	5		5	4171	104,8	14,6	100	840	5		5	607	87,0	12,1	2,5	17,8
PC/HDD	96,5	1000	9		6	4011	121,4	9,5	96,5	1000	9		6	446	99,3	7,8	1,7	22,1
Lighting																		
Other	25	1446	5	3565			54,0	1,4	25	1446	5	0			36,2	0,9	0,5	17,8
							649,0	137,9							435,9	76,6	61,3	213,1

Figure 7. TV plug 1 savings estimates.

TV Socket 2+	Situation with out energy saving socket (ESS)							Situation including ESS, controlled by TV, i.e. ON 14							Avg pen.	Full pen.		
	ON Watt	Time Hours/y	Stdby Watt	Time Hours/y	OFF-m. Watt	Time Hours/y	Cons kWh/y	C incl. kWh/year	ON Watt	Time Hours/y	Stdby Watt	Time Hours/y	OFF-m. Watt	Time Hours/y	Cons kWh/y	C incl. kWh/year	Diff. kWh/year	Diff. kWh/year
DVD	34	130	6		6	8630	56,2	20,4	34	130	6	1316	6	0	12,3	4,5	15,9	43,9
Set-top box	12,1	1446	10	7314			90,6	32,2	12,1	1446	10	0			17,5	6,2	26,0	73,1
Audio equipment	100	840	5		5	4171	104,8	29,0	100	840	5		5	607	87,0	24,1	4,9	17,8
VCR	17	100	3		1	8660	10,4	2,5	17	100	3	1346	1	0	5,7	1,4	1,1	4,6
Surround sound	50	1446	5	3657	5	3657	108,9	14,5	50	1446	5	0	5		72,3	9,6	4,9	36,6
Games machines	77	730	69	716	2	4281	114,2	9,6	77	730	69	716	2	0	105,6	8,8	0,7	8,6
PC/HDD	96,5	1000	9		6	4011	121,4	6,7	96,5	1000	9		6	446	99,3	5,5	1,2	22,1
Lighting																		
Other	25	1446	5	3565			54,0	1,5	25	1446	5	0			36,2	1,0	0,5	17,8
							660,4	116,5							435,9	61,2	55,3	224,5

Figure 8. TV plug 2 savings estimates.

Applying the maximum and minimum power levels from table 7, the annual savings can be calculated to range between 26 and 137 kWh/year, and between 24 and 125 kWh/year for additional TV plugs.

At present, almost one quarter of potential savings with AutoPowerOff plug banks has been achieved. The aggregate savings from 2004 to 2008 constitute about 300 GWh, corresponding to a reduction of about 150,000 tons of CO₂ emitted by Danish power stations.

Summary of findings

- Around 38% of households have at least one AutoPowerOff plug bank for PC usage.
- Around 33% of households have at least one AutoPowerOff plug bank for TV usage.
- Each AutoPowerOff plug bank used with the first PC controls on average 3.35 additional devices.
- Each AutoPowerOff plug bank used with the first TV controls on average 2.48 devices.
- Each AutoPowerOff plug bank for the first PC saves an average 90 kWh/year, ranging from 24 to 181 kWh/year. This is equivalent to eliminating 13 Watt (3–25) on average during hours when the PC is off.
- Each AutoPowerOff plug bank for first TV saves an average 61 kWh/year, ranging from 26 to 137 kWh/year. This is equivalent to eliminating 8 Watt (4–19) on average during hours when the TV is off.

- All AutoPowerOff plug banks at current ownership levels and usage patterns already save at least 60 GWh/year in Denmark.
- If every Danish home installed AutoPowerOff plug banks, savings exceeding 500 GWh per year would be possible, equivalent to 5% of household electricity consumption, or 1.5% of the total in Denmark.

The energy savings given above have been weighted by the penetration of the individual devices with regards to the AutoPowerOff plug bank. Thus, for printers which are plugged into 86% of the banks, only 86% of the savings are quoted above, to provide an average across all homes with AutoPowerOff plug banks. The savings are greater in homes where appliances are owned.

During the survey, respondents may not have fully understood the different operating modes stated in the questionnaire. The figures presented here are based on a conservative estimate of standby consumption, i.e. only the lowest power standby mode has been used for estimating savings, although it is likely that some of the usage declared by respondents to the questionnaire is in a higher power standby mode.

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