



Action Plan for Green IT in Denmark



Ministry of Science
Technology and Innovation

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Ministry of Science, Technology and Innovation
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When we use our computer, we make an impact on the global climate. The use of computers and other IT equipment accounts for up to two per cent of total CO₂ emissions. However, the potential for environmental gains resulting from IT use is far greater. This is the background for my announcement in the summer of 2007 that the Ministry of Science, Technology and Innovation would develop an Action Plan for Green IT.

Green IT can help reduce energy consumption by reducing IT-related energy consumption and promoting innovative IT solutions for reducing energy consumption and CO₂ emissions. In other words, IT might be part of the global environmental problem, but it is also part of the solution.

The Action Plan contains a number of initiatives, each of which can make their own contribution to strengthening efforts in relation to Green IT. At the same time, the Action Plan aims at making an impact on the debate and promoting Danish Green IT technology. That is good for the environment and good for Denmark.

I hope that the Action Plan will have an impact on the opinions of everyone who reads it. Ordinary citizens, companies and authorities alike must become accustomed to not just thinking in terms of best and cheapest when purchasing and using IT. We must also think in terms of what is sustainable. This Action Plan is a large and important step in this direction.

The global environmental problems can only be solved if all sectors in society contribute with initiatives aimed at meeting these challenges.

Helge Sander
Minister of Science, Technology and Innovation





Denmark is often named as the world's leading IT nation, and Denmark has a world class IT infrastructure. Denmark has good conditions for leading the way in relation to Green IT. Over 99 per cent of all Danes are able to establish broadband Internet access in their home. Denmark is among the countries in which IT is used the most, and Denmark is a well-established leader in environmental technology.

On the global level, IT stands for two per cent of total CO₂ emissions.¹ At the same time, IT holds the key to being able to reduce the remaining 98 per cent of CO₂ emissions. Denmark shares the responsibility for taking care of the environment in relation to our use and development of IT solutions.

The Ministry of Science, Technology and Innovation Action Plan is to contribute to positioning Denmark on the forefront of Green IT, partly by bringing about a greener lifecycle for IT solutions – from development, production and use to disposal – and partly by strengthening research and the development of solutions applying IT to reduce our environmental footprint.

The Action Plan includes the following initiatives aimed at setting focus on greener IT solutions in the private and public sectors as well as among ordinary people.

Focus area 1: Greener IT use

> Initiative 1: Corporate IT use must become greener

In the future, environmental consideration will become an integrated aspect of the social responsibility of private companies to a far greater extent than is presently the case. Green IT can therefore counteract red figures on the bottom line. In order to support this development, a catalogue is being compiled that will consist of best practices and good advice about greener IT solutions for companies.

> Initiative 2: Green IT information campaign

Children and young people are frequent users of new technology and the consumers of the future. It is therefore important to ensure the spreading of knowledge about the significance of 'energy-correct' technology and behaviour. The Ministry of Science, Technology and Innovation will launch an information campaign for children and young people about Green IT in order to set focus on Green IT use.

¹ Gartner 2007: Gartner Symposium/Itxpo "Green IT – A New Industry Shockwave", s. 2



> **Initiative 3: Guidelines for Green IT for public authorities**

The Danish Electricity Saving Trust (Elsparefonden) assesses that DKK 4 million can be saved daily if the public sector adopts more resource-conscious electricity consumption.² In cooperation with the other ministries, the Ministry of Science, Technology and Innovation will develop guidelines to help the ministries to establish requirements for Green IT-solutions.

> **Initiative 4: Knowledge base for energy- and CO₂ calculation**

An overview of calculators for energy consumption and CO₂ emissions from the use of IT will be compiled, which will enable everyone – ordinary citizens, companies and authorities alike – to easily gain access to information about the extent of their IT-related energy consumption and thereby how much CO₂ is produced as a result of IT use. The overview will be made available via the Internet.

IT is simultaneously part of the solution. The Action Plan includes the following initiatives, which are to contribute to strengthening the development and use of innovative IT solutions for the reduction of energy consumption.

Focus area 2: IT solutions for a sustainable future

> **Initiative 5: Green IT research funding**

There is a need for research projects promoting the development of energy-friendly IT solutions capable of helping solve problems with total CO₂ emissions. In 2008, the Ministry of Science, Technology and Innovation has allocated DKK 36 million for research in Green IT, pervasive computing and eGovernment.

> **Initiative 6: Export of Green IT know-how and technology**

The Ministry of Science, Technology and Innovation is establishing an export campaign for expertise and technology related to Green IT. This initiative is being developed in collaboration with the IT sector and Danish innovation centres abroad. It will particularly focus on opportunities for the export of green technology to the new growth centres in Asia.

² http://www.elsparefonden.dk/offentlig-and-erhverv/kom-godt-i-gang/kampagne-2007?nm_ct=30

> **Initiative 7: International conference on Green IT**

The Ministry of Science, Technology and Innovation will place Green IT on the agenda. In the first half of 2009, an international conference on Green IT will therefore be arranged. The conference is aimed at contributing to the setting of the agenda and promoting the sharing of knowledge about relevant opinions and initiatives.

Green IT is very much a question of changing one's own behaviour. The Ministry of Science, Technology and Innovation will take the lead and set greener IT solutions on the agenda in all aspects of the ministerial activities.

> **Initiative 8: Green IT in The Ministry of Science, Technology and Innovation**

Through a number of concrete measures, the Ministry of Science, Technology and Innovation will be a pioneering authority in Green IT. The initiative is to help the Ministry of Science, Technology and Innovation reduce its consumption of electricity by at least 10 per cent.

The work with the initiatives will point ahead to December 2009, when Denmark is to host the UN Climate Change Conference COP 15. The objective for the 2009 climate conference is to reach an ambitious and global climate agreement for the period after 2012. The climate conference offers an appropriate occasion to present a number of environmental measures within the IT area.



IT holds considerable potential for society. IT makes it possible to work and produce more efficiently; IT opens new opportunities in the global economy and makes it possible for us to design our lives at work and at home in new ways. It is therefore important that Denmark fully exploits the potential in IT so that the technology contributes to society and how we design it with considerable added value.

Information and communication technology attains ever-greater significance. Figures from Statistics Denmark indicate that Danish households with computers have gone from 15 per cent in 1990 to 83 per cent in 2007.³ Moreover, 94 per cent of the households with computers had Internet access in 2007.⁴ Correspondingly, 98 per cent of Danish companies with more than ten employees use IT.⁵ These figures indicate that Denmark has embraced IT.

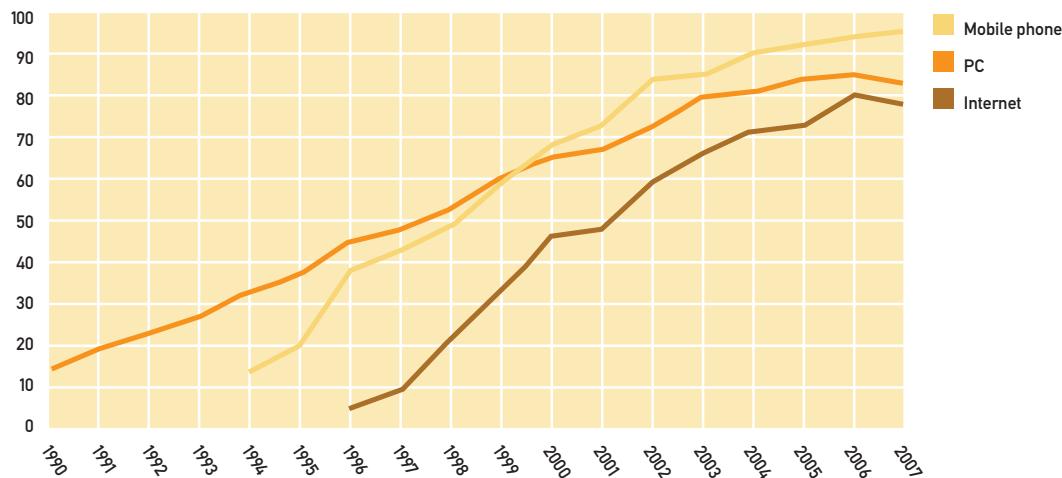


Figure 1: The possession of durable consumer goods in the family 1990-2007. Source: Statistics Denmark.

³ Statistics Denmark, Familiernes besiddelse af varige forbrugsgoder 1990-2007.

⁴ Statistics Denmark 2007: Befolkningens brug af internet 2007, p. 19.

⁵ Statistics Denmark 2006: Informationssamfundet Danmark – It-status 2006, p. 5



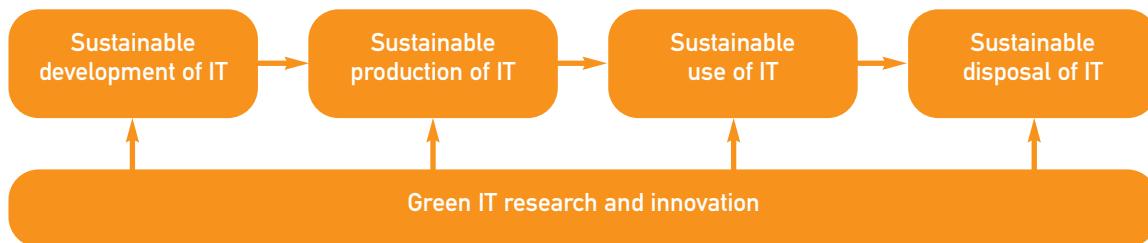
In the meantime, the increasing spread of IT has environmental consequences. Gartner Consulting, a leading IT research and advisory company, has assessed that the CO₂ emissions of IT on the global level equal those of the entire aviation industry, which is assessed to be responsible for two per cent of the total CO₂ emissions.⁶ In the years to come, the environmental impact from IT will attain increasing significance on the global climate agenda.

The Action Plan for Green IT contains two primary focus areas relating to Green IT: first, the development of a greener lifecycle for IT solutions – from development, production and usage to disposal; and second, the research and development of solutions that can reduce the impact on the environment with the help of IT.

Green IT

Green IT can be defined as research in- and use of IT in an efficient and environmentally friendly manner.

The Green IT approach can include several different phases in the lifecycle of a product – the development, production, usage and disposal of IT. Development must grant consideration to the environment; the production must take place using environmentally friendly production methods; the IT solutions must be used in an environmentally friendly manner; and finally, IT waste must be disposed of in an environmentally correct manner. All of these phases are supported by research and innovation in Green IT.



⁶ Gartner 2007: Gartner Symposium/Itxpo “Green IT – A New Industry Shockwave”, p. 2.

Denmark must become better at limiting the harmful effects for the environment through more environmentally friendly utilization of IT. The use of sustainable IT is to be promoted: the development and production of IT; the way we purchase and use IT; and the handling of IT waste.

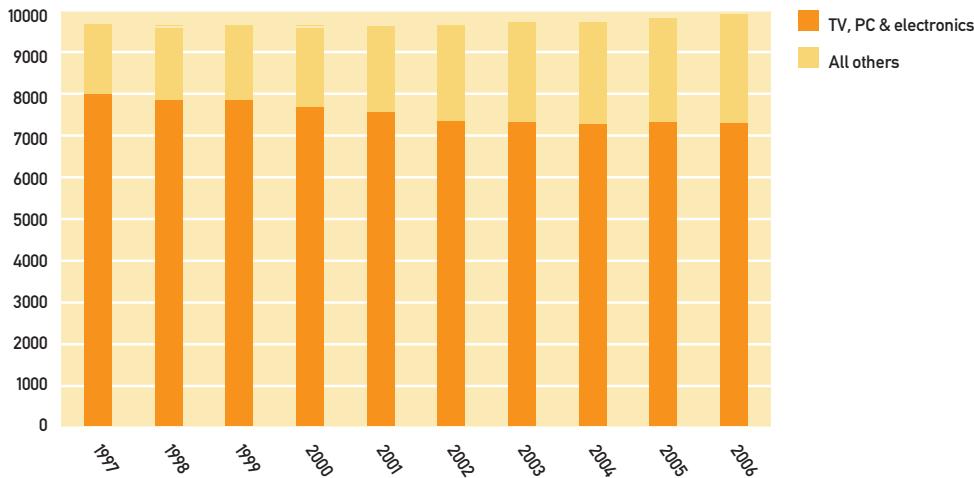


Figure 2: The development of electricity consumption over ten years – total, as well as for IT and consumer electronics.

Source: The Danish Electricity Saving Trust (Elsparefonden) and Elmodel-Bolig.

A study carried out by the European Commission indicates that 84 per cent of the total environmental impact for most electronic equipment is in the usage phase, while only 16 per cent goes to production, distribution and disposal.⁷ In other words, the greatest potential for making environmental gains can be achieved via environmental measures in the usage phase.

⁷ High Tech. Low Carbon, p. 17, <http://www.intellectuk.org/content/view/3799/>





Did you know...
that the production of a single PC requires 1.7 tons of raw materials and water?⁸

Just as the efficiency of an automobile depends on how it is driven, the efficiency of IT depends on how it is used. This is just as true for the private consumer as it is for the large corporation or public authority with large data centres and server rooms.

Would anyone let their car running in the driveway while eating lunch or leave the television on over night? Nevertheless, this kind of behaviour is quite normal when it comes to IT.⁹

The objective is to present and promote a number of simple measures promoting the understanding and spreading of Green IT without rewinding the development back to the time before the digital revolution. It is decisive that ordinary citizens and the public and private sectors continue to exploit the opportunities IT provides while at the same time using energy more efficiently.

Did you know...
that the average lifespan of a computer has fallen from six years in 1997 to just two years in 2005?¹⁰

Intelligent utilization of IT can contribute to reducing the impact on the environment. There can be negative environmental consequences resulting from the increased use of IT products, but the perspectives for the positive effects of IT use are far greater. IT is the key in the development of intelligent solutions that reduce everyday energy consumption and in the production of goods and services, thereby actively contributing to the limiting of the total CO₂ emissions.

⁸ Global Action Plan 2007: An Inefficient Truth, p. 6.

⁹ High Tech, Low Carbon, p. 31, <http://www.intellectuk.org/content/view/3799/>

¹⁰ <http://www.greenpeace.org/international/campaigns/toxics/electronics/the-e-waste-problem>



IT holds the potential to reduce energy consumption and optimize resources. Modern IT equipment makes it possible to hold virtual meetings, rendering flights and other transportation unnecessary. Similarly, home offices also make teleworking possible, which also saves transportation.

Did you know...

that international studies have shown that, on average, 30 per cent of the power a computer uses is pure waste due to the computer being left on when not in use?¹¹

Another example of innovative IT solutions involves the regulation of energy consumption, which can contribute to creating the energy-saving homes and workplaces of the future. In this regard, it is fundamental to invest in research in Green IT.

The increasing spread of IT is part of the strain on the environment, but IT is simultaneously the strong contributor that must ensure the environment of the future. All it takes is the will and ability to think innovatively and promote innovative IT solutions.

Did you know...

- > that every time an employee works from home using IT, it saves on transportation and thus CO₂ emissions?
- > that every time an IT-regulated intelligent power-regulator turns off the lights, turns down the heat or turns off the air-conditioning, CO₂ is saved?
- > that every time a company or public authority produces more efficiently with the help of IT, CO₂ is saved?
- > that every time catalogues, advertisements and letters are replaced by electronic documents and e-mails, CO₂ is saved?
- > that IT is thus much more a part of the solution than a part of the problem regarding CO₂ emissions?

The Action Plan includes the following initiatives, which are intended to place focus on greener IT solutions in the private and public sectors as well as in the lives of ordinary people.

¹¹ Global Action Plan 2007: An Inefficient Truth, p. 5.



Focus area 1: Greener IT use

- > **Initiative 1: Corporate IT use must become greener**
In the future, environmental considerations will be regarded as part of a company's social responsibility to a much greater degree than is the case at present. Green IT can therefore prevent red figures on the bottom line. In order to support this development, a catalogue describing best practices and good advice about greener IT solutions for these companies is being compiled.
- > **Initiative 2: Green IT information campaign**
Children and young people are frequent users of new technology and the consumers of the future. It is therefore important to communicate the significance of energy-correct technology and behaviour. The Ministry of Science, Technology and Innovation will initiate an information campaign for children and young people about Green IT in order to shift the focus to Green IT use.
- > **Initiative 3: Green IT guidelines for public authorities**
The Danish Electricity Saving Trust (Elsparefonden) has assessed that DKK four million can be saved on a daily basis if the public sector in Denmark becomes more resource-conscious about electricity consumption.¹² In cooperation with the other ministries, the Ministry of Science, Technology and Innovation will develop guidelines to assist the ministries to establish requirements concerning Green IT solutions.
- > **Initiative 4: Knowledge base for energy- and CO₂ calculation**
An overview of calculators for energy consumption and CO₂ emissions from the use of IT will be compiled, which will enable everyone – ordinary citizens, companies and authorities alike – to easily gain access to information about the extent of their IT-related energy consumption and thereby how much CO₂ is produced as a result of IT use. The overview will be made available via the Internet.

At the same time, IT is part of the solution. The Action Plan contains the following initiatives, which are to contribute to strengthening the development and use of innovative IT solutions for the reduction of energy consumption.

¹² http://www.elsparefonden.dk/offentlig-and-erhverv/kom-godt-i-gang/kampagne-2007?nm_ct=30

Focus area 2: IT solutions for a sustainable future

> Initiative 5: Green IT research funding

There is a need for research projects promoting the development of energy-correct IT solutions that can help reduce total CO₂ emissions. In 2008, the Ministry of Science, Technology and Innovation has allocated DKK 36 million for research in Green IT, pervasive computing and eGovernment.

> Initiative 6: Export of Green IT know-how and technology

The Ministry of Science, Technology and Innovation will establish an export campaign for Green IT expertise and technology. This initiative is being developed in cooperation with the IT trade organizations and Danish innovation centres abroad. It will focus on opportunities for the export of green technology to the new growth centres in Asia.

> Initiative 7: International conference on Green IT

The Ministry of Science, Technology and Innovation will set Green IT on the international agenda. In the first half of 2009, an international conference on Green IT will therefore be arranged, the purpose of which is to set the agenda and promote the sharing of knowledge about opinions and relevant initiatives.

Green IT is very much a question of impacting behaviour. The Ministry of Science, Technology and Innovation will take the lead by placing greener IT solutions on the agenda in the entire ministry.

> Initiative 8: Green IT in the Ministry of Science, Technology and Innovation

The Ministry of Science, Technology and Innovation will implement a number of initiatives to establish its position as a pioneering authority in Green IT. These initiatives will result in a reduction of energy consumption in the Ministry of Science, Technology and Innovation by at least 10%.

The work with these initiatives will lead up to December 2009, when Denmark is to host the UN Climate Change Conference COP 15. The objective of the 2009 climate conference is an ambitious and global climate agreement for the period after 2012. The climate conference provides a good occasion to present a number of environmental initiatives relating to IT.

The individual initiatives in the Action Plan are presented in the following pages. The Action Plan is divided into two general themes: IT as part of the problem and IT as part of the solution.





Focus area 1: Greener IT use



There is a considerable co-responsibility for reducing total CO₂ emissions using greener IT solutions. In many cases, this can be brought about via changes in IT use on various levels, both in relation to environmentally correct server rooms and greener hardware and software. The Ministry of Science, Technology and Innovation is launching a number of initiatives to bring ordinary people, companies and authorities on board in relation to greener IT solutions.

Initiative 1: Corporate IT use must become greener

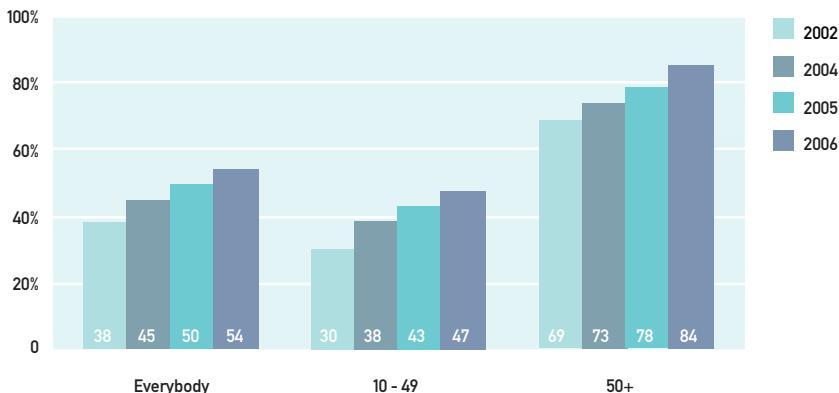
The necessary changes in behaviour can only be brought about via increased focus on intelligent solutions in all of the sectors relying heavily on IT. Considerable reductions can be obtained, while new, more energy-efficient solutions can be developed at the same time.

The Ministry of Science, Technology and Innovation, Technology and Innovation aims to gather and demonstrate the best practices in the field and share the positive stories that can make the activities of Danish companies more energy-efficient.

The already-existing good experiences of Danish companies with Green IT must therefore be accumulated. It is important that this body of experience be used to provide a sense of what works well and what does not in relation to greener solutions regarding IT use. This can include greener IT solutions in connection with server rooms, home offices, the procurement of so-called AutoPowerOff plug banks, or entirely new ideas or models for solutions relating to IT.

The result of collecting experience in collaboration with the IT trade organizations is the production of a brief catalogue of ideas for use by companies interested in developing a greener IT profile.





Remote access to company email systems is usually easier to establish than remote access to the other IT systems. It must therefore be assumed that remote access typically includes access to the company email system, but not always to the other IT systems. These calculations cover companies with at least ten employees. 2004-2006 refers to January, 2002 until the end of the year. Source: Statistics Denmark, Danish corporate use of IT 2006.

Figure 3 – Companies with IT-telework, number of employees.

Since 2002, there has been a marked increase in the use of telework in Danish companies, e.g. via home offices. The larger companies in particular have opened up for telework. This saves on transportation and therefore also on CO₂ emissions.

Denmark is known for being on the forefront with numerous innovative solutions. Gathering experiences is therefore an important step in the further development of green corporate profiles.

Did you know...

about *Climate Savers Computing*, an interesting initiative from the IT business? This initiative has been launched by Intel and Google, and its supporters include Microsoft and Dell, working together with the World Wild Fund for Nature. The aim of the group is to exploit computer use to bring about voluntary reductions in CO₂ emissions amounting to 54 million tons annually, corresponding to the annual emissions from 11 million automobiles.¹³

¹³ <http://www.climatesaverscomputing.org/media/whitepaper11302007.pdf> , p. 4.



Companies are increasingly marketing themselves in environmental tones, including greener IT solutions. An ever-increasing aspect of Corporate Social Responsibility (CSR) deals with environmental conditions.

In addition to strengthening their profile, corporations are able to achieve a considerable savings on energy consumption. Working together with the IT trade organizations, a number of initiatives are therefore being launched that aim to reinforce the corporate focus on this area.

Corporate Social Responsibility (CSR) defines the social, ethical and environmental responsibility of corporations.

Initiative 2: Green IT information campaign

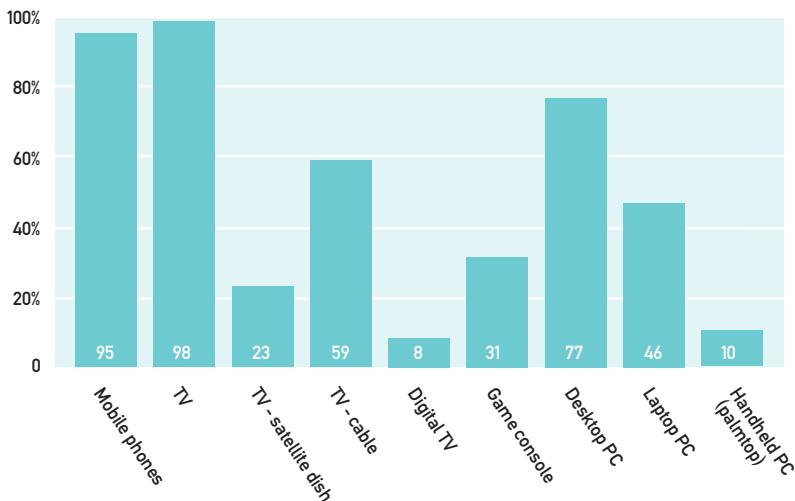
Denmark is one of the leading IT nations in the world. Some of the most enthusiastic users of IT are children and young people. It is therefore vital to focus on their use of IT in relation to energy conservation.

Children and young people represent the largest group of private IT consumers, and they are the group that accepts the new technology the fastest. It is the younger generation – a generation often referred to as *digital natives* – that will come to form the use of IT in the future.

Digital natives describes the generation that has grown up with digital technology, such as computers, cell phones and MP3.

In this connection, it is necessary to target information to the youth about Green IT use. There are opportunities to get the youth involved using computer games, Internet gaming in virtual forums, or campaigns using digital communities. Facebook and MySpace are examples of digital communities.





*Figure 4 – IT products used in the general population – 2006.
The population has access to a great number of different IT products that they either own or have access to in their homes.
Source: Statistics Denmark, Danish corporate use of IT 2006.*

Initiative 3: Guidelines for Green IT for public authorities

Public companies must take the lead in the use of Green IT solutions.

Environmental requirements are already part of the procurement arrangements made by the Danish state and municipalities. The objective is to use these procurement arrangements to save DKK 150 million on electricity use over a three-year period via the purchase of energy-saving equipment. This experience is to contribute to raising the environmental requirements in future procurement arrangements.



Increased use of AutoPowerOff plug banks for computers in the public sector can contribute to reducing energy consumption. AutoPowerOff plug banks turn off all appliances at the same time, thereby reducing the standby consumption.

Click to save energy

An AutoPowerOff plug bank is akin to an intelligent extension cord that automatically turns off screens, modems, printers, scanners and anything else when you turn off your computer. By using an AutoPowerOff plug bank, the individual consumer can typically save DKK 150-200 on the annual electricity bill.

An AutoPowerOff plug bank costs from DKK 50.

For more, see www.elsparefonden.dk

These guidelines will also include recommendations about how the server room is to be designed most appropriately. Servers are among the equipment using the most energy in modern companies. The Danish Electricity Saving Trust estimates that the average Danish workplace consumes electricity for DKK 100,000-200,000 annually on server rooms alone.

Considerable environmental gains can be achieved by designing server rooms appropriately. The Danish Electricity Saving Trust estimates that electricity consumption can be reduced by one-third to one-half without compromising security.¹⁴

For example, the air that is ventilated out of the server room has a temperature of 30-35°C. This warm air can be ventilated to the building's heat recovery unit and used to heat the fresh air vented into the other rooms in the building.

¹⁴ <http://www.elsparefonden.dk/offentlig-og-erhverv/produkter/it-og-kontorudstyr/serve/kom-godt-i-gang>



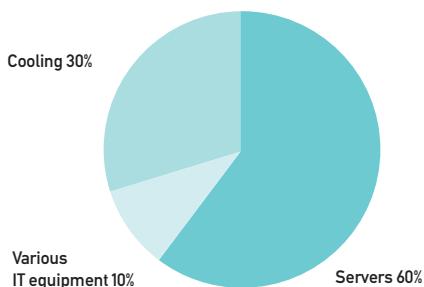


Figure 5: The distribution of electricity consumption in a server room.

The following equipment is typically found in a server room:
Servers: CPUs and hard disks use the most energy. Approximately 60 per cent of the electricity consumed in the server room goes to these units.

Various IT equipment: typically includes backup systems, screens etc. Roughly 10 per cent of the electricity goes to such units.

Cooling equipment: roughly 30 per cent of the electricity consumption is used in the refrigeration equipment.

Source: The Danish Electricity Saving Trust

Increased use of laptop computers and thin clients in public authorities can also provide a considerable environmental saving, as they generally use far less power than desktop computers do.

Thin clients

A thin client is a very simple computer that must be linked up to a server in order to work.

The computer itself contains very little equipment and therefore uses very little electricity. The electricity consumption is instead centralized in larger server rooms, which provides economy-of-scale savings and efficiency gains.

The use of thin clients enables savings on electricity. The Danish Electricity Saving Trust thus estimates that thin clients save between 30 and 80 per cent in relation to stationary computers.

However, thin clients require a terminal server with a constant electricity consumption of 300-600 watts. If the company does not already have a terminal server, it does not always pay to switch to thin clients.



Increased focus on home offices makes it possible to save on transportation and CO₂ emissions. The workplace of the future is flexible. Video conferencing, virtual meetings, e-learning and telework ought to gain a more prominent place in the public and private sectors alike.

Green IT is not merely a question of using the correct, environmentally friendly hardware. It is important that authorities consider the possibility that environmentally friendly software also plays a central role. For example, software can be used for the efficient regulation of the power used by the hardware. Moreover, different software requires different amounts of energy. It can therefore be appropriate to integrate efficient software in the public sector IT.

The IT strategies adopted by public authorities ought to include plans for reducing the environmental impact resulting from IT use. The guidelines for Green IT for public authorities will cover the most important aspects of the environmentally correct use of IT. As such, the guidelines provide instructions for how the public sector can best procure IT equipment while simultaneously granting consideration to their budget and the environment.

Did you know...

that the Danish public sector wastes DKK 4 million worth of electricity on a daily basis, much of which could be saved using simple measures?¹⁵

The purchase of energy-saving and energy-reducing electronic equipment involves a number of one-time expenses. However, these one-time expenses can pay for themselves via the expected savings on energy consumption and the environmental benefits.

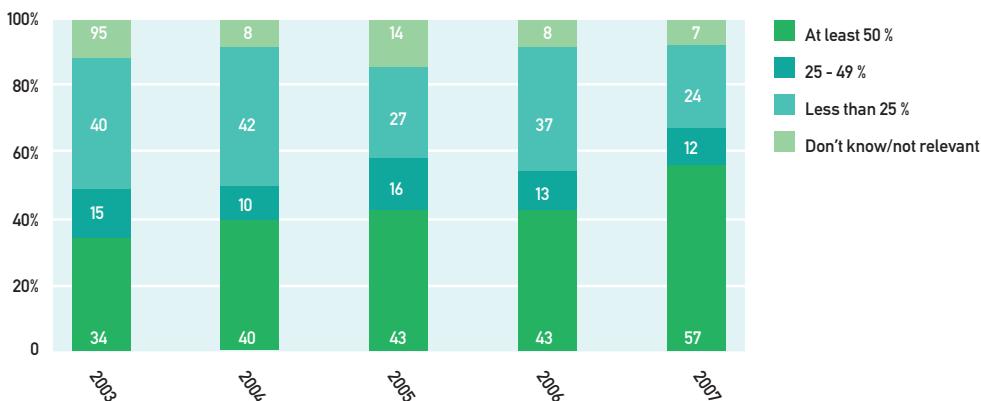
The main focus of the guidelines will be to provide comprehensive instructions for how authorities in the public sector can make their IT use more efficient from an environmental perspective.

¹⁵ http://www.elsparefonden.dk/offentlig-og-erhverv/kom-godt-i-gang?nm_extag=Link=,Fane_offentligogerhverv,Fane.



Percentage of 'paperless' cases. 2003-2007

Percentage of public authorities with electronic document management



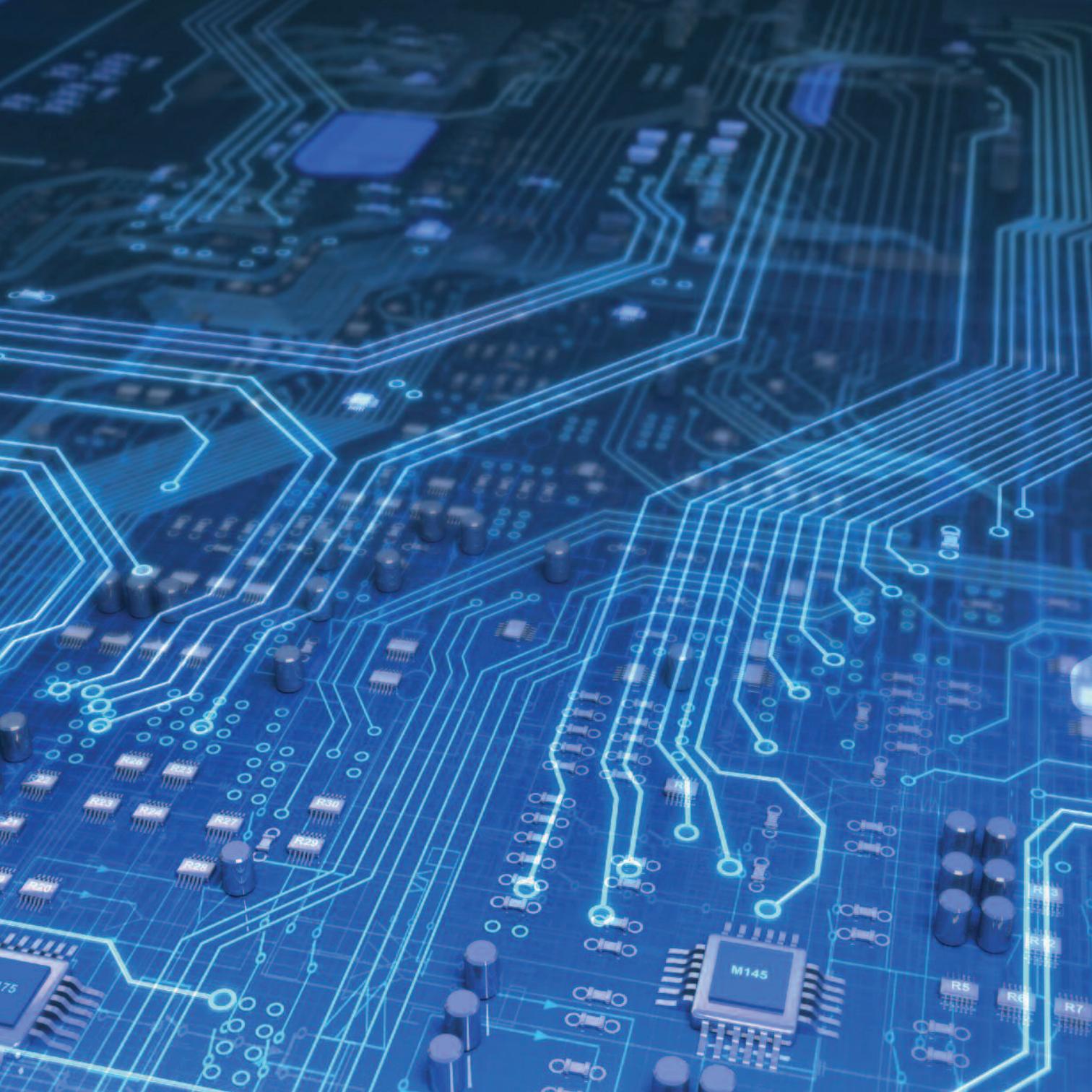
Electronic document management is understood as a system that supports the process of the case between employees

Figure 6 – the percentage of so-called paperless cases has increased significantly since 2003. The percentage of public bodies with electronic document management that deal with at least every second case in a paperless manner thus increased from 34 per cent in 2003 to 57 per cent in 2007.

Source: The Use of IT in the Public Sector 2007, Statistics Denmark.

The plan is for the IT operations and support, including the maintenance and operations of the state servers, to be gathered in massive server centres. In connection with the planned establishment of these administrative collectives, efficient and energy-friendly IT use ought to play a vital role.

These attempts at increasing efficiency can benefit from intelligent power regulation, the increased virtualization of servers and use of communication technology for virtual meetings over great distances instead of business trips.





Did you know...

that an international study has concluded that if 20 per cent of all business travels in the EU were replaced by innovative IT solutions, 25 million tons of CO₂ could be saved annually?¹⁶

Finally, the guidelines will also provide advice about how public bodies are to deal with the disposal of electronic garbage; the so-called e-waste.

"e-waste" or "Waste Electrical and Electronic Equipment" ("WEEE") is electronic garbage. E-waste can include obsolete, defective or discarded electronic equipment.

The guidelines are to help public authorities to include Green IT in all phases of IT products from cradle to grave. Recommendation will be made to all of the state authorities to make use of the guidelines to promote Green IT.

The guidelines can also serve as the basis for international work with disseminating ideas and technology based on Green IT.

Did you know...

that Greenpeace has estimated that globally 50 million tons of electronic equipment are disposed of annually. Most of this waste is not recycled.¹⁷

¹⁶ Global Action Plan 2007: An Inefficient Truth, p. 6.

¹⁷ <http://www.greenpeace.org/international/campaigns/toxics/electronics/the-e-waste-problem>

Initiative 4: Knowledge base for power and CO₂ accounts

It is important that ordinary people, companies and public authorities can easily acquire a picture of how much power is consumed in connection with IT use. It must be possible to access information about energy consumption and CO₂ emissions easily and quickly.

Did you know...

that a country such as the United Kingdom, which Denmark normally compares itself with, uses ten per cent of its energy on IT?¹⁸

A so-called knowledge base for CO₂ emissions from IT use is going to be established. The knowledge base is to provide the individual citizen, company or public authority with access to measurements for how much energy is being used and how much CO₂ is produced.

The knowledge base will be made digitally accessible via the Internet and will compare the various existing accounts so that the users can easily calculate their CO₂ emissions.

The knowledge base will also include advice about electricity consumption, thereby also cutting down on CO₂.

¹⁸ Global Action Plan 2007: An Inefficient Truth, p. 3



Example of CO₂ calculations:

The Jensen family has one desktop and one laptop computer. They are used 6½ and 4½ hours per day, respectively, consume 593 kWh and 41 kWh annually, corresponding to 0.3 and tons and 0.02 tons of CO₂. Company X has 75 desktop computers that are used eight hours daily. Each consumes 210 kWh annually, corresponding to approximately 7.8 tons CO₂.

Governing Body X has 250 desktop computers and 75 laptop computers. Each consumes 120 and 25 kWh annually, respectively, thereby producing roughly 26 and 1.65 tons of CO₂.

The content of the knowledge base will be developed along the same lines and on the background of existing tools from The Danish Electricity Saving Trust and the Climate and Energy Ministry, which can be found at:

- > <http://www.elsparefonden.dk/forbruger/beregn-og-spar>
- > http://www.1tonmindre.dk/beregner_start.asp?m=1&mID=84

Energi saving and IT

- > Look for the Energi Saving Label and the IT declaration when choosing a new computer or screen. The Energi Saving Label is your guarantee that electricity consumption is low. The IT declaration shows exactly how much energy the product uses.
- > Set the power regulator on your computer so that it 'goes to sleep'.
- > Remember to turn off your screen – or let an AutoPowerOff plug bank do so.

More good advice about IT and Energi Saving can be found at www.elsparefonden.dk





Focus area 2: IT solutions for a sustainable future



Green IT is not just about the use of greener IT solutions. The intelligent use of IT can also contribute to a reduction of energy consumption and solving the climate challenge.

Denmark must continue to be part of the international elite in environmental technology. The intelligent use of IT can contribute to reaching this objective, and the increased export of Green IT technology from Denmark can contribute to solving the challenges.

A number of initiatives are therefore being launched that will build on and reinforce the positive effects of IT use.

Initiative 5: Research in Green IT

Research is a pivotal focus area which must ensure that Denmark maintains and expands its strong position regarding Green IT. In 2008, the Ministry of Science, Technology and Innovation, Technology and Innovation has allocated resources for research in Green IT. The resources are put to use as part of the funding for research in information- and communication technology under the auspices of The Strategic Research Council. The total funding in 2008 is DKK 36 million for Green IT, pervasive computing and eGovernment.¹⁹

The research funding is to promote research in how the development of IT can contribute to a greener society and is to be used, inter alia, to promote innovation in the area. The funding can be used to intensify the focus on Green IT and digital services. For example, the focus can be on research in alternative hardware and software technology.

For example, the funding can be used for research projects focusing on energy conservation and environmental sustainability in the development and use of IT in the private sector and society in general.

The funding can also be used to promote research capable of contributing to global energy conservation. In this connection, the emphasis can be on intelligent IT solutions that can contribute to reducing the energy consumption in other sectors.

¹⁹ <http://fi.dk/portal/pls/pr05/docs/1/3444004.PDF>



The focus can also be on research in alternative hardware and software technology that can promote telework, virtual meetings, intelligent power- and light regulation, etc. It is also important to illuminate how economic growth is created and maintained without increasing energy consumption; and how incentives for energy-efficient technological behaviour can be created.

Did you know...

that a study from the British National Energy Foundation has indicated that at least 1.7 million British PCs are often not turned off at night or over the weekend. This results in the emission of 700,000 tons of CO₂. Merely turning off the roughly 2 million PCs owned by the British government when not in use would save 140,000 tons CO₂.²⁰

Initiative 6: Export of Green IT know-how and technology

Denmark is one of the leading countries when it comes to green technology – a status that obligates. Denmark ought to continue to take the lead and ensure innovation – also within the field of Green IT.

There are some countries in which IT-related development is proceeding quickly but where environmental consideration is not sufficiently integrated in IT use. Effort must therefore be made to export Danish Green IT know-how and technology.

Denmark will also be able to share know-how with other countries and gain from the experiences of other countries. Such expertise sharing will proceed via various international forums in which Denmark is represented, but also more targeted in specific countries, such as China and India.

²¹ High Tech. Low Carbon, p. 31, <http://www.intellectuk.org/content/view/3799>



Did you know...

that in 2010 there will be 716 million new computers in use? In China there will be 178 million new computer users, while there will be 80 million new users in India.²¹

The Ministry of Science, Technology and Innovation will launch an export and expertise campaign. The initial objective is a campaign in China, where there is a considerable potential market for Danish Green IT technology. In this connection, the Danish research and innovation centre in Shanghai will be included in the planning.

The export and expertise campaign in China is to be part of the China strategy being pursued by the Ministry of Science, Technology and Innovation, where one of the objectives is to facilitate the access of Danish universities, companies and institutions to create knowledge and innovation in cooperation with Chinese partners.²²

The aim of the China strategy pursued by the Ministry of Science, Technology and Innovation is to facilitate joint ventures between Denmark and China in relation to research, universities and innovation.

The general vision is that Denmark and China can develop a close partnership in the area of expertise in the years to come.

The foundation is thus created for generating value in the Danish and Chinese societies via an exchange of expertise, technology and specialized labour. At the same time, the bilateral cooperation contributes to increased network formation and cultural understanding that will be to the benefit of both Denmark and China in a global context marked by mutual dependence.

The export campaign will be carried out in close cooperation with the IT trade organizations.

²¹ <http://www.greenpeace.org/international/campaigns/toxics/electronics/the-e-waste-problem>

²² <http://videnskabsministeriet.dk/site/forside/publikationer/2008/strategi-for-vidensamarbejde-mellem-danmark-og-kina/index.htm>



Did you know...

that energy technology is one of the most rapidly growing Danish export sectors? This export group is expected to grow seven per cent annually from the current DKK 40 billion.

Initiative 7: International conference on Green IT

In November-December 2009, Denmark will host the UN Climate Change Conference COP 15. The objective for the 2009 climate conference is to reach an ambitious and global climate agreement for the period after 2012.

Leading up to the climate conference, the Ministry of Science, Technology and Innovation will place Green IT on the agenda by arranging an international conference on Green IT in the first half of 2009.

The conference on Green IT is to contribute to placing Green IT on the global agenda, both as regards integrating environmental consideration in IT use as well as using IT towards the solution of the global climate challenge.

Did you know...

that there are more than 1 billion computers around the world?²³

The agenda for the Green IT conference will be to set focus on all of the aspects of Green IT – research, production, usage and the disposal of IT.

²³ Global Action Plan 2007: An inefficient Truth, p. 3



With the participation of international experts, business people and decision makers, hosting the conference is to set the stage for international efforts to reduce the two per cent of the total CO₂ emissions via:

- > Requirements to the production and acquisition of IT equipment
- > Changing the utilization of IT and exploiting the opportunities for home offices, virtual meetings and the like that are afforded by IT
- > Requiring a higher degree of recycling of IT equipment

At the same time there must be a focus on how IT can be used to reduce the remaining 98 per cent of global CO₂ emissions by

- > Researching and developing solutions that, via the intelligent use of IT, can reduce everyday energy consumption
- > Using IT to make the production of goods and services more efficient

The international Green IT conference is to function as a growth laboratory in which new ideas can be promoted and where expertise and experience can be exchanged between countries.

Finally, hosting the conference will provide Denmark with the opportunity to demonstrate Danish Green IT initiatives for the benefit of the relevant international partners.

As a prelude to the Green IT conference in 2009, the Ministry of Science, Technology and Innovation will host an international OECD workshop on Green IT in the spring of 2008.





The Ministry of Science, Technology and Innovation must take the lead



Initiative 8: Green IT in the Ministry of Science, Technology and Innovation

The public sector must contribute by setting an environmental agenda and serving as inspiration for companies and ordinary people in society. The Ministry of Science, Technology and Innovation will take the lead in the work with greener it-solutions. In the course of 2008, the Ministry of Science, Technology and Innovation will therefore implement a number of initiatives aimed at promoting Green IT.

One of the objectives of the Ministry of Science, Technology and Innovation is to reduce electricity consumption. According to the "1 ton less" campaign, every Dane emits ten tons of CO₂ annually. This campaign encourages Danes to reduce their CO₂ emissions by 1 ton – or ten per cent – annually. In this connection, the Ministry of Science, Technology and Innovation will pursue the same objective and save ten per cent of its annual electricity consumption.

Did you know...

that a laptop computer uses five times less energy than a desktop computer?

In connection with future procurements, the Ministry of Science, Technology and Innovation will therefore prioritize laptop computers and other energy-saving types of computers instead of desktop computers.

In order to increase focus on Green IT, the Ministry of Science, Technology and Innovation will hold an internal competition about which part of the ministry can achieve the greatest reduction of CO₂ emissions by using less electricity.

In order to support competition as well as the CO₂ reduction objectives established by the Ministry of Science, Technology and Innovation, the ministry employees will be informed about electricity consumption and provided with advice about energy saving and reducing everyday CO₂ emissions.

It then becomes possible to reduce the production of CO₂ while at the same time informing and motivating a great number of employees who can act as ambassadors for greener IT solutions outside the walls of the Ministry of Science, Technology and Innovation.



The Ministry of Science, Technology and Innovation Green IT objectives for 2008

- > Prioritization of laptop and other energy-saving types of computers instead of desktop computers in future procurements.
- > Setting up AutoPowerOff plug banks in The Ministry of Science, Technology and Innovation.
- > 80 per cent of the printers are to be turned off at night.
- > Carry out an internal competition in the Ministry of Science, Technology and Innovation about which division in the ministry can reduce electricity consumption the most.

The increased use of AutoPowerOff plug banks and more environmentally friendly use of IT are examples of how the Ministry of Science, Technology and Innovation will make an effort to disseminate greener IT solutions. This is not the end of these initiatives, however, as there will be ongoing follow-up work aimed at discovering other areas where environmentally friendly savings can be achieved.



Action Plan for Green IT in Denmark

Green IT is research in and use of IT in an efficient and environmentally correct manner.

Green IT can contribute to reducing energy consumption, both by reducing power consumption as well as promoting innovative IT solutions capable of reducing energy consumption and CO₂ emissions in other sectors.

This Action Plan presents a number of concrete initiatives which will help Denmark actively promote Green IT nationally and internationally.

The objectives for the Action Plan are to promote the understanding of how we can promote Green IT – both by reducing the environmentally harmful effects of IT as well as promoting innovative IT solutions to the benefit of the environment.

The action plan presents the following initiatives:

Focus area 1: Greener IT use

- > Strengthening of corporate Green IT use
- > Information campaign for Green IT
- > Guidelines for Green IT for public authorities
- > Knowledge base for power and CO₂ calculations

Focus area 2: IT solutions for a sustainable future

- > Research funding for Green IT
- > Export of Green IT expertise and technology
- > International Green IT conference

The Ministry of Science, Technology and Innovation must take the lead

- > Green IT in The Ministry of Science, Technology and Innovation