



PRESS RELEASE

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Analysis of Information and Communication Technology Life Cycles E-mail, Web searches, USB flash drives: what is the environmental impact? ADEME offers some early answers.

The 2008 "Impacts of Information and Communication Technologies on Energy Efficiency" report by BIOIS¹ for the European Commission says Information and Communication Technologies (ICT) accounted for 2% of Europe's greenhouse gas (GHG) emissions in 2005. One of its conclusions is that by 2020 the figure could reach nearly 4% with a "Business As Usual" scenario and nearly 3% with an energy-saving scenario (transition to energy-efficient solutions). The use of ICT, already an integral part of our personal and professional lives, has a high growth potential; their environmental impact is becoming a major issue.

ADEME is the Environmental and Energy-Efficiency Agency in France. It participates in implementing public environmental, energy and sustainable development policies. The agency makes its skills and consulting expertise available to companies, local communities, the government and the general public in order to help them move forward in their environmental efforts.

With that in mind, ADEME set out to evaluate ICT's environmental impact. It launched a study focusing on life cycle analysis (LCA) of these practices. The study, done by BIOIS and critically reviewed by several independent experts, focused on three things:

- E-mail
- Internet searches
- USB flash drives

Based on its findings, ADEME suggests some simple gestures to limit ICT's environmental impact.

¹Specializing in product health and environmental information studies and consulting.

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A word on LCA methodology:

The study's environmental impact assessments are based on LCA methodology (see *summary note in appendix*). A benchmark scenario is established for each of the study's three components (e-mail, web searches and USB flash drives). Then, two or three scenarios are set up compared to the benchmark. The potential impact of all the study's findings is illustrated for each scenario through the lens of the three most relevant indicators:

- Potential climate change
- Potential depletion of metals, reflecting the consumption of resources
- Potential depletion of fossil resources, due mainly to the energy mix used.

1. E-mail

An average of 247 billion e-mails a day, including spam, was sent worldwide in 2009². The figure is expected to reach 507 billion in 2013.

The scenarios showed that on average, each employee in a French company with 100 employees receives 58 e-mails and sends 33³ every day. The average size is approximately one mega-byte (MB). Sending them results in GHG emissions. On the basis of 220 working days a year, they account for 13.6 tons of CO₂ equivalent.

- **Reducing e-mails systematically including one's supervisor and co-workers in a 100-person company can cut GHG emissions by 10%, or approximately one ton of CO₂ equivalent (a round trip between Paris and New-York⁴).**

The specific case of a French company where an employee sends 10 or 100 people a 1-MB e-mail was studied. The findings showed that increasing the number of addressees tenfold multiplies the impact on climate change by four. To obtain more specific data, the scenarios measured the difference in impact between sending a 1-MB e-mail to one, two or three addressees. An additional 6g of CO₂ equivalent, approximately, are emitted for each additional addressee, which amounts to around 44kg of CO₂ equivalent per year per employee.



Tip:

- Rationalise the number of each e-mail's addressees as much as possible.

²<http://www.arobase.org/actu/chiffres.htm>

³Email Statistics Report 2011-2015, Executive Summary, the Radicati Group, Inc

⁴<http://www.developpement-durable.gouv.fr/aviation/eco-calculateur/index.php>

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Increasing the number of an e-mail's addressees by 10 multiplies the impact on climate change by four

- **Decreasing printouts of e-mails employees of a 100-person company receive by 10% helps save five tons of CO₂ equivalent a year (the equivalent of approximately five round trips between New York and Paris).**

The scenarios compared the impact of printing a four-page attached file in various formats and found that printing, as well as the printing format selected, has a strong influence on potential climate change. They also showed that reading a document received by e-mail on screen determines how much time the computer is in use.



Tips:

- Print only if necessary.
- Examples:
 - Reading a 4-page document, whose estimated reading time is put at 3-4 minutes a page, on screen will have less impact on potential climate change.
 - If it takes longer than approximately 15 minutes to read the four-page document, it is preferable to print it out in black and white, front/back, 2 pages per sheet.

- **Storing e-mails and attached files on a server has an important impact: the longer the e-mail is stored, the greater the negative impact on potential climate change.** Its role in the potential depletion of fossil resources also increases.

To reach that conclusion, the scenarios compared sending a 1-MB e-mail to one person, sending a 1-MB e-mail to one person who stored it on his server for six months and sending a 1-MB e-mail to one person who stored it on his server for three months. The shorter the storage time, the lower the impact on potential climate change.



Tips:

- Optimise document size in order to reduce message size and the amount of information sent and stored.
- Save only necessary e-mails.
- Sort your e-mails and clean out your mailbox on a regular basis.

- **Cutting the amount of 10-MB e-mails sent in a 100-person company by 10% could save eight tons of CO₂ equivalent a year (the equivalent of eight 8 round-trips between New York and Paris).**

To reach that finding, the scenarios measured and assessed the environmental impact generated over one year when 10% of the employees in a 100-person French company send 1-MB e-mails without compressing the documents (shift to a 10-MB message).



Tips:

- Compress big documents before sending them.
- When possible, send hypertext links instead of attached files.

2. Web searches

The purpose of this part of the study was to measure the environmental impact of the following situation: an individual decides to surf the Internet looking for a holiday destination. The person does not have a specific idea of what she is looking for. She types the key word "holiday" in the search engine, clicks on five links and spends an average of one minute per page before finding a trip she likes.

It is estimated that a French web surfer does an average of 2.6⁵ Internet searches a day, or 949 searches a year (365 days/year). On the basis of 29 million Internet users⁶ in France, GHG emissions would account for 287,600 tons of CO₂ equivalent. For an individual Internet user, using a search engine to look for information on the Internet would account for 9.9kg of CO₂ equivalent a year.

- **Reduce the number of pages consulted by using precise key words during a search. Type the Internet site's web address in the navigation bar when you know it. These practices would help save five kg of CO₂ equivalent a year, the equivalent of driving a car approximately 40 km⁷.**

The scenarios showed that looking for an address in "bookmarks" has less impact on potential global warming and depletion of metals and fossil resources than using a search engine.



Tips:

- Bookmark frequently consulted sites.
- Type the url address in the navigation bar instead of using a search engine.
- Narrow searches in order to limit strain on the search engine.

- **Keeping a computer for seven instead of four years reduces a conventional Web search's environmental impact by approximately 20% to 35%.** The scenarios showed that the longer a computer's lifespan, the lower the production and end-of-life impact.

To reach that conclusion, the scenarios compared the environmental impact of using a search engine to look for information on a new computer and on a seven-year-old computer. The seven-year-old computer has less impact on global warming, the consumption of resources and the depletion of fossil fuels. By and large, using a computer three years longer saves 2.3kg of CO₂ equivalent a year, which, in a country the size of France, is equivalent to the amount of CO₂ released by travelling approximately 500 million km a year by car.



Tip:

- Make your computer last as long as possible.

⁵ <http://www.generation-nt.com/mediametrie-recherche-internet-requetes-actualite-265401.html>

⁶ 2009 estimate. <http://www.commentcamarche.net/news/5848987-le-nombre-d-internautes-multiplie-par-10-en-10-ans-en-france>

⁷ The average amount of CO₂ emissions per km travelled was 133g in 2009.

<http://www2.ademe.fr/servlet/getDoc?cid=96&m=3&id=69915&ref=23980&p1=B>

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Typing a site's address instead of using a search engine saves 5 kg of CO₂ equivalent /year

3. USB flash drives

The last part of the study is based on the following context: a company manager attends a conference. A 200-page report is given to him on a 512-MB USB flash drive. He transfers the document to his computer and skims it, spending 30 seconds on each page. It takes him three minutes to thoroughly read a page.

- **It takes 10 hours to thoroughly read 200 pages on a computer. Increasing reading time by 12 multiplies the impact on potential climate change eightfold.**

The three scenarios' findings were compared: saving documents on a computer and skimming a 200-page document; saving documents on a computer and thoroughly reading a 200-page document; saving documents on a computer and thoroughly reading 40 pages. The latter are power-point slides whose estimated reading time is put at 30 seconds per page. If the 100 conference attendees receive a USB flash drive and thoroughly read the 200-page document on their computers, GHG emissions from the transmission of the information alone rise eightfold compared to an average estimated reading time of two to three minutes per page. Those emissions account for 80kg of CO₂ equivalent, which corresponds to a 20% increase in a conventional conference's carbon footprint (400kg of CO₂ equivalent⁸ if the flash drive is not distributed).



Tip:

- Making it easier to browse through documents (itemised contents, indexes, keyword searches, etc.) when preparing data to be downloaded on a USB flash drive will help cut the time it takes to read the document transmitted on screen, consequently reducing the environmental impact of data transmission.

⁸According to the calculator Climat Mundi http://www.climatmundi.fr/Ing_FR_srub_65-calculateur-co2-conferences-et-evenements.html. Hypothesis retained: regional event, 500m² room, electric heat, meals not included in the calculation.

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- **Setting your printer's default mode to black and white, front/back, two pages per sheet cuts GHG emissions by three.** Printing increases potential climate change.

The scenarios made it possible to calculate that if 10% of the people at the same conference printed out their documents in black and white, it would avoid releasing approximately 15kg of equivalent CO₂, which corresponds to around 110km travelled by car.



Tips:

- When printing is necessary, if possible print on front/back, 2 pages per sheet.
- Print in black and white whenever possible.

- **If it does not take longer than two to three minutes to read a page, reading on screen seems to have less impact on potential global warming than printing.** If it does take longer, it is better to print out the document in black and white, front/back on the same page, two pages per sheet.

The scenarios made it possible to calculate the tipping point between reading on screen and printing by basing the calculation on the time required to read a 200-page document (estimated at approximately seven hours and 20 minutes). The tipping point stands at two minutes and 12 seconds for this particular document.



Tips:

- Print only if necessary.
- Quickly assess the received document's size before deciding whether to read it on screen or print it out.
- Read PowerPoint documents on screen instead of printing them out. They often contain little text and, consequently, take relatively little time to read.

- **Changing the material making up the USB flash drive's shell is not a priority because manufacturing accounts for approximately 2% of its total impact.**

The study found no significant variations in the impact on potential global warming or metal and fossil resource depletion between a PVC/aluminum 128-MB flash drive, a PVC 128-MB flash drive and a bamboo 128-MB flash drive.



Tips:

- Avoid systematically handing out promotional or other flash drives whose main purpose is not to transmit information.
- Use flash drives with sizes matching your needs.

Reminder of useful tips

- Make your computer last as long as possible.
- Avoid systematically printing out every document, whatever its nature.
- Optimise Internet searches.
- Rationalise the number of e-mail addresses.
- Clean out your mailbox on a regular basis.
- Buy a computer certified by the European ecolabel or Energy Star.
- Be attentive at the end of your computer's life. It is considered electronic waste: taking it to a dump or back to the store are two possible options.
- Avoid systematically handing out promotional USB flash drives.

The appendices are available at the ADEME Internet site's following link:

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ADEME IN BRIEF

The Agence de l'Environnement et de la Maîtrise de l'Energie (Environmental and Energy-Efficiency Agency), or ADEME, is a public agency under the authority of the Ministry of Ecology, Sustainable Development, Transport and Housing; Ministry of Industry, Energy and the Digital Economy; and Ministry of Higher Education and Research. It participates in implementing public environmental, energy and sustainable development policies. The agency makes its skills and consulting expertise available to companies, local communities, the government and the general public in order to help them move forward in their environmental efforts. It also helps fund, research and implement waste management, soil conservation, energy efficiency, renewable energy, air quality and noise abatement projects.

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