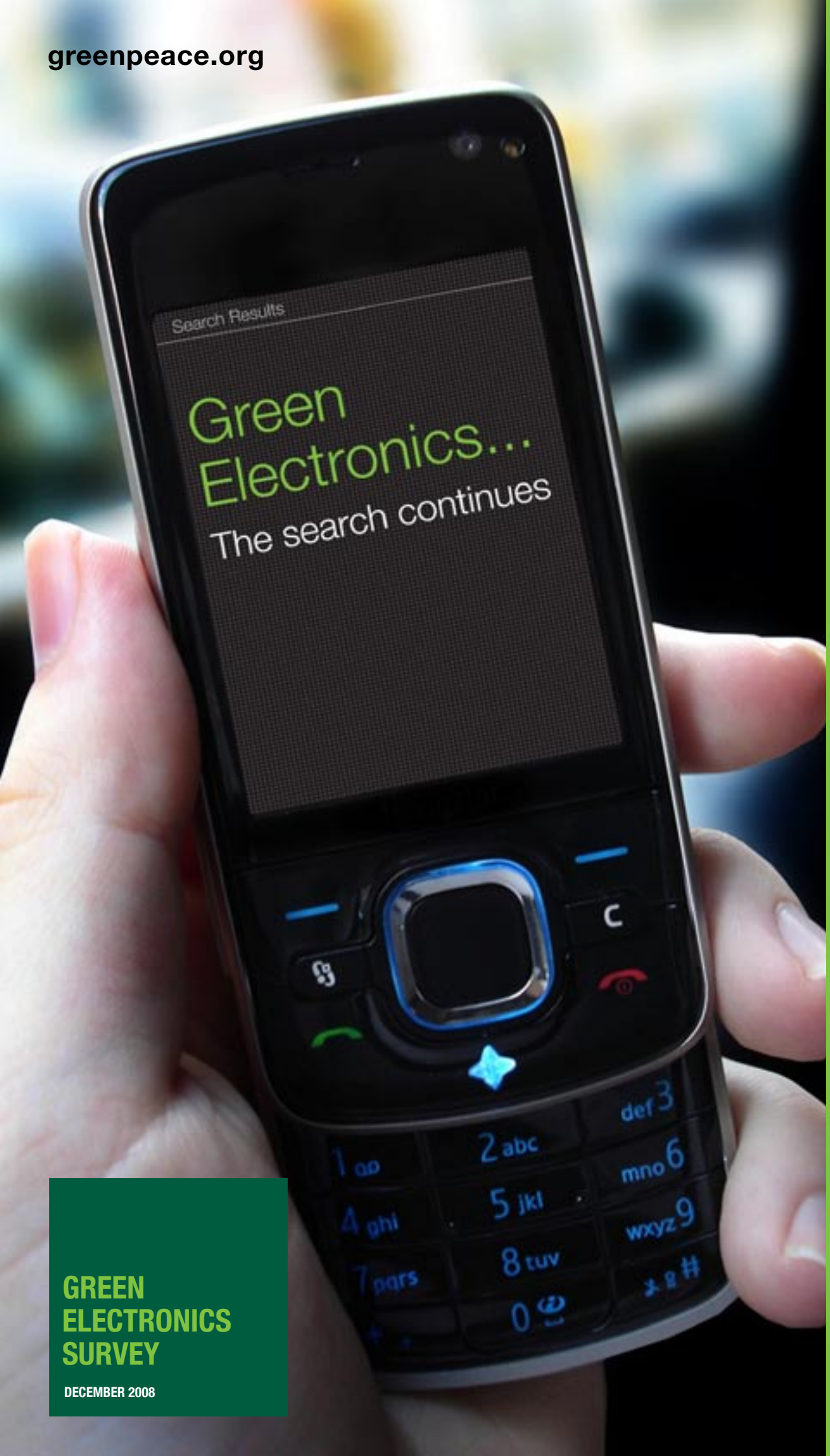
greenpeace.org




# GREEN ELECTRONICS SURVEY

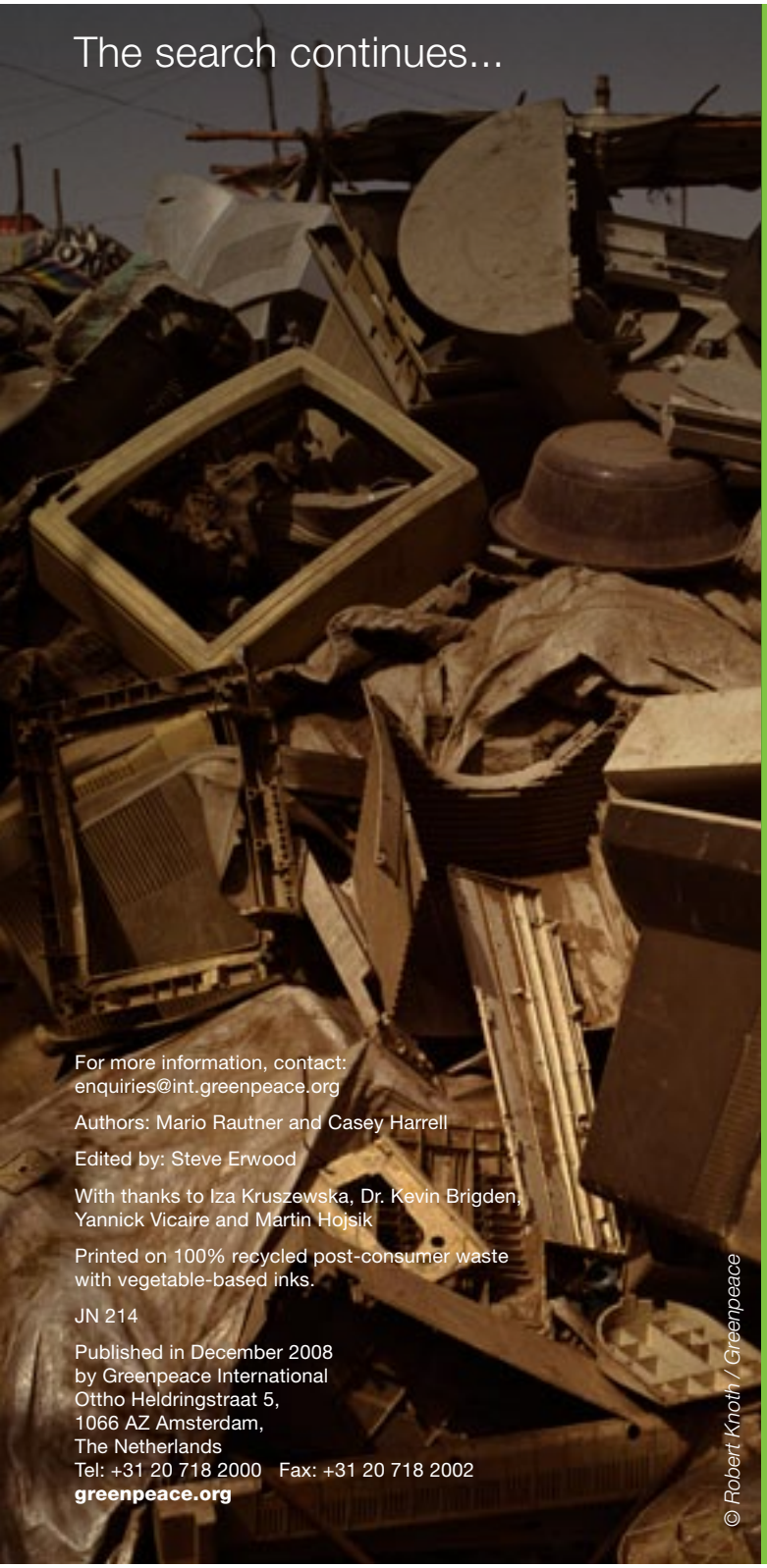
DECEMBER 2008

GREENPEACE

Creating a toxic-free future

# Green Electronics

## The search continues...



For more information, contact:
enquiries@int.greenpeace.org

Authors: Mario Rautner and Casey Harrell

Edited by: Steve Erwood

With thanks to Iza Kruszewska, Dr. Kevin Brigden, Yannick Vicaire and Martin Hojsik

Printed on 100% recycled post-consumer waste with vegetable-based inks.

JN 214

Published in December 2008
by Greenpeace International
Ottho Heldringstraat 5,
1066 AZ Amsterdam,
The Netherlands
Tel: +31 20 718 2000 Fax: +31 20 718 2002
**greenpeace.org**



## Contents

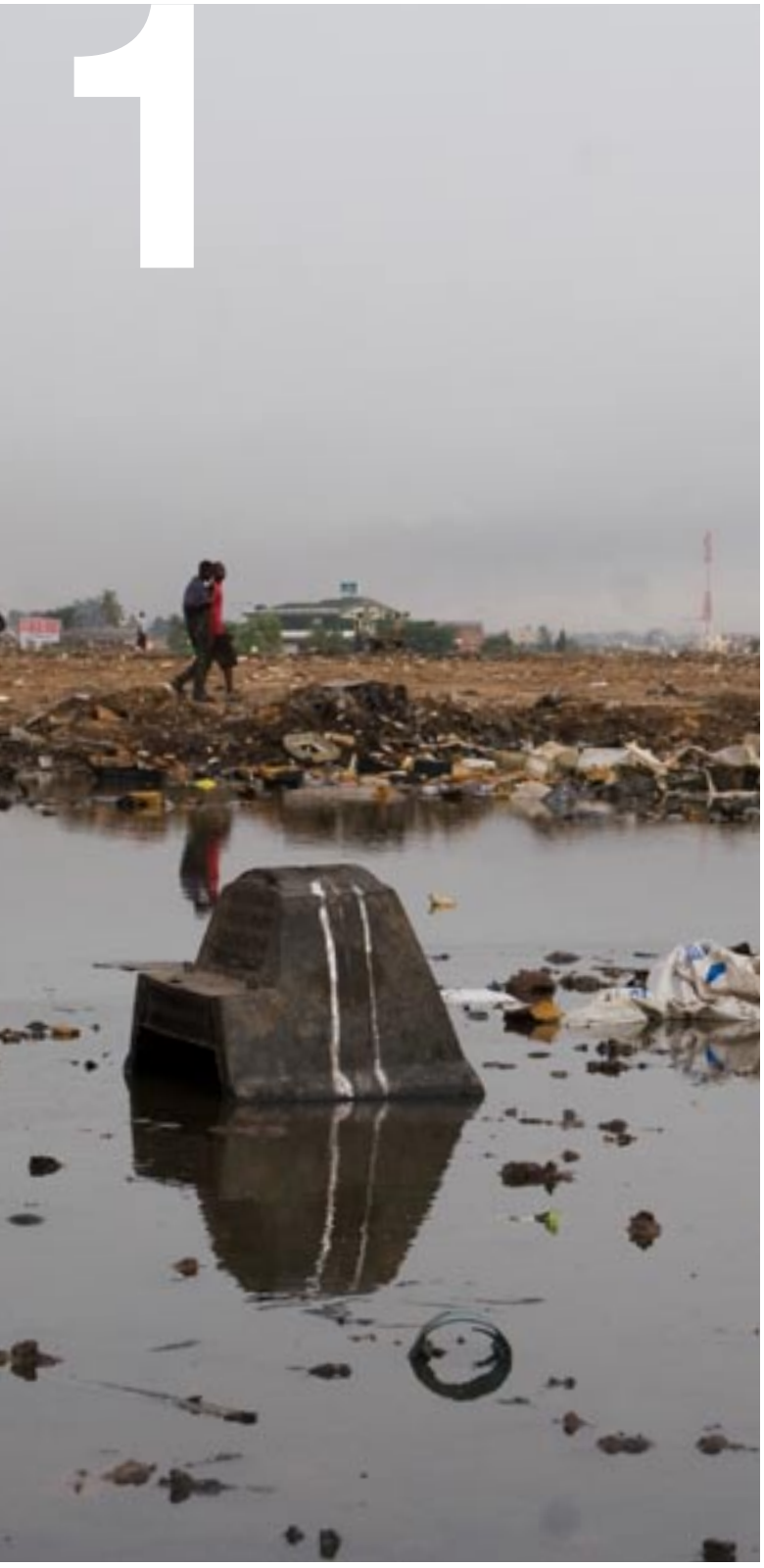


*Front cover: design - Toby Cotton; original image - RafeB*

*Images © Robert Knoth / Greenpeace*
***Toxics E-Waste Documentation in Pakistan***
*In the Karachi district of Lyari, hundreds of workers, including teenage children, earn their livelihoods by dismantling electronic scrap and extracting valuable components such as copper to sell. This is an insight into the personal cost of e-waste. Thousands of tonnes of e-waste such as discarded PCs, mobile phones and TVs, are dumped in Africa and Asia every year. Greenpeace research shows that some of this waste is exported from Europe to Pakistan.*

*Images © Greenpeace / Kate Davison*
***Toxics E-Waste Documentation in Ghana***
*The majority of second-hand electrical goods that are exported to Ghana from developed countries are beyond repair and are either dumped or recycled in a crude fashion. In the yards, unprotected workers, many of them children, dismantle computers and TVs with little more then stones in search of metals that can be sold. The remaining plastic, cables and casing is either burnt or simply dumped.*

# Green Electronics - The Search Continues…



© Greenpeace / Kate Davison

## Introduction

Since August 2006 Greenpeace has assessed the environmental policies of consumer electronics companies through its "Guide to Greener Electronics". Initially this quarterly publication focused on leading computer and mobile phone producers and their policies with regards to hazardous chemicals used in their products and the waste generated by their branded products. Since then the Guide has evolved to include the 18 top manufacturers of personal computers, mobile phones, televisions, and games consoles. It now assesses their policies on toxic chemicals, recycling, energy efficiency and climate change mitigation. These reports have contributed towards motivating producers to take responsibility for the environmental impacts caused by modern consumer electronics. They have helped shape policies of many electronics companies that now far exceed policies that were in place in 2006 as well as legislative requirements.

As companies have made increasingly stronger commitments to eliminate toxic chemicals, increase their products' energy efficiency and improve their recycling efforts by embracing financial responsibility for their electronic waste, Greenpeace has sought to comprehensively assess the state of green products coming into the global marketplace, looking even beyond its initial criteria in the Guide to Greener Electronics. Using information submitted by companies in late 2007, Greenpeace published the first edition of its Green Products Survey in early 2008. Unlike the electronics Guide described above, which focuses on overall corporate policies and practice, this survey evaluates the products that the manufacturers themselves consider to be their greenest. The first edition revealed no products that could claim the title of a truly green product, with only a few scores barely reaching a total score of 5 out of 10. In 2008, we invited the companies to submit their greenest models again, to find out if new product line-ups showed improved environmental performances, and to once again try to find the greenest electronic products on the market.

Companies choosing to participate in the 2008 survey are:

Acer, Dell, Fujitsu Siemens, Hewlett Packard, Lenovo, LG Electronics, Motorola, Nokia, Panasonic, RIM/Blackberry, Sharp, Samsung, Sony, Sony Ericsson and Toshiba

Unfortunately not all companies invited took the opportunity to showcase the environmental performance of their products. The companies that refused to take part in the survey were:

Apple, Asus, Microsoft, Nintendo, Palm and Philips

Because Microsoft and Nintendo opted not to take part in the survey, and only Sony submitted game consoles for review, it has not been possible to rank game consoles.

In addition to desktop and notebook computers, mobile phones and smart phones, which were also assessed in 2007, the categories of LCD and plasma screen televisions and LCD computer monitors have been included in this edition. In total we received 50 products from 15 companies.

## The Green Electronics Survey

The principles behind this year's survey were the same as last year's: leading manufacturers were directly invited to submit their greenest products via an assessment form that was sent to them. In addition, the forms were published on the Greenpeace website and other forums to enable smaller manufacturers to participate as well. Each company was allowed to submit three products per product category, which we then assessed and scored against our criteria. To make certain that the survey was as up-to-date as possible upon its publication, we also offered companies the opportunity to submit products that, while unreleased at the time we contacted them, would be on the market by 1 January 2009. If a company submitted more than one product in a category we chose the highest-scoring device for inclusion in the report. Once assessments were completed, companies were invited to review them to ensure accurate product information.

The products submitted were assessed against four broad groups of criteria:

- **Use of hazardous chemical substances**, including polyvinyl chloride (PVC), brominated flame retardants (BFRs), antimony, phthalates, beryllium and a number of other chemicals.
- **Power consumption of the products**, assessed by comparing them with the Energy Star standards of the US Environmental Protection Agency. Points were also given for a number of other areas such as providing detailed power consumption data to consumers.
- **Product lifecycle**, including criteria such as recyclability rate and use of recycled plastic in the product. Long warranty periods and good take-back programmes were also rewarded.
- **Availability of data** that enables assessment of the energy taken to manufacture the products as well as **special innovations** that help to reduce the total burden on the environment.

A maximum of 100 points could be reached. The total points for each product were adjusted to a possible top score of ten. Because the assessment criteria are often specific to a product category i.e. laptops are not compared with mobile phones, etc, comparisons are only possible within a product category. In addition one product category scoring higher than another is not an indication of an overall better environmental performance of that product category.

The criteria are by-and-large the same as those used in 2007. However, small changes have been made due to new criteria being added to reflect the rapidly changing nature of consumer electronics design. In addition, there have been changes in international standards such as those for energy efficiency, and these have been reflected in the survey. Therefore, this year's results cannot be directly compared with the results from 2007.

## Main findings

The electronics industry continues to make progress in putting products on the market with reduced environmental impacts, and this is confirmed by the results of Greenpeace's 2008 Green Electronics Survey. In addition to the overall improvement in the year since the first Greenpeace survey, the product scores are increasingly closer together, suggesting a more competitive environment in a 'race to the top' to produce truly green products. There are a number of findings that underline this trend, but also significant shortcomings in certain practices.

- Progress continues with regards to phasing out the use of hazardous chemicals. More products are PVC-free than in the previous year's survey and fewer RoHS (Restriction of Hazardous Substances) exemptions are being used by the manufacturers.

For notebooks, LED displays that save energy and avoid the use of mercury in backlights are becoming more widespread. *(See Annex 1 for a fuller explanation of RoHS exemptions).*

- For larger products such as TVs and monitors, significant amounts of post-consumer recycled plastic are being used, while mobile phones and - with some exceptions - desktop and notebook computers are lagging behind in this respect. As producers establish more comprehensive voluntary take-back and recycling programmes, increasingly detoxified end-of-life products should be feeding the increased demand for recycled plastics.

- Companies have adapted quickly to new Energy Star requirements, however a small number of products submitted for the survey did not yet meet the latest of these requirements.

- While more companies now track the energy used to produce their products, there is no international standard that allows for a good comparison of energy embodied in the product to be made.

- Even though computer manufacturers are generally good at providing in-use energy data and comparisons for their products, monitor and television producers need to make this a higher priority.

- While some companies now have sections on their website that list green products, these are still usually not prominent enough to promote green products as a major purchasing decision. More work needs to be done by companies to integrate the environmental attributes of their products into their marketing efforts.

Despite the fact that there are major differences between the various product categories and although the survey does not make comparisons between the product categories, one product performed exceptionally well - the **Lenovo L2440x wide** monitor. It is far ahead of the competition by being PVC and BFR-free (albeit allowing an unacceptably high limit of 900 ppm bromine and chlorine) and also free of phthalates, antimony and beryllium. Furthermore, it uses post-consumer recycled plastic for nearly 30% of its plastic parts and has a LED backlit display, which negates the use of mercury and improves energy efficiency.

*© Greenpeace / Kate Davison*

## Summary of results

### Desktop computers

Lenovo takes first place with its ThinkCentre 58/58p model; last year, Lenovo's product had the lowest score of all submitted desktop computers. The Fujitsu Siemens Esprimo E7935 E-Star 4 is only one-tenth of a point behind in second place. The products submitted by Dell and Hewlett Packard did not reach the 5 points half-way mark, and Acer, who did not take part in the survey last year, scored well below 4 points and finds itself in last place. Unfortunately, no desktop (or notebook) computer submitted is entirely PVC or BFR-free, which means that computers still lag behind other product categories when it comes to the use of hazardous chemicals.

| Rank | Model | Points |
|---|---|---|
| 1 | Lenovo ThinkCentre 58/M58p | 5.88 |
| 2 | Fujitsu Siemens Esprimo E7935 E-Star 4 | 5.73 |
| 3 | Dell Studio Hybrid | 4.86 |
| 4 | Hewlett Packard dc7900e USDT | 4.73 |
| 5 | Acer Veriton M678G | 3.31 |

### Notebook computers

Toshiba takes the top spot with its Portege R600, beating Hewlett Packard's Elitebook 2530p by a narrow margin. While the Hewlett Packard product scores much higher in the lifecycle category, Toshiba is ahead of everyone else when it comes to the elimination of toxic chemicals. These are the only products that score above 5 points out of a maximum possible 10. The Lenovo X300 is in third place, followed by the Dell Latitude E-4200. Sony, which last year had the highest-scoring product in this category, is ranked fifth. Neither Panasonic's or Acer's reached the 4 points mark.

| Rank | Model | Points |
|---|---|---|
| 1 | Toshiba Portege R600 | 5.57 |
| 2 | Hewlett Packard Elitebook 2530p | 5.48 |
| 3 | Lenovo X300 | 4.68 |
| 4 | Dell Latitude E-4200 | 4.41 |
| 5 | Sony VGN-Z11WN/B | 4.20 |
| 6 | Panasonic CF-W7 | 3.80 |
| 7 | Acer TravelMate 6293 | 3.44 |

### Mobile phones

All the mobile phones submitted to the survey score within one point of each other, but the lead goes to the Samsung SGH-F268. The Motorola V9 and Nokia 3110 Evolve are ranked second and third respectively, with only one-tenth of a point separating them, while the Sony Ericsson C905 and LG KT520 stay just short of the half-way 5 points mark – this is still less than one point behind the leader. A major step has been made in the use of chemicals, with all but the LG phone claiming to be PVC-free and Samsung's phone being free of BFRs, well below the commonly used so-called 'halogen-free' industry limit of 900ppm bromine.

| Rank | Model | Points |
|---|---|---|
| 1 | Samsung SGH-F268 | 5.45 |
| 2 | Motorola MOTORAZR V9 | 5.20 |
| 3 | Nokia 3110 Evolve | 5.00 |
| 4 | Sony Ericsson C905 | 4.88 |
| 5 | LG KT520 | 4.61 |

© Greenpeace / Kate Davison

## Smart phones/PDAs

Nokia's 6210 Navigator secures first place in this category, ahead of the Sony Ericsson G900. Both models are PVC-free, but Nokia gets more points due to better energy efficiency and the product's lifecycle. Hewlett Packard's iPAQ is third, ahead of the Blackberry Pearl, which lost a lot of points in the lifecycle criteria and for poor energy efficiency, and did not even meet the Energy Star standard. Hewlett Packard's PDA lagged in the area of hazardous chemicals phase out.

| Rank | Model | Points |
|---|---|---|
| 1 | Nokia 6210 Navigator | 5.20 |
| 2 | Sony Ericsson G900 | 4.80 |
| 3 | Hewlett Packard iPAQ 910 | 4.20 |
| 4 | RIM Blackberry Pearl 8130 | 3.50 |

## Televisions

There was a tight race for the top spot for televisions that was ultimately won by the Sharp LC-52GX5. This model scores best overall even though it does not lead in any of the four sets of scoring criteria. The Sony KDL-32JEI takes second place and leads in the lifecycle criteria. These two televisions are sold only in Japan. The Panasonic television is ranked last among the three but has the best performance when it comes to the reduction of hazardous chemicals used. Unfortunately, LG Electronics had to pull its submission, when its LCD model television's release was delayed past the publication date of this report.

| Rank | Model | Points |
|---|---|---|
| 1 | Sharp LC-52GX5 | 5.92 |
| 2 | Sony KDL-32JE1 | 5.84 |
| 3 | Panasonic TH-42PZ800U | 4.96 |

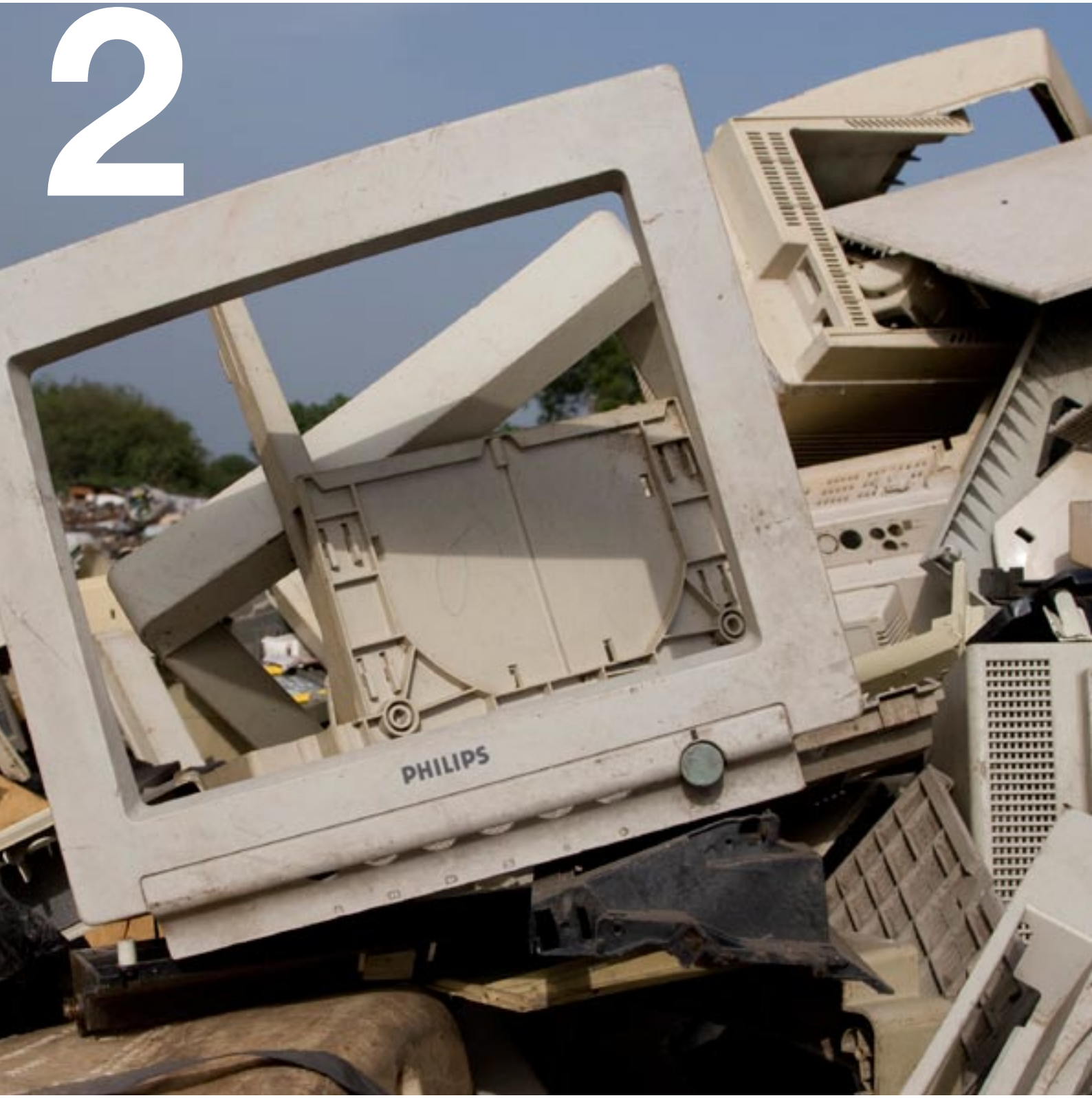
## Computer monitors

The clear winner and the highest-scoring overall product is the Lenovo L2440x widescreen monitor, being free of PVC and BFRs as well as other chemicals such as beryllium and antimony. No other monitor submitted has eliminated the use of PVC and BFRs, although Lenovo's definition of 'free' allows use of BFRs and PVC up to a limit of 900ppm bromine or chlorine. The Fujitsu Siemens SCENICVIEW P22W-5 ECO gets second place and has eliminated the use of beryllium and also uses zero watts of energy in sleep and stand-by modes. Third and fourth places are taken by Samsung's and LG Electronics' products, which scored highly in energy efficiency. The products submitted by Hewlett Packard and Dell also scored more than 5 points, but Acer's fell short, particularly in the lifecycle criteria.

| Rank | Model | Points |
|---|---|---|
| 1 | Lenovo L2440x wide | 6.90 |
| 2 | Fujitsu Siemens SCENICVIEW P22W-5 ECO | 6.33 |
| 3 | Samsung 2443BW | 5.89 |
| 4 | LG Electronics W2252TE | 5.74 |
| 5 | Hewlett Packard L1950g | 5.48 |
| 6 | Dell E2009W | 5.13 |
| 7 | Acer V194HQ | 4.29 |

## Observations and the ways forward

# 2




*© Greenpeace / Kate Davison*

Our second survey showed companies making significant improvements over the last year while also leaving significant scope for further gains. Taking the top scores within each criteria and product category, a pathway to the design of truly green electronics products becomes clear. Companies are still achieving piecemeal improvements but this need not be the case – for example, using the technologies employed by the current market leaders and thus combining the best characteristics of the submitted desktop products, a significantly greener product could already be on the market, and a score of well over 7 points in this survey could be achievable. On top of this, since several companies now have clear phase-out dates for PVC and BFRs for their entire product range their potential score could be pushed above 8 points. Now is the time for manufacturers to combine their best green practices and put them forth in complete and integrated fashion into the marketplace.

## Designing out toxic chemicals

Significant gains have been made on the reduction of hazardous chemicals since the first survey commissioned in 2007. The number of RoHS exemptions used by companies decreased; it has become commonplace to see products, especially mobile phones, use only two or three RoHS exemptions (see Annex 1 for a fuller explanation of RoHS exemptions). A total of six mobile phones and smartphone/PDAs were PVC 'free', although most used an unacceptably high threshold of 900ppm for chlorine and bromine. Key mobile products (the Motorola Razr V9 and the Samsung F268) showed that it is possible to eliminate levels of hazardous PVC and BFRs, respectively, to much lower threshold levels. The survey also witnessed the first product introduced to the marketplace that is PVC, BFR, antimony, beryllium and phthalate free – the Lenovo L2440x widescreen monitor.

Sadly, there is still no notebook manufacturer that manages to produce PVC and BFR-free products at the time of the survey. A number of companies have announced they will phase out use of PVC and BFRs in 2009, which would mean that under the current criteria it should be possible to manufacture products scoring well over 8 points in this survey.

It is disappointing that Apple has, for a second year running, decided not to take part in this survey, especially since its new line-up of MacBooks, with drastic PVC and BFR reduction and high energy efficiency, could have scored well.

**Phase out use of PVC and BFRs in consumer electronic products.** In our 2008 survey, we see more products reducing their uses of hazardous PVC and BFRs and a number moving towards becoming PVC and BFR-free. It's imperative that designing out these toxic chemicals continues; it will have a positive environmental impact and create financial incentives for companies to take responsibility for their waste.

**Go beyond RoHS exemptions.** The use of RoHS exemptions was seen to decrease in the 2008 survey. Companies are proving, with increasing frequency, that they no longer need RoHS exemptions to make successful, highly-functional and profitable consumer electronics. Greenpeace has compiled a long list of products offering alternatives for each of the RoHS exemptions (see http://www.greenpeace.org/raw/content/international/assets/binaries/ngo-rohs-submission.pdf)

**Strengthen the RoHS list.** RoHS currently only regulates a limited list of hazardous chemicals while the list of products or components that avoid the use of additional hazardous chemicals (PVC, BFRs, antimony, phthalates and beryllium), as seen in the 2008 survey, continues to grow. More and more often producers and their component and material suppliers are designing new models in anticipation of these chemicals being included in an revised RoHS Directive; it is high time to strengthen the list so that it reflects the market's readiness to comply and levels the playing field for the industry leaders.

**Make 'free' mean 'free'.** Industry standards for 'halogen-free' commonly allow use of bromine (in BFRs) and chlorine (in PVC), creating an unnecessary loophole that allows for the formation of toxic chemicals including halogenated dioxins under some recycling and disposal operations, especially open burning. For Greenpeace, this level is unacceptable: 'free' should mean as close to zero as possible. For more information, see page 5 of the document "New Improved Ranking Criteria Explained", available at: **www.greenpeace.org/international/press/reports/improved-criteria-explained.pdf**

## Energy efficient products

**Beyond Energy Star.** Climate change is now a global priority - it is likely that we are currently seeing a fast technological jump in energy efficiency because this field of innovation has been otherwise ignored for decades. Energy Star (see Annex 1 for more details) provides a well-recognised benchmark for energy efficiency. Our survey shows that these current standards can already be surpassed for the devices that we assessed, and should therefore be considered to provide a minimum baseline below which a company should not even considering marketing a product.

On the other hand, it would seem that there is scope for a significant strengthening of future standards of energy efficiency – new products, marketed after this survey was undertaken, demonstrate that they are able to comfortably beat the records already identified in our survey. The US Environmental Protection Agency has already adopted a 'new approach', where the much tighter Energy Star 5.0 standards, which will launch for computers in July 2009, will be introduced once 25% of products are in compliance with Energy Star 4.0. This approach should also be considered by legislators drafting future mandatory requirements, to get the worst, least energy efficient products off the market as soon as possible. Certain products, such as desktops, use more energy and materials in production and are less energy efficienct during consumer use.

**Information for consumers**. Making products energy efficient is not enough. Consumers need information as to how to make the best use of their devices with regard to energy use. There are no initiatives reaching very far in providing this information to consumers, and one could reasonably expect much more from companies who publicly express their concerns and communicate their efforts about tackling climate change. Guidelines or even a standard for the electronics industry to follow should be in place.

## Product lifestyle approach

**Recyclability.** As found in the 2007 survey, there appears to be no common industry practice when calculating recyclability rates. Recyclability claims made by companies in all product categories ranged as high as 85 to 90% recyclability, and they most likely do not match the reality of common recycling practices. For example, CRT monitors quoting recyclability levels this high must take into account CRT glass, often over 50% of product weight, which can at best be downcycled and not truly recycled.

To make "recyclability" improvements fit with recycling practices, manufacturers need better communication with recyclers to also improve separation and recycling technologies and build capacity among the organisations and companies in charge of collection and recycling.

**Lifecycle analysis.** There is an urgent need to work towards an industry-wide standard of lifecycle analysis that encompasses the use of energy and natural resources across the entire chain of production – from mining, manufacture and distribution to consumption and end-of-life treatment. In the meantime, companies should develop their own analysis that covers the entire product lifecycle. Without knowing and tracking what resources and how much energy it takes to make a product, it is hard to determine how significant, systematic changes can be made. All stakeholders need to be able to understand where action needs to be taken as a priority, to design out toxics, and to assess whether actions taken downstream are efficient or merely shift toxic burdens from one environmental medium to another (for example, from the soil to the air). With respect to tackling climate change, it is also essential to have a fair disclosure of total energy used during the manufacture of products – by fair, meaning that every company can be judged on the same stages of production and not according to where it sets its own boundaries for responsibility; once the carbon footprint of the manufacturing process has been established, it is also important to consider the carbon footprint incurred by the mining of raw resources, for example.

© Robert Knoth / Greenpeace

**Extend the lifecycle of products.** To design truly ecologically sound products, companies need to shift away from products designed with a limited lifespan (planned obsolescence) and towards long-living upgradeable goods, with warranty periods significantly above minimum legal standards and with long availability of components. Many other initiatives could contribute towards this objective, from the standardisation of peripherals and chargers to allowing or offering repair services, easing and organising safe reuse of second-hand products. Refurbishment initiatives should also be promoted in developed countries, where recycling is too focused on metal recovery after shredding the whole device and condemning most of it to combustion.

**Reconsider business models.** Move from products to services. The products evaluated in this survey are physically sold to customers in a traditional manner. However, as already seen long ago in the photocopier business, leasing of products (big-size peripherals or others) instead of selling them is another valid way to amend business models in the direction of dematerialisation. Moving to new, service-based business models might enable manufacturers to design ultra-slim devices backed up by shared and efficiently used central infrastructure, reducing today's huge redundancies in computing and storage capacity in private ICT devices.

## Innovations and marketing

It should be noted that the desktops included in this survey are standard desktop computers and that there are new technologies available that in some cases allow the use of products with significantly fewer environmental impacts. For example, offices with powerful servers and even homes with one standard desktop can run thin clients on their networks. Thin clients draw processing power from the server or another desktop and thereby reducing the need for many stand-alone desktops. Often, thin clients do not need to have their own motherboard or memory and use less power and materials than ordinary desktops.

# Annexes

## Annex 1: Methodology of scoring


© Robert Knoth / Greenpeace

Products were assessed against four sets of criteria that include some of the most important issues when it comes to manufacturing green consumer electronics products.

A maximum of 100 points was available, which was then adjusted to a score on a ten-point scale for comparison purposes. In other words, a product's "score" equals the total points achieved, divided by 10. Analysis of each product category included criteria specific to consumer use and main environmental issues of that product category, in addition to a number of criteria applicable across all product categories.

A composite score, per product category, was created using the top scoring answers from each criteria question. These best practice scores, ranging as high as 8.6 points, demonstrate that there is environmental innovation available now to produce significantly greener products today

While very similar, the scoring for this survey cannot be compared exactly to the previous scoring that took place in the survey published in March 2008. This is due to using updated international standards in areas such as energy efficiency, and also due to small changes in the scoring to allow for innovations in product development.

### Use of hazardous chemical substances

**(30 out of the total of 100 points a product can achieve)**

**RoHS exemptions**

The European Union Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) regulates the use in electronic products of certain critical chemicals namely lead, mercury, cadmium, hexavalent chromium and the brominated flame retardants PBBs and PBDEs (though not other BFRs). Since all products are expected to follow current legislation, they were not awarded points for merely being RoHS compliant. However, RoHS allows products to still be in compliance if they use the restricted chemicals in specific listed applications, though only where substitution is deemed not currently possible, or the substitute would be more harmful. Companies were asked to provide the exemptions

being used in each product. The fewer exemptions reported for a product, the more points awarded.

**PVC and BFRs**

Points were awarded if a product was declared free of all PVC plastics and/or free of all BFRs. One point was deducted for using a 900 ppm or greater limit for chlorine/bromine. While many companies now have timelines to phase out these two chemical groups, there are still very few products on the market that avoid them altogether. To recognise this, points were awarded where major components of the product did not use these chemicals:

**For PVC:**

- External cabling and wire
- Internal cabling and wires (including ribbon cables)
- Housing
- Packaging
- Plastic coated/encased electrical connectors

**For BFRs:**

- Laminates of printed wiring boards, including flexible circuit boards.
- Battery, including casing and components
- Housing (including for periphery equipment, e.g. transformer)
- Fan and fan housing
- Ribbon cables
- Electrical insulation sheet
- Plastic coated/encased electrical connectors

**Antimony, phthalates and beryllium**

These hazardous chemicals are not currently restricted under the RoHS Directive. Additional points were awarded for each of these chemical groups not used in the product.

For details of the environmental and human health impacts of the chemicals mentioned here, see the Greenpeace report "Toxic Tech – The dangerous chemicals in electronic products", available at: **www.greenpeace.org/international/press/reports/toxic-tech-chemicals-in-elec**

or also see "Chemical contamination at e-waste recycling and disposal sites in Accra and Korforidua, Ghana", available at: **www.greenpeace.org/raw/content/international/press/reports/chemical-contamination-at-e-wa.pdf**

## Energy use and power saving

**(30 out of the total of 100 points a product can achieve)**

Consumer electronics play a significant and growing part in an individual's carbon footprint. Using energy efficient products reduces $CO_2$ emissions - and thereby the impact on the climate - and results in lower household energy bills.

**Energy Star assessment**

Energy Star is the energy efficiency rating of the US Environmental Protection Agency and the US Department of Energy. This certification has become a globally-accepted standard and sets benchmarks for a number of products. If these benchmarks are met or exceeded, products can be labelled as Energy Star compliant. For the Greenpeace survey, points were awarded according to the percentage by which devices exceeded Energy Star minimum requirements. For example, a desktop computer using 1 Watt in stand-by mode instead of the 2 Watts required by Energy Star would be 50% better than Energy Star. For desktop and notebook computers, the stand-by, idle and sleep modes were taken into account. For mobile phones and PDAs, the energy efficiency and no-load energy use of the external power adapters was analysed. Monitors were assessed against off mode, sleep mode and on mode energy use, while televisions were compared with the Energy Star requirement for the stand-by and on modes.

An additional point could be earned for notebooks and desktops if the products enter sleep mode in a shorter time period than required by Energy Star during user inactivity. This means power is saved, since the product spends more time in a lower power state. Mobile phone and PDA producers could also earn an additional point by shipping the products with power saving settings enabled, for example by powering down of the screen after a shorter period of time. A point was also available for television and computer monitors that have hard-off switches, which result in a zero watt power consumption.

The detailed requirement for Energy Star qualifying products can be found on the Energy Star website at **www.energystar.gov**

**Power-saving information**

Points were awarded to companies providing the consumer with information on how best to reduce the energy consumption of a device. The more comprehensive the information is, the more points awarded to the product. The areas in which points could be scored included provision of an online energy calculator to compare products, public access to environmental data sheets where actual power consumption is listed, the manual explicitly encouraging power-saving, additional power-saving tips on company or product websites and making consumers aware of the connection between climate change and power consumption. Additional software and hardware energy-saving functions and solutions were also rewarded. It is possible that results for these criteria, particularly relating to information to be found on websites, may have changed since the survey was undertaken.

## Product lifecycle

**(30 out of the total of 100 points a product can achieve)**

Consumer electronics are known for their short and continuously diminishing lifecycles that are increasing the burden on the environment. A longer warranty period, designing products that can be upgraded rather than replaced and making spare parts available long after the production of the device has been discontinued all help to encourage consumers to keep using the products longer.

**Upgradeability**

Products were given points for the extent to which they are upgradeable by the user, with clear directions on how to upgrade parts being given in the user manual. For computers, upgradeable parts included the system memory, the hard drive, the graphics card (GPU), the processor (CPU) and the optical drive (CD/DVD). Parts that are usually replaced rather than upgraded (such as fans in computers, for example) were not included.

For mobile phones and PDAs, upgradeable parts included the battery and memory cards. In addition, points have been allocated according to the price of the battery compared with the price of the actual device. Since the battery usually needs earlier replacement and expensive batteries are an incentive for the consumer to discard the product rather than to simply replace the battery. The smaller the percentage the battery price is of the total price of the device, the more points awarded.

Monitors are usually not upgradeable. Instead, the manufacturer's replacement policy for monitors showing pixel defects have been analysed and points have been awarded by comparing the company policy with the ISO standard.

Televisions are not upgradeable, so no points could be awarded. Instead the overall score for a television's product lifecycle criterion was adjusted by a factor of 1.2 to remain consistent with a total of 30 points for this set of criteria.

**Warranty**

Points were awarded according to the number of years for which products are under manufacturer warranty on the global market. The longer the warranty time given by the manufacturer, the less likely it is that the consumer will have to replace a device before it is outdated.

**Availability of spare parts**

Similarly to the scoring for warranty, products were awarded points for every year that a consumer is able to obtain spare parts for a product after production has ceased. The longer these spare parts are available the less likely it is that the consumer will dispose of a product rather than repair it.

**Recyclability**

Because the recyclability rate is difficult to define and compare between products, the definition of the European Union Waste Electrical and Electronic Equipment Directive (WEEE Directive) was applied. This directive gives a definition of recycling that excludes energy recovery. Energy recovery is a means of generating energy by directly incinerating combustible waste, with or without other waste, and recovering the heat. Indeed, energy recovery from combustion eliminates the possibility to effectively reuse waste through material recycling and therefore cannot be considered true recycling. The directive also demands a legal minimum percentage of recyclability per weight of the device. Computers, for example, need to be at least 65% recyclable. Points were awarded according to how much a device exceeds the legal minimum recyclability rate of the WEEE directive.

© Greenpeace / Kate Davison

In the 2008 survey, when reviewing the companies' submissions, we were confronted by figures claiming recyclability rates that were unlikely to be matched in practice. Such figures presumably do not take into account the destruction of certain materials during recovery processes, for example, discounting some plastics or resins that will be destroyed during the recovery of metal parts in a smelter. Although smelting of e-waste is considered a state-of-the-art recycling process for recovering metals in electronic scrap, the plastics in the scrap (for example, whole mobile phones or printed circuit boards) are not materially recovered. Therefore the maximum points that could be obtained from this criterion were reduced, and additional points were awarded instead if companies could provide an independent assessment backing up their recyclability claims.

**Use of recycled plastic**

Points were awarded for products using significant amounts of recycled plastics, and additional innovation points were awarded for products that use mostly post-consumer recycled plastic rather than just post-industrial recycled plastic. The increased demand for post-consumer plastic drives the waste collection of these plastics via take-back practices and encourages toxic elimination in design, in turn making plastics more easily recyclable. Additionally, recycling saves the energy embodied in materials, reducing the impacts on greenhouse gas emissions and climate change.

**Coding of plastic parts**

Coding plastic parts of electronic products is important to ensure that they are treated and recycled properly at the end of life of the product. In many instances only the larger plastic components in a product are coded. Points were awarded for products that also code plastic parts weighing less than 25g, the limit usually applied under an ISO standard.

**Take-back**

The companies' take-back programmes were analysed to see whether they focused on individual financial responsibility for the recycling and disposal of the submitted products in the geographic locations where they were sold. The better the take-back programme, which must be cost-free to the consumer or last owner, and the better the information provided to the consumer about where the products can be returned to at their end-of-life, the more points were awarded.

## Innovation and marketing

**(10 out of the total of 100 points a product can achieve)**

**Energy during production**

The energy used to manufacture a product is as important to investigate as the energy it takes to power a device during consumer use. Reducing energy during production plays an important role in reducing the impact on natural resources and the climate. Unfortunately, there is no existing global standard that allows for comparing products under this category. Therefore, points were awarded to products for which companies have an energy lifecycle analysis that takes into account a significant part of the production chain of that particular product model. Activities that should be included when calculating the energy taken to make a product include the extraction and refining of natural resources, production of materials (e.g. plastics), the manufacturing of parts provided by suppliers, the manufacturing of parts by the brand owner, the shipping of parts to the assembly facility, the assembly itself and the distribution of the products to importers and wholesalers. Points were awarded for each of the major stages included in the assessment. However, companies that only calculate the energy of the final assembly stage of production were not awarded any points.

**Visibility and promotion**

Electronics companies spend huge amounts of money advertising and promoting their products. The more visible green products are, the more likely they are going to be purchased by consumers. To determine this visibility, the amount of website navigation (such as the number of clicks or drop-down menus) required to reach the specifications of a product was assessed. The less website navigation needed, the more points awarded. The average of a number of major websites visited was used and it is possible that the sites accessed for this assessment have since changed.

**Other innovations**

Green innovations going beyond common practices were awarded with additional points. These include mercury-free and more energy-efficient LED lights in screens, a significant weight percentage of post-consumer recycled plastic, zero watt stand-by power use, or manufacturing extremely light or durable products.

# Annex 2: Detailed product line-up

## Desktops

The desktop category was dominated by the products from Fujitsu Siemens and Lenovo, with the Lenovo ThinkCentre M58/M58p taking first place. The scoring of these products was, by and large, close throughout all sets of criteria. The special points awarded to Lenovo for using recycled plastic that is entirely from post-consumer sources rather than post-industrial made a significant difference in the final score.

The Esprimo E7935 by Fujitsu Siemens is the leading product when it comes to use of hazardous chemicals, being the only submitted product free of beryllium and beryllium compounds (one of the toxic chemicals groups not currently regulated under RoHS). The Dell Studio Hybrid and the Hewlett Packard dc7900e USDT make up the second group of products. The reason why they lag behind the front runners is due to their much weaker performance under the chemicals criteria.

The Dell model scores best out of all models when it comes to energy efficiency and providing the consumers with power-saving information. The Dell is also awarded with special points for the very small and light design of the product and the recycling kit that comes with it. The Acer Veriton M678G falls far behind because of weak scoring on energy efficiency.

Like last year the recyclability rates reported by the companies for their products are likely to be significantly overstated and none provided us with an independent assessment of their recycling rates.

It is disappointing to note that none of the desktop manufacturers has yet introduced a product that is PVC or BFR-free.

| Criteria | Maximum points | Lenovo ThinkCentre M58/M58p | |
|---|---|---|---|
| | | Results | Points |
| **Chemicals** | | | |
| PVC-free | 5 | NO | 0 |
| PVC-containing parts | 3 | 3 | 1.8 |
| BFR-free | 5 | NO | 0 |
| BFR-containing parts | 3 | 6 | 0.5 |
| Antimony-free | 3 | NO | 0 |
| Phthalate-free | 3 | NO | 0 |
| Beryllium-free | 3 | NO | 0 |
| RoHS exemptions used | 11 | 3 | 8 |
| **Energy use** | | | |
| Stand-by % better than Energy Star | 8 | 64.4% | 8 |
| Sleep % better than Energy Star | 8 | 68.1% | 8 |
| Idle % better than Energy Star | 8 | 15.1% | 3 |
| Inactivity-to-sleep (minutes) | 1 | 20 | 1 |
| Power-saving information | 5 | YES | 3 |
| **Lifecycle** | | | |
| Upgradeable parts | 5 | 5 | 5 |
| Warranty in years | 7 | 3 | 5 |
| Component availability in years | 7 | 5 | 5 |
| WEEE recyclability rate (%) | 3 | 92% | 3 |
| Independent assessment for recyclability rate provided | 1 | NO | 0 |
| Recycled plastic weight % | 3 | 22% | 3 |
| Plastic part coded at < 25grams | 1 | NO | 0 |
| Take-back programme and information | 3 | YES | 1 |
| **Other** | | | |
| Energy during production analysis | 1 | NO | 0 |
| Parts of production chain included in assessment | 3 | 0 | 0 |
| Other special features | 3 | YES | 2 |
| Visibility on web | 3 | 3 | 1.5 |
| **Total adjusted points** | **10** | | **5.88** |

© Greenpeace / Kate Davison

| Fujitsu Siemens ESPRIMO E7935 E-Star 4 | | Dell Studio Hybrid | | HP dc7900e USDT | | Acer Veriton M678G | | Combining greenest parts from products submitted |
|---|---|---|---|---|---|---|---|---|
| Results | Points | Results | Points | Results | Points | Results | Points | |
| | | | | | | | | |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| 3 | 1.8 | 3 | 1.8 | 3 | 1.8 | 3 | 1.8 | 1.8 |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| 3 | 2 | 5 | 1 | 4 | 1.5 | 5 | 1 | 2 |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| YES | 3 | NO | 0 | NO | 0 | NO | 0 | 3 |
| 6 | 5 | 8 | 3 | 8 | 3 | 3 | 8 | 8 |
| | | | | | | | | |
| 37.0% | 6 | 45.6% | 7 | 37.8% | 6 | 12.4% | 2 | 8 |
| 59.6% | 8 | 46.6% | 7 | 37.0% | 6 | 13.8% | 2 | 8 |
| 44.6% | 7 | 61.2% | 8 | 38.3% | 6 | 12.0% | 2 | 8 |
| 60 | 0 | 15 | 1 | 30 | 0 | 30 | 0 | 1 |
| YES | 3.5 | YES | 2 | YES | 4 | YES | 2 | 4 |
| | | | | | | | | |
| 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 5 |
| 3 | 5 | 1 | 1 | 3 | 5 | 1 | 1 | 5 |
| 5 | 5 | 3 | 3 | 5 | 5 | 3 | 3 | 5 |
| 95% | 3 | 85% | 2 | 90% | 3 | 97% | 3 | 3 |
| NO | 0 | NO | 0 | NO | 0 | partly | 0.5 | 0.5 |
| 0 | 0 | 15% | 2 | 0 | 0 | 0 | 0 | 3 |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| YES | 1.5 | YES | 2 | YES | 1 | YES | 1 | 2 |
| | | | | | | | | |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NO | 0 | YES | 2 | NO | 0 | NO | 0 | 3 |
| 3 | 1.5 | 2.5 | 1.75 | 4 | 1 | 2.5 | 1.75 | 1.75 |
| | 5.73 | | 4.86 | | 4.73 | | 3.31 | 7.21 |

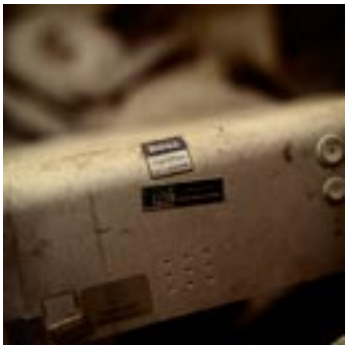
## Notebook computers

As with desktops, there are two products in the notebook category that vie for the top spot, with the Toshiba Portege R600 winning narrowly over the Hewlett Packard Elitebook 2530p. While the Toshiba notebook earns the highest scores when it comes to avoiding hazardous chemicals, the Elitebook is more energy efficient.

Three other products, namely the Lenovo X300, Dell Latitude E-4200, and the Sony Vaio Sony VGN-Z11WN/B make it over the 4 points mark. At the bottom end of the scale, the Panasonic CF-W7 and Acer TravelMate 6293 score the lowest points overall and specifically in the lifecycle set of criteria.

All but one product earn special innovation points for using LED displays that reduce energy consumption and the use of mercury. While Panasonic's display is a conventional LCD, the company earns innovation points because its notebook is a "toughbook" that is extremely durable and can withstand drops, pressure and spills. Toshiba gets an additional point for using post–consumer recycled plastic parts.

| Criteria | Maximum points | Toshiba Portege R600 | | HP Elitebook 2530p | |
|---|---|---|---|---|---|
| | | Results | Points | Results | Points |
| **Chemicals** | | | | | |
| PVC-free | 5 | NO | 0 | NO | 0 |
| PVC-containing parts | 3 | 2 | 2.4 | 1 | 3 |
| BFR-free | 5 | NO | 0 | NO | 0 |
| BFR-containing parts | 3 | 5 | 1 | 6 | 0.5 |
| Antimony-free | 3 | NO | 0 | NO | 0 |
| Phthalate-free | 3 | NO | 0 | NO | 0 |
| Beryllium-free | 3 | YES | 3 | NO | 0 |
| RoHS exemptions used | 11 | 3 | 8 | 4 | 7 |
| **Energy use** | | | | | |
| Stand-by % better than Energy Star | 8 | 28.2% | 4 | 50.0% | 7 |
| Sleep % better than Energy Star | 8 | 38.3% | 6 | 31.3% | 5 |
| Idle % better than Energy Star | 8 | 37.1% | 6 | 47.1% | 7 |
| Inactivity-to-sleep (minutes) | 1 | 15 | 1 | 30 | 0 |
| Power-saving information | 5 | YES | 3 | YES | 4 |
| **Lifecycle** | | | | | |
| Upgradeable parts | 5 | 1 | 1 | 4 | 4 |
| Warranty in years | 7 | 1 | 1 | 3 | 5 |
| Component availability in years | 7 | 5 | 5 | 5 | 5 |
| WEEE recyclability rate (%) | 3 | 90% | 3 | 91% | 3 |
| Independent assessment for recyclability rate provided | 1 | NO | 0 | NO | 0 |
| Recycled plastic weight % | 3 | 8.8% | 1 | 0 | 0 |
| Plastic part coded at < 25grams | 1 | NO | 0 | NO | 0 |
| Take-back programme and information | 3 | YES | 2 | YES | 1 |
| **Other** | | | | | |
| Energy during production analysis | 1 | YES | 1 | NO | 0 |
| Parts of production chain included in assessment | 3 | 6 | 3 | 0 | 0 |
| Other special features | 3 | YES | 3 | YES | 2 |
| Visibility on web | 3 | 3.5 | 1.25 | 3.5 | 1.25 |
| Total adjusted points | 10 | | 5.57 | | 5.48 |



© Robert Knoth / Greenpeace

| Lenovo X300 | | Dell Latitude E-4200 | | Sony VGN-Z11WN/B | | Panasonic CF-W7 | | Acer TravelMate 6293 | | Combining greenest parts from products submitted |
|---|---|---|---|---|---|---|---|---|---|---|
| Results | Points | Results | Points | Results | Points | Results | Points | Results | Points | |
| | | | | | | | | | | |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| 3 | 1.8 | 3 | 1.8 | 1 | 3 | 1 | 3 | 2 | 2.4 | 3 |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| 4 | 1.5 | 5 | 1 | 3 | 2 | 7 | 0 | 5 | 1 | 2 |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| NO | 0 | NO | 0 | YES | 3 | NO | 0 | NO | 0 | 3 |
| 6 | 5 | 7 | 4 | 5 | 6 | 5 | 6 | 4 | 7 | 8 |
| | | | | | | | | | | |
| 23.5% | 4 | 44.9% | 7 | 10% | 2 | 10% | 2 | 35.3% | 5 | 7 |
| 27.9% | 4 | 20.0% | 3 | 0% | 0 | 20.8% | 3 | 10.0% | 2 | 6 |
| 51.7% | 8 | 12.2% | 2 | 16.4% | 3 | 28.6% | 4 | 12.9% | 2 | 8 |
| 25 | 1 | 15 | 1 | 25 | 1 | 20 | 1 | 30 | 0 | 1 |
| YES | 4 | YES | 3 | YES | 3 | YES | 2 | YES | 2 | 4 |
| | | | | | | | | | | |
| 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 5 |
| 1 | 1 | 3 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 5 |
| 5 | 5 | 5 | 5 | 6 | 6 | 7 | 7 | 3 | 3 | 7 |
| 90% | 3 | 85% | 2 | 90% | 3 | 77% | 1 | 84% | 2 | 3 |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | partly | 0.5 | 0.5 |
| 1% | 1 | 15% | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| YES | 1 | YES | 2 | YES | 2 | YES | 1 | YES | 1 | 2 |
| | | | | | | | | | | |
| NO | 0 | NO | 0 | YES | 1 | YES | 1 | NO | 0 | 1 |
| 0 | 0 | 0 | 0 | 5 | 2.5 | 4 | 2 | 0 | 0 | 3 |
| YES | 2 | YES | 2 | YES | 2 | YES | 2 | YES | 2 | 3 |
| 3 | 1.5 | 3.5 | 1.25 | 5 | 0.5 | 4 | 1 | 3 | 1.5 | 1.5 |
| | 4.68 | | 4.41 | | 4.20 | | 3.80 | | 3.44 | 7.50 |

## Mobile phones

While only one product scored over 5 points in the 2007 survey, this year three out of the five submitted products reach the halfway mark. The winner is the Samsung SGH-F268, a remarkable achievement since last year's survey when the Samsung phone was in the last place. It is also the only product to be free of BFRs, at levels well below the industry standard of 900ppm. The Motorola MOTORAZR V9 scores particularly well in avoiding hazardous chemicals and is the only product to be free of beryllium and its compounds. The Nokia 3310 Evolve obtains the third place; Nokia also submitted the recently released 7200 Supernova, which is the first mobile phone to be free of BFRs (albeit using a 900ppm limit) but unfortunately scores less than the Nokia 3110 Evolve overall despite its strong performance under the hazardous chemicals criteria.

Fourth place goes to the Sony Ericsson, which falls just short of the 5 points mark. Only the LGE KT520 was declared not to be PVC-free and it is this performance in chemicals that is likely to have resulted in its obtaining fifth place, even though there has been an improvement by LG Electronics in its scoring over the previous survey. Overall, there has been a significant improvement with regards to the reduction in RoHS exemptions still being used by the companies, with only Nokia relying on more than two exemptions in its products (six in total).

Innovation points were awarded to Motorola, for its very low threshold for declaring its product to be PVC-free, and to Nokia for using bio-plastic in the cover of its phone. However, Nokia did not provide additional information on what type of bio-plastic it is using or how it is grown and therefore the possible maximum environmental benefit (and innovation points for this survey) in using this bio-plastic could not be assessed.

| Criteria | Maximum points | Samsung SGH-F268 | |
|---|---|---|---|
| | | Results | Points |
| **Chemicals** | | | |
| PVC-free | 5 | YES | 4 |
| PVC-containing parts | 3 | n/a | n/a |
| BFR-free | 5 | YES | 5 |
| BFR-containing parts | 3 | n/a | n/a |
| Antimony-free | 3 | NO | 0 |
| Phthalate-free | 3 | NO | 0 |
| Beryllium-free | 3 | NO | 0 |
| RoHS exemptions used | 11 | 2 | 9 |
| **Energy use** | | | |
| External adapter efficiency % better than Energy Star | 12 | 9.93% | 2 |
| No-load % better than Energy Star | 12 | 66.7% | 12 |
| Shipped with power-saving enabled | 1 | YES | 1 |
| Power-saving information | 5 | YES | 3 |
| **Lifecycle** | | | |
| Upgradeable parts | 1 | 2 | 1 |
| Battery vs. unit costs | 4 | 6% | 4 |
| Warranty in years | 7 | 1 | 1 |
| Components availability in years | 7 | 3 | 3 |
| WEEE recyclability rate (%) | 3 | 85% | 2 |
| Independent assessment for recyclability rate provided | 1 | NO | 0 |
| Recycled plastic weight % | 3 | 0 | 0 |
| Plastic part coded at < 25grams | 1 | YES | 1 |
| Take-back programme and information | 3 | YES | 2 |
| **Other** | | | |
| Energy during production analysis | 1 | YES | 1 |
| Parts of production chain included in assessment | 3 | 5 | 2.5 |
| Other special features | 3 | NO | 0 |
| Visibility on web | 3 | 4 | 1 |
| **Total adjusted points** | 10 | | 5.45 |

© Greenpeace / Kate Davison

| Motorola MOTORAZR V9 | | Nokia 3110 Evolve | | Sony Ericsson C905 | | LG KT520 | | Combining greenest parts from products submitted |
|---|---|---|---|---|---|---|---|---|
| Results | Points | Results | Points | Results | Points | Results | Points | |
| | | | | | | | | |
| YES | 5 | YES | 4 | YES | 4 | NO | 0 | 5 |
| n/a | n/a | n/a | n/a | n/a | n/a | 3 | 1.8 | n/a |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | 5 |
| 2 | 2.5 | 1 | 3 | 1 | 3 | 2 | 2.5 | n/a |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| YES | 3 | NO | 0 | NO | 0 | NO | 0 | 3 |
| YES | 3 | NO | 0 | NO | 0 | NO | 0 | 3 |
| 2 | 9 | 6 | 5 | 2 | 9 | 2 | 9 | 9 |
| | | | | | | | | |
| 2.85% | 1 | 5.27% | 2 | 0% | 0 | 0.59% | 0 | 2 |
| 86.7% | 12 | 90% | 12 | 66.7% | 12 | 66.7% | 12 | 12 |
| YES | 1 | YES | 1 | YES | 1 | YES | 1 | 1 |
| YES | 2.5 | YES | 5 | YES | 3 | YES | 3 | 5 |
| | | | | | | | | |
| 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 |
| 10% | 3 | 29% | 0 | 8% | 3 | 10% | 3 | 4 |
| 1 | 1 | 2 | 3 | 1 | 1 | 1 | 1 | 3 |
| 2 | 2 | 5 | 5 | 3 | 3 | 3 | 3 | 5 |
| 65% | 0 | 65% | 0 | 75% | 1 | 85.1% | 2 | 2 |
| NO | 0 | NO | 0 | NO | 0 | No | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| YES | 1 | YES | 1 | YES | 1 | YES | 1 | 1 |
| YES | 2 | YES | 2 | YES | 1 | YES | 2 | 2 |
| | | | | | | | | |
| NO | 0 | YES | 1 | YES | 1 | YES | 1 | 1 |
| 0 | 0 | 6 | 3 | 6 | 3 | 3 | 1.5 | 3 |
| YES | 2 | YES | 1 | NO | 0 | NO | 0 | 3 |
| 4 | 1 | 4 | 1 | 2.5 | 1.75 | 3.5 | 1.25 | 1.75 |
| | 5.20 | | 5.00 | | 4.88 | | 4.61 | 7.18 |

## Smart phones/PDAs

With its 6210 Navigator, Nokia is the clear winner in the smart phone/PDA category. While it scores less than the winning mobile phone it is the best scoring PDA mainly because it is the most energy efficient and Nokia provides a lot of information to its customers on how to save power.

Second place goes to the Sony Ericsson G900, which did particularly well in the chemicals category. The Hewlett Packard iPAQ910 is third, while the Blackberry Pearl 8310 is the only phone whose power supply does not meet the new Energy Star requirements.

No special points were awarded in this product category. It should be pointed out that, for phones and PDAs, no real independent assessments of the claimed recyclability rates were provided. The recyclability rates provided fluctuate widely and it is likely that some are overly optimistic.

When combining the best scores for each set of criteria it becomes obvious that, while the currently-achievable score is lower than for mobile phones, companies should be able to already produce PDAs that score significantly higher than at present.

| Criteria | Maximum points |
|---|---|
| **Chemicals** | |
| PVC-free | 5 |
| PVC-containing parts | 3 |
| BFR-free | 5 |
| BFR-containing parts | 3 |
| Antimony-free | 3 |
| Phthalate-free | 3 |
| Beryllium-free | 3 |
| RoHS exemptions used | 11 |
| **Energy use** | |
| External adapter efficiency % better than Energy Star | 12 |
| No-load % better than Energy Star | 12 |
| Shipped with power-saving enabled | 1 |
| Power-saving information | 5 |
| **Lifecycle** | |
| Upgradeable parts | 1 |
| Battery vs. unit costs | 4 |
| Warranty in years | 7 |
| Components availability in years | 7 |
| WEEE recyclability rate (%) | 3 |
| Independent assessment for recyclability rate provided | 1 |
| Recycled plastic weight % | 3 |
| Plastic part coded at < 25grams | 1 |
| Take-back programme and information | 3 |
| **Other** | |
| Energy during production analysis | 1 |
| Parts of production chain included in assessment | 3 |
| Other special features | 3 |
| Visibility on web | 3 |
| **Total adjusted points** | **10** |

© Robert Knoth / Greenpeace

| Nokia 6210 Navigator | | Sony Ericsson G900 | | HP iPAQ 910 | | RIM Blackberry Pearl 8130 | | Combining greenest parts from products submitted |
|---|---|---|---|---|---|---|---|---|
| Results | Points | Results | Points | Results | Points | Results | Points | |
| | | | | | | | | |
| YES | 4 | YES | 4 | NO | 0 | NO | 0 | 4 |
| n/a | n/a | n/a | n/a | 4 | 1.2 | 1 | 3 | n/a |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| 1 | 3 | 2 | 2.5 | 4 | 1.5 | 1 | 3 | 3 |
| NO | 0 | NO | 0 | NO | 0 | YES | 3 | 3 |
| YES | 3 | NO | 0 | NO | 0 | NO | 0 | 3 |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| 6 | 5 | 2 | 9 | 2 | 9 | 6 | 5 | 9 |
| | | | | | | | | |
| 5.27% | 2 | 0% | 0 | 3.56% | 1 | -2.5% | 0 | 2 |
| 90% | 12 | 66.7% | 12 | 56.7% | 12 | 40% | 8 | 12 |
| YES | 1 | YES | 1 | YES | 1 | YES | 1 | 1 |
| YES | 5 | YES | 3 | YES | 1 | YES | 1.5 | 5 |
| | | | | | | | | |
| 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 |
| 13% | 2 | 9% | 3 | 10% | 3 | 10% | 3 | 3 |
| 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| 5 | 5 | 3 | 3 | 5 | 5 | 3 | 3 | 5 |
| 80% | 2 | 75% | 1 | 91.9% | 3 | 65% | 0 | 3 |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| YES | 1 | YES | 1 | NO | 0 | YES | 1 | 1 |
| YES | 2 | YES | 1 | YES | 1 | NO | 0 | 2 |
| | | | | | | | | |
| NO | 0 | YES | 1 | NO | 0 | NO | 0 | 1 |
| 0 | 0 | 6 | 3 | 0 | 0 | 0 | 0 | 3 |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| 4 | 1 | 3 | 1.5 | 3.5 | 1.25 | 3 | 1.5 | 1.5 |
| | 5.20 | | 4.80 | | 4.20 | | 3.50 | 6.55 |

## Televisions

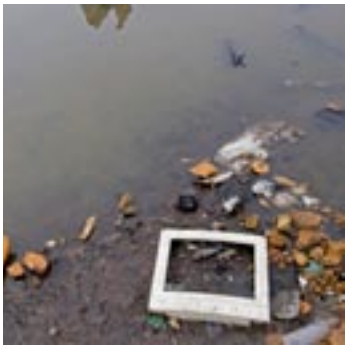
This is the first time that televisions, both plasma and LCD screens, are included in this survey, and all major manufacturers with the exception of Samsung decided to submit products. LG Electronics pulled the submission of its soon-to-be-released LCD model when the product release timeline was delayed past the publication and release timeline of this survey.

The Sharp LC-52GX5 is the highest scoring product due to its superior performance under the hazardous chemicals criteria. It is the only product that avoids all uses of beryllium and its compounds and only uses BFRs and PVC in one major product component (printed wiring board laminates and antenna cable, respectively). It also receives an innovation half point for plant-based paint. The Sony KDL-32JE1 earns second place, gaining innovation points for using recycled plastic in 50% of plastic parts by weight. The Sharp and the Sony TVs only are available on the Japanese market. Even though it does not break the 5-points barrier, the Panasonic TH-42PZ800U plasma is not far behind and gains innovation points for having a mercury and lead-free display.

While it is realistic that large products such as televisions have a higher recyclability rate than smaller mobile phones, the recyclability rates claimed by companies seem to be higher than what is achievable. Sharp has a very high recycling rate and claims to have worked with an independent organisation to verify this rate. This is a step in the right direction but the recyclability rate reported still seems to be higher than what might actually be achievable.

Because televisions are usually not consumer upgradeable, only 25 points were available in the lifecycle set of criteria instead of the 30 available in other product categories. Therefore, the calculation of points was adjusted to a total of 30, in order to keep with the 10-point scale ranking.

| Criteria | Maximum points |
|---|---|
| **Chemicals** | |
| PVC-free | 5 |
| PVC-containing parts | 3 |
| BFR-free | 5 |
| BFR-containing parts | 3 |
| Antimony-free | 3 |
| Phthalate-free | 3 |
| Beryllium-free | 3 |
| RoHS exemptions used | 11 |
| **Energy use** | |
| On-mode % better than Energy Star | 12 |
| Stand-by % better than Energy Star | 12 |
| Hard-off switch | 1 |
| Power-saving information | 5 |
| **Lifecycle*** | |
| Warranty in years | 7 |
| Components availability in years | 7 |
| WEEE recyclability rate (%) | 3 |
| Independent assessment for recyclability rate provided | 1 |
| Recycled plastic weight % | 3 |
| Plastic part coded at < 25grams | 1 |
| Take-back programme and information | 3 |
| **Other** | |
| Energy during production analysis | 1 |
| Parts of production chain included in assessment | 3 |
| Other special features | 3 |
| Visibility on web | 3 |
| **Total adjusted points** | **10** |



© Greenpeace / Kate Davison

| Sharp LC-52GX5 | | SONY KDL-32JE1 | | Panasonic TH-42PZ800U Plasma | | Combining greenest parts from products submitted |
|---|---|---|---|---|---|---|
| Results | Points | Results | Points | Results | Points | |
| | | | | | | |
| NO | 0 | NO | 0 | NO | 0 | 0 |
| 1 | 3 | 1 | 3 | 2 | 2.4 | 3 |
| NO | 0 | NO | 0 | NO | 0 | 0 |
| 1 | 3 | 2 | 2.5 | 4 | 1.5 | 3 |
| NO | 0 | NO | 0 | NO | 0 | 0 |
| NO | 0 | NO | 0 | NO | 0 | 0 |
| YES | 3 | NO | 0 | NO | 0 | 3 |
| 4 | 7 | 6 | 5 | 2 | 9 | 9 |
| | | | | | | |
| 37.3% | 8 | 23.8% | 5 | 10.4% | 2 | 8 |
| 90.0% | 12 | 85.0% | 12 | 80.0% | 12 | 12 |
| NO | 0 | NO | 0 | YES | 1 | 1 |
| YES | 2 | YES | 3 | YES | 2 | 3 |
| | | | | | | |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 8 | 7 | 8 | 7 | 8 | 7 | 7 |
| 99% | 3 | 90% | 3 | 96% | 3 | 3 |
| Partly | 0.5 | NO | 0 | NO | 0 | 0.5 |
| 3.7% | 1 | 50% | 3 | <1% | 0 | 3 |
| NO | 0 | YES | 1 | NO | 0 | 1 |
| YES | 1 | YES | 2 | YES | 1 | 2 |
| | | | | | | |
| YES | 1 | YES | 1 | Yes | 1 | 1 |
| 6 | 3 | 5 | 2.5 | 4 | 2 | 3 |
| YES | 0.5 | YES | 2 | YES | 1.5 | 3 |
| 5 | 0.5 | 2 | 2 | 4.5 | 0.75 | 2 |
| | 5.92 | | 5.84 | | 4.96 | 7.20 |

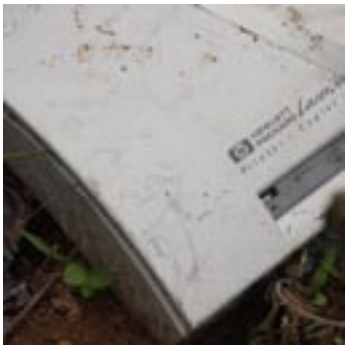
## Computer monitors

The highest-scoring product across all product categories is a monitor. The Lenovo L2440x wide is the first computer monitor to be free of PVC and BFRs, albeit using a limit of 900ppm chlorine and bromine. It is also free of beryllium, phthalates and antimony. Its weakest link in a very strong chemicals score is the five RoHS exemptions it still uses. It almost reaches the 7-points mark and is far ahead if its competitors.

The Fujitsu Siemens SCENICVIEW P22W-5 Eco is the runner-up and scores special points for zero watt power use in sleep and off modes. It is also the only model equipped with a hard-off switch.

The Samsung 2443BW reaches third place and together with the LG Electronics W2252TE exceeds the Energy Star minimum qualification criteria by 50% in most power modes. Three models, the winning Lenovo, the HP L1950 in fifth place and the Dell E2009W in sixth, get innovation points for using significant (at least 20%) post-consumer plastic sources. The Lenovo also uses LED backlights.

| Criteria | Maximum points | Lenovo L2440x wide | |
|---|---|---|---|
| | | Results | Points |
| Chemicals | | | |
| PVC-free | 5 | YES | 4 |
| PVC-containing parts | 3 | n/a | n/a |
| BFR-free | 5 | YES | 4 |
| BFR-containing parts | 3 | n/a | n/a |
| Antimon-free | 3 | YES | 3 |
| Phthalate-free | 3 | YES | 3 |
| Beryllium-free | 3 | YES | 3 |
| RoHS exemptions used | 11 | 5 | 6 |
| Energy use | | | |
| On-mode % better than Energy star | 8 | 25.6% | 4 |
| Sleep-mode % better than Energy Star | 8 | 54.5% | 8 |
| Off-mode % better than Energy Star | 8 | 60% | 8 |
| Hard-off switch | 1 | NO | 0 |
| Power-saving information | 5 | YES | 2 |
| Lifecycle | | | |
| Pixel defect warranty (months) | n/a | 36 | n/a |
| Pixel defects replacement policy (bright, dark, sub) | 5 | 3,6,6 | 3 |
| Warranty in years | 7 | 3 | 5 |
| Components availabillity in years | 7 | 5 | 5 |
| WEEE recyclability rate (%) | 3 | 90% | 3 |
| Independent assessment for recyclability rate provided | 1 | NO | 0 |
| Recycled plastic weight % | 3 | 28 | 3 |
| Plastic part coded at < 25grams | 1 | NO | 0 |
| Take-back programme and information | 3 | YES | 1 |
| Other | | | |
| Energy in production tracked? | 1 | NO | 0 |
| Parts of production chain included? | 3 | 0 | 0 |
| Other special features | 3 | YES | 3 |
| Visibility on web | 3 | 4 | 1 |
| Total adjusted points | 10 | | 6.90 |



© Greenpeace / Kate Davison

| Fujitsu Siemens SCENICVIEW P22W-5 ECO | | Samsung 2443BW | | LG W2252TE | | HP L1950g | | Dell E2009W | | Acer V194HQ | | Combining greenest parts from products submitted |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Results | Points | Results | Points | Results | Points | Results | Points | Results | Points | Results | Points | |
| | | | | | | | | | | | | |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | 4 |
| 3 | 1.8 | 2 | 2.4 | 2 | 2.4 | 3 | 1.8 | 3 | 1.8 | 2 | 2.4 | n/a |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | 4 |
| 3 | 2 | 2 | 2.5 | 3 | 2 | 1 | 3 | 2 | 2.5 | 2 | 2.5 | n/a |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | 3 |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | 3 |
| YES | 3 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | YES | 3 | 3 |
| 2 | 9 | 2 | 9 | 4 | 7 | 8 | 3 | 6 | 5 | 6 | 5 | 9 |
| | | | | | | | | | | | | |
| 33.2% | 5 | 46.1% | 7 | 55.5% | 8 | 43.8% | 7 | 28.0% | 4 | 27.8% | 4 | 8 |
| no energy use | 8 | 70% | 8 | 85.0% | 8 | 68% | 8 | 67.5% | 8 | 66.5% | 8 | 8 |
| no energy use | 8 | 70% | 8 | 70.0% | 8 | 42% | 6 | 53% | 8 | 44.0% | 7 | 8 |
| YES | 1 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | 1 |
| YES | 2.5 | YES | 2 | YES | 3 | YES | 3.5 | YES | 2 | YES | 1 | 3.5 |
| | | | | | | | | | | | | |
| 36 | n/a | 6 | n/a | 12 | n/a | 36 | n/a | 36 | n/a | 12 | n/a | n/a |
| 1,2,5 | 5 | 0,3.0 | 3 | 1,5,9 | 1 | 1,1,3 | 5 | 6,6,n/a | 0 | 6, n/a, n/a | 0 | 5 |
| 3 | 5 | 1 | 1 | 2 | 3 | 3 | 5 | 3 | 5 | 1 | 1 | 5 |
| 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 3 | 5 |
| 95% | 3 | 81% | 2 | 91% | 3 | 95% | 3 | 85% | 2 | 99% | 3 | 3 |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | partly | 0.5 | 0.5 |
| 0 | 0 | 20 | 3 | 8.5 | 1 | 25 | 3 | 28 | 3 | 0 | 0 | 3 |
| NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | NO | 0 | 0 |
| YES | 1.5 | YES | 2 | YES | 2 | YES | 1 | YES | 2 | YES | 1 | 2 |
| | | | | | | | | | | | | |
| NO | 0 | YES | 1 | YES | 1 | NO | 0 | NO | 0 | NO | 0 | 1 |
| 0 | 0 | 5 | 2.5 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2.5 |
| YES | 2 | YES | 0 | NO | 0 | YES | 2 | YES | 2 | NO | 0 | 3 |
| 3 | 1.5 | 5 | 0.5 | 4 | 1 | 5 | 0.5 | 4 | 1 | 3 | 1.5 | 1.5 |
| | 6.33 | | 5.89 | | 5.74 | | 5.48 | | 5.13 | | 4.29 | 8.60 |

GREENPEACE

Greenpeace is an independent global campaigning organisation that acts to change attitudes and behaviour, to protect and conserve the environment and to promote peace.

Greenpeace International
Ottho Heldringstraat 5
1066 AZ Amsterdam
The Netherlands
Tel: +31 20 7182000
Fax: +31 20 7182002

**greenpeace.org**